



Small Boat Safety and Survival: Volume 4

Surviving Outdoor Adventures

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This publication is a product of the Alaska Marine Safety Education Association (AMSEA) whose mission is to reduce injury and the loss of life due to drowning and hypothermia through education and training.

AMSEA is supported by the following organizations: Alaska Vocational Technical Center (AVTEC); University of Alaska Marine Advisory Program; North Pacific Fishermen's Association; North Pacific Fisheries Observer Training Center; Alaska Native Tribal Health Consortium; Southeast Alaska Regional Health Consortium, Environmental Health; Alaska Department of Fish and Game; Petersburg Vessel Owners Association; Alaska Department of Health and Human Services, Community Health and Emergency Medical Services Section; National Institute of Occupational Safety and Health, Division of Safety Research; U.S. Coast Guard 17th District, Maritime Office of Compliance (MOC).

This publication was made possible by funding from the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Rural Health Outreach; the Alaska Department of Community and Regional Affairs; the Alaska Department of Health and Social Services, Division of Public Health; the Reuben E. Crossett Endowed Alaskan Fund; and the Sitka, Alaska School District Migrant Education Program.

More lesson plans and additional teaching resources can be found on AMSEA's Web site: www.amsea.org

Elmer E. Rasmuson Library Cataloging in Publication Data:

Allen, Marian.

Small boat safety and survival / Marian Allen . . . [et al.]. – Fairbanks, Alaska : University of Alaska Sea Grant College Program, 2002.

262 p. : ill. ; cm. – (Surviving outdoor adventures ; v.4)

Note: Curriculum and activities for grades 3-12.

Includes bibliographical references.

1. Boating for children—Study and teaching—Alaska. 2. Boats and boating—Study and teaching—Alaska.
3. Survival skills—Study and teaching—Alaska. 4. Navigation—Study and teaching—Alaska. I. Title.
- II. Allen, Marian. III. Series: Surviving outdoor adventures ; v.4.

GV777.6.A44 2002

ISBN 1-56612-076-4

Credits

This book is published by the University of Alaska Sea Grant College Program, which is cooperatively supported by the U.S. Department of Commerce, NOAA National Sea Grant Office, Grant no. NA86RG-0050, project A/161-01; and by the University of Alaska Fairbanks with state funds. The University of Alaska is an affirmative action/equal opportunity institution. Cover design by Dixon Jones, copyedit by Sue Keller, layout and design by Sue Mitchell, Inkworks, Fairbanks, Alaska.

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Welcome to Surviving Outdoor Adventures!

Surviving Outdoor Adventures is a K-12 curriculum designed to be used in its entirety or in parts to help you prepare children and young adults to play and work safely in the outdoors and around cold water. This curriculum consists of four volumes:

1. *Survivor!* (for kindergarten-2nd grades)
2. *Cold Water Safety and Survival* (for 3rd-12th grades)
3. *Small Boat Safety and Survival* (for 3rd-12th grades)
4. *Land Safety and Survival* (for 3rd-12th grades)

Each volume can be used alone and contains:

- Instructional units—each with a brief introduction and goal statement, background information, an activities guide, a variety of student activities, and content standards
- Overhead masters (except in *Survivor!*)
- Resources

Each instructional unit has an introduction page that summarizes the rationale and goal of the unit. Used with the activities guide, it provides a tool for you to choose the topics and activities that are most relevant to your students and their outdoor safety and survival. Activities are approached in a variety of ways and incorporate the following Content Standards subjects: Language Arts, Mathematics, Science, Geography, Government and Citizenship, History, Skills for a Healthy Life, Arts, World Languages, Technology, Library/Information Literacy, and Cultural Standards (*Alaska Content Standards*, 2000 edition).



Acknowledgments

The curriculum content of this series was adapted from the Alaska Marine Safety Education Association's *Marine Safety Instructor Training Manual*, 8th edition, 2001 and *Outdoor Adventures*, 2000 edition. Additional editing and/or activities were contributed by: Dolly Garza, University of Alaska Marine Advisory Program, Ketchikan, Alaska; Carol Scott, Fairbanks North Star Borough School District, Fairbanks, Alaska; Annette Blankenship, Susan Brown, Jetta Budd, Pauline Duncan, Margie Esquiro, Sherry Foster, Shay LeBeau, Kay McCarthy, Mike Morris, Mary Stevens, Sitka School District, Sitka, Alaska; Jenny Baird, Janice Huls, Susan Jensen, Kathy O'Gara, Kristie Sherrodd, Sitka, Alaska; Peter Kokes, Gustavus School, Gustavus, Alaska; Jane Eisemann, Louis Martinez, Kodiak Borough School District, Kodiak, Alaska; Al Hill, Hoonah School District, Hoonah, Alaska; Matt Anderson, Henry Hopkins, Dennis Early, Juneau, Alaska; Sue Hargis, Sue Jorgensen, U.S. Coast Guard 17th District, Maritime Office of Compliance (MOC), Juneau, Alaska; Anna Borland-Ivy, Brenda Dolma, Homer School District, Homer, Alaska; Bernie Gurule, Lake and Peninsula School

District, King Salmon, Alaska; Dr. Martin Nemiroff, Sonoma, California; Richard Hiscock, ERE Associates, North Chatham, Massachusetts; Russ Page, National Weather Service, Anchorage Forecast Office, Anchorage, Alaska; George Ackerman, Metlakatla School, Metlakatla, Alaska; Shawn-Marie Carpenter, Ketchikan School District, Ketchikan, Alaska; Terry Sherwood, Anchorage School District, Anchorage, Alaska; Shannon Vandervest, Petersburg School District, Petersburg, Alaska; Leslie Lyman, Juneau School District, Juneau, Alaska; Elizabeth "Tizzy" Bennett, Children's Hospital and Regional Medical Center, Seattle, Washington.

Illustrations were provided by: Nancy Behnken, Kristie Sherrodd, Vern Culp, Steve Lawrie, K. Lundquist, and Julie Schmitts. Tide and correction tables were provided by Alaska Tidal Book Company, Kenai, Alaska. Newspaper articles were reprinted with permission from the *Cape Cod Times*, Hyannis, Massachusetts and the *Daily Sitka Sentinel*, Sitka, Alaska. The Refusal Skill™ is used with permission from the Comprehensive Health Education Foundation, Seattle, Washington.

Volume 4: Small Boat Safety and Survival

Survival and boating safety experts classify almost all U.S. waters as cold water. This places boaters at special risk, operating in a hostile environment. In the U.S. there are roughly 800 recreational boating fatalities a year, and many thousands of non-fatal casualties. Approximately one-half of all boating fatalities are alcohol or drug related. Every year, capsizing and falling overboard emergencies are the leading cause of boating fatalities. Survivability and prevention of these emergencies must be addressed.

Boating is a way of life in Alaska. Alaska has more coastline than the rest of the continental U.S. and many more miles of rivers than roads. Alaskans use boats for transportation, work, subsistence, and recreation activities such as hiking, berry picking, fishing, hunting, visiting friends and relatives, and exploring nature. All of these are safer and more enjoyable when everyone participating is well-prepared and has learned basic boating skills. Unfortunately, for many years Alaska has had a boating fatality rate that is ten times the national average.

How to Use Volume 4: Small Boat Safety and Survival

The goal of this volume is to provide the foundation for life-long safe boating habits. The skills and attitudes children learn when young stay with them throughout their lives and may be transferred to their children. Using the information and activities in this volume, you can help children prepare for boating activities, learn to recognize and avoid hazards, and increase their chances of surviving a boating emergency.

Small Boat Safety and Survival contains three units presenting the latest information on:

1. Preparing for a Boat Trip
2. Small Boat Skills
3. Boating Emergencies

Whether you are teaching one lesson, a semester, or a year-long program, this volume provides information and activities needed to cover small boat safety and survival. The information and activities are sequential, with each unit assuming knowledge of the material in the preceding unit(s). This volume does not intend, however, to cover all the knowledge and skills a mariner should have before operating a boat.

Getting around Volume 4: Small Boat Safety and Survival

Each of the three units in this volume contains:

- Overview: the unit rationale and goals.
- Teacher Information: in-depth background information presented in outline form to provide teachers with the latest information on small boat safety and survival. Icons appear in the margin to indicate where overhead masters may be used to reinforce content and concepts. Teachers are advised to use their judgment when presenting this material; some concepts and activities, such as flares, may not be suitable for younger children.
- Activities Guide: a teacher's planning guide with a list of activities that coincide with major topics in the Teacher Information, and a brief summary of each activity, its objectives, Alaska Content Standards, and page numbers.
- Activities: stand-alone lessons that include an overview, objectives, materials list, procedures, Alaska Content Standards, plus student handouts, answer keys, and templates.

The information in *Small Boat Safety and Survival* works best when used in conjunction with *Cold Water Safety and Survival*, Volume 2, which covers hypothermia, PFDs, and cold water survival skills in depth. These are vital subjects to include when teaching small boat safety and survival.



Permission Forms and Waivers

Any hands-on activity carries risk of injury to participants. AMSEA is not responsible for injuries resulting from the activities in this publication. Teachers are strongly encouraged to follow the safety guidelines in the activities and provide proper supervision and organization. This is especially critical for in-water activities. Instructors are encouraged to co-teach and report to AMSEA safety problems or concerns that arise.

It is strongly suggested that instructors get signed permission forms for each student participating in hands-on activities. It is especially important that students' parents/guardians note any health problems or physical considerations that may limit students' participation. A sample form follows.

A sample liability form (waiver) is also included in case you are not instructing under the liability protection of a school or other organization. Check with the organization you are working under regarding your liability. It is up to the instructor to ensure that they have proper liability protection.

Surviving Outdoor Adventures Permission Slip

I give my permission for _____ to participate in the water or land safety and survival training exercise field trip as part of

Mr./Ms. _____ class. Staff and students will be traveling to _____ on date(s) and time(s) _____.

_____ We will be taking the bus to and from the school.

_____ We will be walking to and from the school

Please list any special needs or concerns your child may have _____

Parent/Guardian Signature _____ Date _____

Printed name _____

..... 

Surviving Outdoor Adventures Permission Slip

I give my permission for _____ to participate in the water or land safety and survival training exercise field trip as part of

Mr./Ms. _____ class. Staff and students will be traveling to _____ on date(s) and time(s) _____.

_____ We will be taking the bus to and from the school.

_____ We will be walking to and from the school

Please list any special needs or concerns your child may have _____

Parent/Guardian Signature _____ Date _____

Printed name _____



Sample Waiver Form

Waivers are a controversial topic. Some legal experts believe they limit liability by making students aware of hazards, while others believe they increase liability. Instructors should make their own choice, consulting a lawyer if necessary to make a decision. If you use a waiver in your class, get it signed *before* the class begins. Parents should never be pressed to sign a waiver. A sample follows.

Small Boat Safety and Survival Program Assumption of Risk and Waiver & Release

I, _____ (print name) recognize the activity in which my child desires to participate involves a risk of injury. I am aware and accept the risks involved, which may include but are not limited to: striking objects when entering water, cardiac arrest, ventricular fibrillation, inadvertent gasping and inhalation of water, sudden drowning syndrome, or drowning from other causes, hypothermia, falls from walking on slippery beaches or woods, and other injuries which may occur due to the use of safety and survival equipment such as distress flares, liferafts, personal flotation devices, dewatering pumps, fire extinguishers, etc.

I hereby execute this release as a condition of and in partial consideration for allowing my child to participate in all or a portion of the cold water training program conducted by _____ . I am familiar with the activities and events that will be included in this training and I have read a copy of the schedule of activities in which my child is to participate. I have read and voluntarily signed this release, waiver of liability and indemnity agreement, intending legally to be bound, and I further agree that no oral representations, statements, or inducements apart from those contained in this release have been made to me.

I hereby release, discharge, and covenant not to sue _____, its agents, employees, representatives, officers, directors, members, and all other persons acting for _____ and all instructors, participants and advertisers (hereinafter called "Releasees") from all liability. This includes me, my child, my personal representatives, heirs, assigns, and next of kin, for any and all loss or damage and any claim or demands thereof on account of injury to my child, his/her or property or his/her death, whether caused by the negligence of the Releasees or otherwise, as the result of my child having participated in any portion of the program.

I hereby agree to indemnify and save and hold harmless the Releasees and each of them from any loss, liability, damage, or cost they might incur due to my child's participation in the survival program in any manner and assume responsibility for, and the risk of, bodily injury, death, or property damage due to the negligence of Releasees or otherwise, resulting from my child's participation in the program. I acknowledge that my child's health and physical condition will allow him/her to perform the activities in this training.

IN WITNESS THEREOF, I have executed this release on _____ (date)

Releasor signature _____

Printed name _____

Please list any health problems or injuries that may limit your child's participation on the back of this page and return to instructor.



Unit 1: Preparing for a Boat Trip

Unit Rationale

Thorough preparation is essential to enjoying any outdoor experience; it enhances safety and should begin the moment the decision is made to go. Being well-prepared also increases self-confidence when circumstances force an unplanned extension of time on the water.

Many children and adults lose their lives when involved in outdoor activities. By learning basic information about weather, hypothermia, dressing appropriately, being prepared for the unexpected, and understanding the danger of mixing alcohol with boating, many of these fatalities can be prevented.

Unit Goal

To introduce the knowledge and skills needed to prepare for a safe boating trip.

Preparing for a Boat Trip: Teacher Information

The information in this section gives teachers a background in the topic. Use your judgment when presenting this material; some concepts may not be suitable for younger children.

Weather

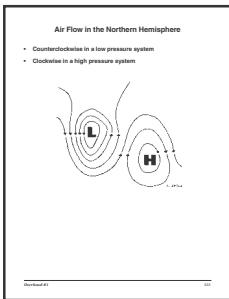
Introduction

- A. Weather can make your boating experience a pleasure or a disaster
- B. Learn your limits for operating in unfavorable weather
 - 1. If tempted to operate in marginal conditions, remember, “When in doubt, chicken out!”
 - 2. Avoid “get-home-itis”—it can be fatal!
 - 3. It’s better to be late than never arrive at all
- C. Movement of large air masses around the earth create weather
 - 1. Weather fronts
 - a. Are located where two air masses meet
 - b. Are often marked by different cloud formations and wind shifts
 - c. Indicate a change in weather
 - 2. Local weather
 - a. Local weather is influenced by local geographic variations
 - b. Local weather is highly variable; changes can be sudden
 - c. Local knowledge is best to understand dangers
 - 3. Seasonal weather conditions
 - a. Weather changes tend to occur more suddenly at or between fall and spring equinoxes
 - b. Higher incidence of strong winds autumn through winter in Alaska
 - c. Other regions of U.S. have different seasonal weather; e.g., in southern U.S. summer brings higher incidence of hurricanes
 - 4. Sudden changes in weather can occur during any part of the year

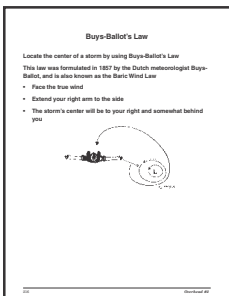
Evaluating the weather

- A. Weather can change very quickly—evaluate **before** and **during** your boat trip
- B. Use more than one source to evaluate weather
 - 1. Access most recent weather reports and forecasts for departure point, route, and destination
 - a. Scheduled forecasts on AM and FM radio stations
 - b. VHF radio—on demand
 - c. SSB radio—available on larger boats
 - d. TV weather stations
 - e. Internet—links for Alaska weather on AMSEA’s Web site: www.amsea.org
 - f. Telephone—available in some locations, number varies, 907-790-6850 in Alaska

2. Check local conditions
 - a. Check and interpret local weather conditions and patterns, and relate to conditions on the water
 - b. Learn local patterns—look for fog, clouds, squalls, etc. (e.g., in most parts of coastal Alaska, the western sky should be observed for oncoming weather)
 - (1) Clouds
 - (a) High, fast moving clouds indicate surface winds will increase
 - (b) Darker clouds are heavily laden with water and indicate wet, windy weather
 - (2) Sudden drop in temperature and/or a rapid change in wind speed or direction usually indicate a front coming through
 - (3) Winds from low pressure systems usually
 - (a) Start building from the east
 - (b) Build to maximum from the southeast
 - (c) Begin to weaken from the southwest
 - (d) Indicate system has passed when coming from a westerly direction
 - c. Check the barometer to measure current air pressure
 - (1) Low pressure system in Northern Hemisphere—counterclockwise air flow—brings wet, windy, foul weather (the North Pacific has a semi-permanent low in winter) (See Overhead #1)
 - (2) High pressure system in Northern Hemisphere—clockwise air flow—brings clear, dry, and sometimes windy weather
 - (3) The greater the difference between nearby pressure systems, the greater the wind
 - (4) Rapidity of barometer’s rise and fall
 - (a) Is more important than barometer reading at any given time
 - (b) Indicates strength of weather system
 - (5) Generally, a rising barometer brings improving weather
3. Use local knowledge—Elders and experienced local boaters are a good source of local weather information



Overhead #1



Overhead #2

Buys-Ballot's Law—used to find center of storm system in Northern Hemisphere (See Overhead #2)

- A. Place your face into the true wind—not the apparent wind caused by the combination of true wind and wind caused by boat's own forward motion
 - B. Extend your right arm out to the side
 - C. The center of the low pressure will be to your right and somewhat behind you
- Types of maritime weather warnings for sustained winds for at least 2 hours. One knot (nautical mile per hour) equals 1.15 m.p.h.
 1. Small craft advisory = winds 18-33 knots and/or sea conditions dangerous to small craft (in Alaska anything over 20 knots)
 2. Gale warning = winds 34-47 knots

3. Storm warning = winds 48-64 knots
4. Typhoon or hurricane force = winds 65 knots or greater

Wind effect on wave height variables

- A. Proximity
 1. Swells (long undulations of the water's surface) result from wind some distance away on larger bodies of water; this causes well-formed, widely spaced swells
 2. Chop (smaller, more closely spaced waves) result from local wind
- B. Fetch (distance over which wind blows) wave height increases with distance wind has traveled
- C. Time—wave height increases with length of time wind has been blowing
- D. Depth of the water—wave height can increase with decrease in water depth
- E. Narrowness of channel—wave height can increase as channel width decreases
- F. Current—if wind blows **against** current, wave height increases as wind and current speed increases

Fog—increases risk of collision and getting lost

- A. Radiation fog
 1. Radiation fog develops at night or in early morning when there is no wind
 2. If not cleared by warming sun in late morning, may stay all day
- B. Advection fog—caused by warm moist air moving over colder surfaces
 1. Can develop night or day
 2. Needs wind to clear up

Tides

- **Vertical** change in water depth caused by gravitational pull of moon and sun
- A. Affect water conditions and where you can safely travel, beach, or anchor
 - B. Are affected by barometric pressure
 1. Low pressure systems cause water levels to rise higher than expected
 2. High pressure systems cause water levels to be lower than expected

Tidal range = vertical distance between high and low tides

- A. Varies greatly by location
 1. Bay of Fundy in eastern Canada has highest tidal range in North America (about 53 feet)
 2. Cook Inlet has highest tidal range in Alaska (up to 38.9 feet), second highest in North America
 3. Can be as low as 1 to 2 feet in other parts of U.S.
- B. Big tidal ranges can result in dangerous currents, especially in restricted channels

- C. Gradually sloped beaches with large tidal range result in extensive horizontal tidal areas

Tide cycles

- A. Can be predicted by using tide tables
- B. Vary depending on location and oceanographic conditions
 - 1. Some places like Gulf of Mexico have one high and one low tide per day (diurnal or daily tides)
 - 2. Others have two high tides and two low tides per day
 - a. Semi-diurnal = twice daily tide cycle where both high tides are the same level, and both low tides are the same level (common in Atlantic Ocean)
 - b. Mixed semi-diurnal = twice daily tide cycle where both high tides are different levels, and both low tides are different levels (common in Pacific Ocean waters)
 - c. Occasionally there will only be three tide changes in a 24-hour period
- C. Definitions
 - 1. Higher high tide or higher high water = the highest of the day's two high tides
 - 2. Lower low tide or lower low water = the lowest of the day's two low tides
 - 3. Mean lower low water = average of lower low tides, depth shown on charts in areas with mixed semi-diurnal tides
 - 4. Spring tides
 - a. Are twice-monthly tides with greatest tidal variation—get highest highs and lowest lows of month
 - b. Caused by combined gravitational pull of sun and moon in alignment with earth at new and full moon
 - 5. Neap tides
 - a. Are twice-monthly tides with least tidal variation
 - b. Caused by partially offset gravitational forces of sun and moon at quarter and three-quarter moon
 - 6. Tides are often higher than predicted due to storm conditions

Tide books contain

- A. Tide tables
 - 1. Tide tables predict times and heights of high and low tides by date and location
 - 2. Tide tables are predictions, **not** guarantees
- B. Correction tables
 - 1. Since tides are long-lasting waves, high and low tides do not reach all places at exact same times—correction tables correct for this
 - 2. Be sure to use these for your area, they extend predictions to specific locations within a region
- C. Other valuable information

Currents

- Are caused by ocean circulation, tides, rivers, and wind
 - Can cause rapid water condition changes and dangers
 - Affect boat's speed, how long it takes to get to destination, and heading (direction) that must be maintained
- A. When traveling against current
 1. You will travel more slowly (speed over ground is slower)
 2. E.g., if boat speed is 5 knots and current against your direction is 3 knots, you will make 2 knots over ground
 - B. When traveling with current
 1. You will travel more rapidly (speed over ground is faster)
 2. E.g., if boat speed is 5 knots and current in your direction is 3 knots, you will make 8 knots over ground
 3. You may have difficulty controlling your boat
 - C. When current is at an angle to boat's course, it affects the following in direct proportion to the angle
 1. Speed over ground
 2. Course over ground—current may cause boat to change direction
 - D. Strong winds running against strong currents, especially in narrow passages, can cause steep and standing waves
 - E. Currents meeting each other can cause rips, whirlpools, and standing waves

Tidal currents

- A. Tidal currents are **horizontal** motion of water from one point to another resulting from difference in tidal height between those points
- B. Greatest velocities of tidal currents are during middle third of each rising or falling tide
- C. Velocities may reach up to 8 knots in some locations
- D. Tidal current tables predict current strength, direction, and time by date and specific location

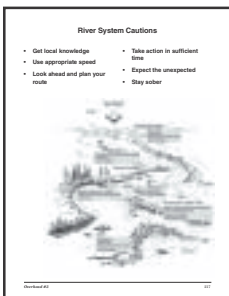
River System Cautions (See Overhead #3)

Channels

- A. Channels shift position over time and after heavy water flows
- B. Generally, deepest water is one-quarter of river's width from outside bank
- C. When in doubt, follow the cut bank
- D. Surface water patterns give indications of depth and current, but interpreting these patterns takes experience

Hazards

- A. Current
 1. Strongest over deepest part of channel
 2. Stronger during and immediately following rain; water levels may also rise dramatically during this period



Overhead #3

3. Hazards for boaters
 - a. Affect boat speed and direction, can overpower boat
 - b. Upstream travel takes more fuel and time
 - c. Strong wind against current and incoming tides can create turbulence
 - d. Going upstream with power is easier than going downstream in terms of steering and maneuverability
- B. Shoals/sand bars
 1. Can form
 - a. On inside curve of a bend
 - b. Where two rivers join
 - c. Near river mouths
 - d. Where water flow changes from rapid to slow
 2. Hazards for boaters—grounding, capsizing, being thrown from boat, and damage to lower engine, prop, and hull
- C. Rapids
 1. Part of river where current runs swiftly
 2. Classed according to severity
 - a. Class I = few riffles and waves, best route easy to see
 - b. Class II = waves to 3 feet, wide clear channels, maneuvering needed
 - c. Class III = high, irregular waves, narrow passes, complex maneuvering needed
 - d. Class IV = long, difficult, turbulent rapids, difficult rescue, difficult to find route
 - e. Class V = long, extremely difficult, violent rapids with congested passes, rescue unlikely, complicated routes
 - f. Class VI = most hazardous rating, scouting for routes from shore mandatory
 3. Hazards for boaters = grounding, capsizing, and damage to lower engine, prop and hull
- D. Floating or submerged debris
 1. Hazards for boaters = grounding, capsizing, being thrown from boat, and damage to lower engine, prop, and hull
- E. Rocks
 1. Hazards for boaters = grounding, capsizing, being thrown from boat, and damage to lower engine, prop, and hull
- F. Strainers/sweepers
 1. Obstructions in the water that allow water to pass through (e.g., trees, branches, and fences)
 2. Hazards for boaters = they hold and trap boats and people, capsizing, and damage to lower engine, prop, and hull
- G. Widow makers
 1. Widow makers are tree trunks extending over river near or at high water due to collapsing riverbank

2. Prepare for trees to fall from a bank in front of you, especially with current behind you
3. Hazards for boaters = sweep people out of boat, hold and trap boat and people, capsizing

H. Ice

1. Can come from upstream or be locked in temporary dams in channel during breakup
2. Hazards for boaters = capsizing, limit ability to maneuver, trap boat and people behind dam, and damage to lower engine, prop, and hull

I. Locks and dams

1. Locks and dams are difficult to see from upstream
2. Current very strong near overspill
3. Areas should be buoyed off limits
4. Hazards for boaters = capsizing

Avoiding hazards

- A. Get local knowledge—learn channels and hazards from experienced local boaters
- B. Use appropriate speed—enough to maintain steerage, but slow enough to see ahead and respond to unexpected situations
- C. Look ahead and plan your route
- D. Take action in sufficient time—currents can sweep you into hazards
- E. Expect the unexpected—bars, obstructions, constantly changing traffic
- F. Stay sober

Float Plans (See Overhead #4)

- Should be part of preparing for every boat trip
- Leave with reliable person who will miss you
- Update when plans change
- Cancel when you return

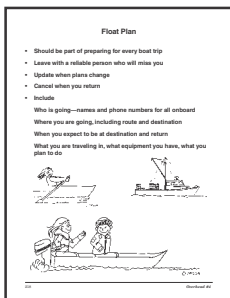
Include

A. Who

1. Names and contact phone numbers of all people onboard
2. Emergency contacts
3. Helps searchers
 - a. Know how many people to look for
 - b. Call other people on float plan in case you forget to check in
 - c. Contact others in case of emergency

B. Where

1. Describe route, what you plan to do along the way, and destination
2. Add alternative routes you may take
3. Include contingency plans (e.g., what you will do if weather turns bad)
4. Helps searchers know where to look



Overhead #4

- C. When
1. When you are expected to arrive at destination and return home
 2. Helps search to be launched sooner
 3. If you are not in trouble but running late, contact the person holding your plan, if possible
- D. What
1. What you are traveling in—description of your boat and engine
 2. Equipment you are taking
 3. What you plan to do
 4. Vehicle you took to launch site, if applicable—description, license number, and where left
 5. Helps searchers
 - a. Know what to look for
 - b. Know where to look based on your planned activities
 - c. Determine how critical situation is—if you packed extra clothes, extra food, or radio, situation may not be as critical as if you hadn't

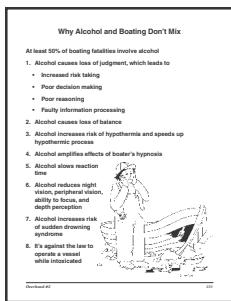
Boater's Hypnosis

- A. Research shows that 4 hours of exposure to noise, vibration, sun, glare, wind, and other motion
1. Produces boater's hypnosis
 2. Slows reaction time almost as much as if legally drunk
- B. Alcohol intensifies effects of boater's hypnosis

Alcohol and Drugs

Alcohol (See Overhead #5)

- A. At least 50% of nation's boating fatalities involve alcohol
- B. Some facts about alcohol that may surprise you
1. Most widely used drug by U.S. teens
 2. Causes more deaths every year in U.S. than any other drug
 3. One 12-ounce beer is as intoxicating as a 4 oz. (half cup) glass of wine
 4. Alcohol kills brain cells
 5. A 150-pound person who has just one drink in a 2 hour period, can experience a loss in judgment, reaction time, and coordination
 6. Cold shower, coffee, or physical exercise will not sober you up
 7. Central nervous system depressant—your brain is affected first
 8. Absorbed by stomach
 - a. Carbonated drinks speed up absorption time
 - b. Alcohol is absorbed faster when consumed on empty stomach
- C. Eight reasons why alcohol and boating do not mix
1. Alcohol causes loss of judgment that contributes to increased risk-taking, and poor decision making, reasoning, and information processing



Overhead #5

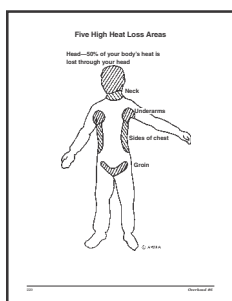
2. Alcohol causes loss of balance—many people drown within 10 feet of safety
3. Alcohol increases risk of hypothermia—alcohol dilates your blood vessels which works against your body’s natural impulse to conserve heat; it actually speeds up hypothermic process
4. Alcohol amplifies effects of boater’s hypnosis
5. Alcohol slows reaction time—at 30 mph, alcohol slows reaction time by 100 feet
6. Alcohol reduces
 - a. Night vision—53% of boating fatalities and accidents happen at night
 - b. Peripheral vision
 - c. Ability to focus
 - d. Ability to distinguish some colors
 - e. Depth perception
7. Alcohol increases risk of sudden drowning syndrome—many good swimmers drown due to cold water in inner ear, this effect is increased by alcohol
8. Operating a boat while intoxicated is against federal and state laws
 - a. Federal law defines intoxication for recreational boat operators as 0.10% blood alcohol content (or state-defined level if lower), or any behavior that meets defined standard for intoxication
 - b. Blood alcohol content (BAC) standards are being reduced to 0.08%; implementation date depends on the state
 - c. BAC rate in Alaska is 0.08%
 - d. Federal law defines intoxication for non-recreational boaters as 0.04% BAC, or apparent intoxicated behavior
 - e. In most states penalties are the same as for driving a car while intoxicated

Prescription drugs and controlled substances

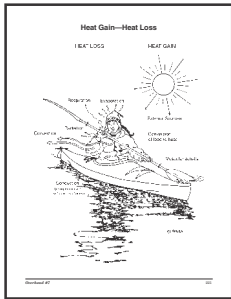
- A. Can also negatively affect judgment, physiology, vision, etc.
- B. Specific effects depend on type of drug
- C. Check possible prescription drug side effects before planning trip

Hypothermia Prevention While Boating

- Hypothermia = a potentially life-threatening condition where your body core temperature drops below normal
 - Hypothermia is possible in any water less than 91 °F (33 °C) or in air less than 80 °F (27 °C)
 - See *Cold Water Safety and Survival*, Volume 2, Hypothermia unit for in-depth information on hypothermia recognition and treatment
 - Prevention requires balancing heat gain and heat loss
- A. High heat loss areas (See Overhead #6)
 1. Head—50% of your body’s heat is lost from your head



Overhead #6



Overhead #7

2. Neck
 3. Underarms
 4. Sides of chest
 5. Groin
- B. How to gain heat while boating (See Overhead #7)
1. Consume food and water
 2. Exercise
 - a. Easy in paddle or rowboats, but sweating makes you lose heat
 - b. Not easy in skiffs
 3. Use external heat sources
 - a. Sun not always a reliable external heat source
 - b. Carry chemical heat packs, hot liquids in insulated containers
 - c. In boats with a cabin, keep stove running

How heat is lost (See Overhead #7)

- A. Radiation
1. Your body is like large radiator, giving off heat to environment 24 hours a day
 2. To minimize, insulate body well, drink water, and eat
- B. Respiration
1. Air cooler than your body is inhaled, warmed, then exhaled
 2. To minimize, breathe through your nose or a scarf
- C. Conduction
1. Occurs when in contact with a surface cooler than your body
 2. Is 25 times faster in water than in still air
 3. To minimize, stay as dry as possible and insulate yourself from cold surfaces
- D. Evaporation
1. Heat is lost when sweat or water on skin evaporates
 2. To minimize, reduce exposure to precipitation and sweating
 - a. Use waterproof outer layer as appropriate
 - b. Regulate temperature with layers of clothing
 - c. Reduce activity to minimize sweating
- E. Convection
1. Occurs when moving air or water removes body heat
 2. Heat loss increases as air or water speed increases
 3. Speeds up process of cooling from other four heat loss mechanisms
 4. To minimize, stay out of wind and water, and wear windproof outer layer

Preventing heat loss

- A. Use good judgment—know your limits, equipment, and environment
- B. Eat nutritious foods and drink water regularly

- C. Rest frequently
- D. Have a positive mental attitude—depression makes you cooler
- E. Reduce exposure to wind, wet, and cold—stay dry and warm!
- F. Wear proper clothing—clothes are your primary shelter
 - 1. Body heat is retained by trapping air next to it
 - 2. The more still air clothing holds and keeps warm, the better its insulating value
 - 3. Proper clothing protects against wind, wet, and cold, and protects high heat loss areas
 - 4. Avoid “day trip” mentality—bring enough clothing to spend an unexpected night
- G. If you are getting cold, stop your activity, decrease heat loss, and increase heat gain while you are still able to control cooling process
 - See *Cold Water Safety and Survival*, Volume 2, Hypothermia unit for an in-depth look at clothing

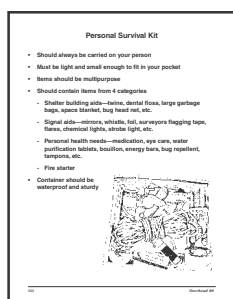
Survival Gear

Most people find themselves in survival situations with only

- A. Clothing they are wearing
- B. Items in their pockets

Items to have *on your person at all times*

- A. Clothing appropriate for outside environment—cotton is a poor choice in wet environments
- B. Hat—wool or synthetic stocking/watch cap
- C. Good knife or multipurpose utility tool
- D. Personal survival kit (See Overhead #8)



Overhead #8

- 1. Four essential categories of contents are
 - a. Shelter aids—twine, dental floss, large garbage bags, space blanket, bug head-net, etc.
 - b. Signal aids—mirrors, whistle, foil, surveyors flagging tape, flares, chemical lights, strobe light, etc.
 - c. Personal health needs—medication, eye care, water purification tablets, bouillon, energy bar, tampons, bug repellent, etc.
 - d. Fire starter
- 2. Must be light and small enough so it is always with you
- 3. Everyone on trip should have one or two kits
- 4. Contents depend on individual, environment, and activity
- 5. Items should be multipurpose
- 6. Kit should not be dominated by one or two items or categories of items
- 7. Commercially purchased kits may not have contents in four essential categories of personal survival kit
- 8. Consider putting kit in PFD pocket
- 9. Kit should be inspected regularly—replace outdated items

10. Container must be waterproof and sturdy
11. Considerations for children
 - a. Choose age-appropriate items
 - b. Train to use all items properly

Comfort kit (abandon ship kit, go bag)—nice-to-have items

- A. Can contain larger items from same four categories as personal survival kits—may want to include items like EPIRB
- B. Should be accessible and known to all onboard
- C. Should float free if boat sinks or capsizes
- D. Must be waterproof, sturdy, and have a handle
- E. Don't count on it being there when you need it, this is not a personal survival kit
- F. Contents depend on
 1. Environment
 2. Type of boating activity
 3. Price
 4. Container size
- G. Should be inspected regularly
- H. Should be taken to shore with you, not left to drift away with boat

Boat equipment kit

- A. It is your boat's survival kit
- B. Contains repair equipment and tools for boat
- C. Should be accessible and in floatable, waterproof container

Personal Flotation Devices (PFDs)

Why wear them

- A. Can save your life!
- B. Will help keep your airway out of the water
- C. Helps when you can't help yourself if you become weak, uncoordinated, or incapacitated from hypothermia or other injury
- D. In the event of death, allows searchers to find body, allowing closure for family
 - Wear one that fits and is appropriate for conditions
 - See *Cold Water Safety and Survival* volume for an in-depth look at PFDs; this is critical information for you to cover when teaching small boat safety and survival

PFD requirements

- A. Federal requirements
 1. Boats less than 16 feet must have one Type I, II, III, or V PFD for each person aboard
 2. Boats greater than 16 feet must have one Type I, II, III, or V PFD for each person aboard **and** one Type IV

3. All PFDs must be
 - a. U.S. Coast Guard approved
 - b. In serviceable condition
 - c. Appropriately sized for wearer
 4. Wearable PFDs must be worn or readily accessible
 5. Throwable devices must be immediately accessible
 6. Functional waterproof lights should be attached to all PFDs if operating at night
 7. Some commercial fishing boats have requirements for PFDs or immersion suits, depending on distance from shore and water temperature
- B. State requirements
1. Vary from state to state; check with your state boating regulators for specifics
 2. Many states require children to wear PFDs
 - a. Required age varies
 - b. Required by Alaska law for children under age 13 in open boat or on deck

Pre-Departure Checklist

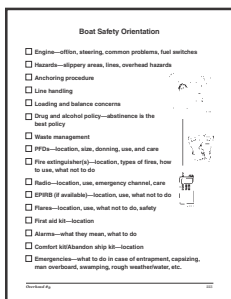
Boat equipment—depends on boat type and operations; minimum equipment includes

- A. Personal flotation device(s)
- B. Fuel
 1. 1/3 to get there
 2. 1/3 to get back
 3. 1/3 to spare
- C. Oars/paddles
- D. Flares, radio(s), emergency signaling devices
- E. Anchor and/or shore line as appropriate
- F. Bailer or pump(s)
- G. Fire extinguisher(s)
- H. Throwable flotation/rescue device
- I. First aid kit
- J. Spare/replacement engine parts (spare paddles if self-propelled)
- K. Emergency shelter
- L. Appropriate boat equipment kit with tools
- M. Comfort kit
- N. Appropriate hull repair kit
- O. Charts or maps
- P. Water and food
- Q. Lights and horn
- R. Additional line

- S. Knife
- T. Additional equipment may be needed for specific boats and operations
- U. Federal requirements are covered in *Federal Requirements and Safety Tips for Recreational Boats*
- V. Additional Alaska requirements are in *Alaska Boater's Handbook* or contact Alaska Office of Boating Safety at www.dnr.state.ak.us/parks/boating
- W. Contact your state safe boating office for boating requirements specific to your state

Pre-Departure procedures

- A. Check weather forecast
- B. Check equipment—present and operable
- C. File float plan
- D. Don PFDs
- E. Give passenger safety orientation (see below)
- F. Check stability
 - 1. Stability terminology
 - a. Aft = toward stern or back of boat
 - b. Fore = toward front of boat
 - c. Freeboard = vertical distance from waterline to boat's keel
 - d. Gunwale = upper edge of boat's side
 - e. Trim = fore and aft balance of boat; to trim fore and aft balance of boat
 - 2. Achieving stability
 - a. Load boat carefully
 - b. Passengers board one at a time; keep low, near midline, and sit down in small boats
 - c. Distribute load evenly and secure it
 - d. Balance freeboard against weight—adjust for weather and loading conditions; this is also called trimming a boat
 - e. Some freeboard is necessary to keep waves out of boat
 - f. Weight in bottom of boat will lower freeboard but is also needed to keep boat stable
 - g. Never exceed capacity rating of your boat for weight and engine—boat's capacity plate is mounted near stern of boat



Overhead #9

Small Boat Safety Orientation (See Overhead #9)

- All passengers should be oriented to boat—you never know who will have to be a responder in an emergency

Important areas to cover in orientation (some may not be appropriate for younger children)

- A. Engine—off/on, steering, common problems, fuel switches
- B. Hazards—slippery areas, lines, overhead hazards
- C. Anchoring procedure

- D. Line handling
- E. Loading and balance concerns
- F. Drug and alcohol policy—abstinence is best policy
- G. Waste management
- H. PFDs—location, size, donning, use, and care
- I. Fire extinguisher(s)—location, types of fires, how to use, what not to do
- J. Radio—location, use, emergency channel, care
- K. EPIRB (if available)—location, use, what not to do
- L. Flares—location, use, what not to do, safety
- M. First aid kit—location
- N. Alarms—what they mean, what to do
- O. Comfort kit/abandon ship kit—location
- P. Emergencies—what to do in case of entrapment, capsizing, man overboard, swamping, rough weather/water, etc.

Preparing for a Boat Trip: Activities Guide

- The activities in this volume are sequential, and each unit assumes knowledge of the material in the preceding unit.
- Activities are arranged by topic in the same order as the Teacher Information.
- Within a topic activities are organized from easiest to most difficult.
- Detailed Alaska Content Standards are located at the end of each activity's procedures.
- Times needed for activities are approximate.
- Many activities contain true stories; be sensitive to the possibility that they could be written about your students' relatives or friends.
- **AMSEA** This symbol means the equipment is available to borrow from AMSEA.

Topic: Weather

Activity	Objectives	Standards
1. Weather Action Act out boating-related terms p. 28	<ul style="list-style-type: none"> • Act out Buys-Ballot's Law • Act out six variables of wind effect on wave height 	Language Arts Science Geography Arts
2. Foggy-Sunny Day Picture Create visual art to show how fog affects visibility p. 30	<ul style="list-style-type: none"> • Demonstrate how fog changes visibility for boaters 	Language Arts Science Skills for a Healthy Life Arts
3. Weather Log Use repeated weather observations and local resources to predict weather p. 31	<ul style="list-style-type: none"> • Compare National Weather Service forecasts with actual weather • Compare their predicted weather forecast, based on recorded daily weather observations, with the actual weather 	Mathematics Science Geography Skills for a Healthy Life Cultural Standards

Topic: Tides

Activity	Objectives	Standards
4. Introducing Tide Tables Practice reading and using tide books p. 33	<ul style="list-style-type: none"> • Use a tide book to predict tides • Identify at least three other useful pieces of information in a tide book • Use the correction tables in the tide book to accurately predict tides in a local area • Graph a tide curve 	Language Arts Mathematics Science Geography

5. Air Pressure and Tides Do an experiment p. 39	<ul style="list-style-type: none"> Describe how a drop in air pressure affects water level 	Science
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Topics: Currents, River System Cautions

Activity	Objectives	Standards
6. River System Cautions Use maps and build models p. 41	<ul style="list-style-type: none"> List at least eight potential river hazards to a boater Describe at least one problem posed to a boater by each hazard 	Language Arts Science Geography Skills for a Healthy Life Art Cultural Standards

Topic: Float Plans

Activity	Objective	Standards
7. Writing Float Plans Writing float plans p. 44	<ul style="list-style-type: none"> Write a float plan including four critical elements for a given scenario 	Language Arts Skills for a Healthy Life

Topic: Alcohol and Drugs

Activity	Objectives	Standards
8. Alcohol and Drug Dangers Use a video and obstacle course p. 49	<ul style="list-style-type: none"> List eight reasons why alcohol should not be used while boating 	Language Arts Skills for a Healthy Life
9. Alcohol Stories and The Refusal Skill™ Analyze newspaper articles and practice The Refusal Skill™ p. 53	<ul style="list-style-type: none"> State that loss of judgment is one effect of alcohol consumption Demonstrate one technique to avoid participating in activities where alcohol is consumed 	Language Arts Skills for a Healthy Life

10. Wahoo! Game Play a board game p. 58	<ul style="list-style-type: none"> Describe at least six effects of alcohol on the body's physiology 	Language Arts Science Skills for a Healthy Life
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Topic: Hypothermia Prevention While Boating

Activity	Objectives	Standards
11. High Heat Loss Areas Do an experiment p. 64	<ul style="list-style-type: none"> List the five high heat loss areas Describe the effect of exposing high heat loss areas to cold air 	Language Arts Science Geography Skills for a Healthy Life

Topic: Survival Gear

Activity	Objectives	Standards
12. Survival Kits Assemble a personal survival kit p. 65	<ul style="list-style-type: none">• List the four categories of essential items for a personal survival kit• Select items for a personal survival kit based on the four essential categories• Assemble a personal survival kit	Language Arts Skills for a Healthy Life

Topic: Pre-Departure Checklist

Activity	Objectives	Standards
13. Legal Requirements Familiarize students with the federal requirements for recreational boaters p. 69	<ul style="list-style-type: none">• Select the correct answer to commonly asked questions about recreational boating safety requirements	Language Arts Government and Citizenship Skills for a Healthy Life
14. Keep Your Boat Afloat Two experiments with play boats and weights p. 72	<ul style="list-style-type: none">• Explain why people need to stay in the center of a small boat• Explain why people need to board a small boat one at a time• Explain why putting too much weight in a boat is dangerous	Science Skills for a Healthy Life

Topic: Small Boat Safety Orientation

Activity	Objective	Standards
15. Boat Safety Orientation Demonstrate the importance of a safety orientation when boarding a boat p. 74	<ul style="list-style-type: none">• Demonstrate at least 10 points of a boat's safety orientation	Skills for a Healthy Life

Culminating Activity

Activity	Objective	Standards
16. Choices Use sets of cards to choose items for a boat trip p. 76	<ul style="list-style-type: none">• Choose the most appropriate items or actions for a safe boat trip when presented with options	Language Arts Skills for a Healthy Life

Weather Action

Time: 50 minutes

Overview

Act out boating-related terms.

Objectives

After completing this activity, students should be able to:

1. Act out Buys-Ballot's Law.
2. Act out six variables of wind effect on wave height.

Materials

- Overheads #1 **Air Flow in the North Pacific** and #2 **Buys-Ballot's Law**
- 1 set, **Weather Action cards** (make from Template #1)
- Imagination

Procedure

1. Explain to students that they will be acting out wind effect on wave height variables, and Buys-Ballot's Law.
2. Describe Buys-Ballot's Law using Overheads #1 and #2. Describe wind effect on wave height variables: proximity, fetch, time, depth of water, narrowness of channel, and current.
3. Divide students into 7 groups and give one Weather Action card to each group.
4. Explain that they will be acting out the term on their **Weather Action card**. Encourage them to use their imagination, and give them enough time and privacy to practice.
5. Have students act out the term on their **Weather Action card** without announcing it to the class, so the rest of the class can guess which term it is.
6. Discuss any difficulties and reinforce concepts.

This activity addresses Alaska Content Standards:

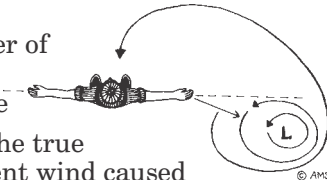
Language Arts A-6 Using visual communication

Science A-4 Observable natural events

Geography C-1 Physical systems of earth, C-3 Regional environments

Arts A-1 Participate in the arts, A-2 Refine artistic skills, A-3 Materials, tools, techniques, and processes

Weather Action Cards

<p>Buys-Ballot's Law</p> <ul style="list-style-type: none"> • Used to find the center of a storm system in the Northern Hemisphere • Place your face into the true wind—not the apparent wind caused by the combination of the true wind and the wind caused by a boat's own forward motion • Extend your right arm out to the side • The center of the low pressure will be to your right and somewhat behind you 	<p>Wind effect on wave height—Proximity</p> <ul style="list-style-type: none"> • Swells—long undulations of the water's surface—result from wind some distance away on larger bodies of water; this causes well-formed, widely spaced swells • Chop—smaller, more closely spaced waves—result from local wind
<p>Wind effect on wave height—Fetch</p> <ul style="list-style-type: none"> • The distance over which wind blows • Wave height increases with distance wind has traveled 	<p>Wind effect on wave height—Narrowness of channel</p> <ul style="list-style-type: none"> • Wave height can increase as channel width decreases
<p>Wind effect on wave height—Time</p> <ul style="list-style-type: none"> • Wave height increases with length of time wind has been blowing 	<p>Wind effect on wave height—Current</p> <ul style="list-style-type: none"> • If wind blows against current, wave height increases as wind and current speed increases
<p>Wind effect on wave height—Depth of water</p> <ul style="list-style-type: none"> • Wave height can increase with decrease in water depth 	

Foggy-Sunny Day Picture

Time: 40 minutes

Overview

Create visual art to show how fog affects visibility.

Objective

After completing this activity, students should be able to demonstrate how fog changes visibility for boaters.

Materials

- Tracing paper
- Glue
- White drawing paper
- Markers, paints, or crayons

Procedure

1. Explain to students that they will be illustrating how fog changes visibility for boaters.
2. Have students draw a picture of a sunny day. Encourage them to use bright, rich colors for most of the drawing, and a few items in lighter shades of gray.
3. Have students tape a piece of thin tracing paper to the top edge of their pictures.
4. When the tracing paper is on top of the drawing, students have a picture of a foggy day. When the paper is lifted, they have a drawing of a sunny day.
5. Compare the visibility of different colors in the “fog.” Do any colors or shapes disappear when in the “fog?” What colors show up the best?
6. Relate the drawings to visibility when boating. What implications does it have for finding your way in fog? What colors may make the most visible signals on a foggy day?

This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing, A-2 Writing conventions, A-6 Using visual communication

Science A-4 Observable natural events, A-15 Using local knowledge

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury

prevention, A-6 Making informed choices, B-1 Identifying risk and consequences, D-2 Safe and healthy environments

Arts A-1 Participate in the arts, A-2 Refine artistic skills, A-3 Materials, tools, techniques, and processes

Weather Log

Time: 15 minutes per day over a 2 week period

Overview

Use repeated weather observations and local resources to predict weather.

Objectives

After completing this activity, students should be able to:

1. Compare National Weather Service forecasts with actual weather.
2. Compare their predicted weather forecast, based on recorded daily weather observations, with the actual weather.

Materials

- Large calendar or butcher paper
- Barometer
- Thermometer
- Rain gauge
- Access to computer, local newspapers, or radio weather broadcasts
- Local Elder or other weather expert

Procedure

1. Explain to students that they will be recording weather and then attempting to predict the weather.
2. Explain barometric pressure and the effect it has on weather.
3. Emphasize the importance of checking actual conditions and forecasts before going on a trip.
4. Create a calendar bulletin board for the days that you are studying weather.
5. Each day for several weeks have students:
 - Record on the calendar the outdoor temperature, barometric pressure, and weather conditions including sky condition, visibility, precipitation, wind speed and direction, and sea state. Standardize the terms you will use before you start.
 - Record on the calendar the time of day the readings and observations were made. Try to keep the time consistent to make weather comparisons more accurate.
 - Keep official weather forecasts from the newspaper, computer, or radio for each day.
 - Check out the National Weather Service Web site (<http://www.nws.noaa.gov/>).
6. After completing class observations and measurements, have students compare them to official weather forecasts and observations.
7. Discuss any patterns that seem to emerge. Look for correlation between temperature, barometer readings, and other weather conditions.
8. For several days, have students try to predict the next day's weather, including sea state, based on what they have observed and recorded over the previous few weeks.
9. Have students compare their predictions against the actual weather.
10. Invite a local Elder or other expert to discuss local factors to consider when assessing weather for boating.
11. Debrief, emphasizing the need and ways to check the weather before leaving on a boat trip.

This activity addresses Alaska Content Standards:

Mathematics A-2 Measurement, A-6 Statistics and data collection

Science A-4 Observable natural events, A-15 Using local knowledge, B-1 Scientific processes, B-2 Tools of scientific investigation, C-3 Knowledge through experimentation

Geography B-6 Making informed decisions about place, C-1 Physical systems of earth, C-3 Regional environments

Skills for a Healthy Life A-3 Injury prevention, A-6 Making informed choices

Cultural Standards D-1 Interactions with Elders

Introducing Tide Tables

Time: 60-90 minutes

Overview

Practice reading tide books and using them to predict high and low tides.

Objectives

After completing this activity, students should be able to:

1. Use a tide book to predict tides.
2. Identify at least three other useful pieces of information in a tide book.
3. Use the correction tables in the tide book to accurately predict tides in a local area.
4. Graph a tide curve.

Materials

Part 1

- 1 per student, tide book
- 1 per student, section of a nautical chart for area covered by tide book

Part 2

- 1 per student, tide book or Student Handout #1 **1998 Thompson's Tide Tables for the Southeastern District of Alaska**
- 1 per student, Student Handout #2 **Correction Tables**

Part 3

- 1 per student, Student Handout #3 **Tide Curve**
- 1 per student, graph paper
- Calendar showing lunar phases or tide book

Procedure

Part 1. Introduction

1. Explain to students that they will be using a tide book to learn to predict tides.
2. Introduce the concepts of tides. Emphasize the difference between “tide” (vertical motion) and “tidal current” (horizontal motion). The terms are often misused.
3. Distribute an up-to-date tide book to each student.
4. Ask students to locate and describe non-tidal information in the tide book.
5. Introduce the concept of tide prediction.
6. Choose a date and specific district in the tide book and explain how to read a tide table.
7. Have students practice using the tide tables.
8. Distribute nautical charts. Explain to students that tide tables show water height in feet, nautical charts show water depth in either feet or fathoms (1 fathom = 6 feet).
9. Have students determine the actual depth of water at a specific time and place:
 - Choose a location and date, and use a tide book to look up the height of the higher high tide for that day and place.
 - Add that number to the depth of water shown on the corresponding nautical chart for that location. For example, if there is a charted depth of 5 fathoms (30') in a location near Ketchikan, on January 1, 1998, at 2:11 PM, and the tide for that time and place is 17.5', the actual water depth would be 30' plus 17.5', or 47.5'.
10. Discuss conditions that may affect the timing and height of tides, especially high and low pressure systems, and wind.

Part 2. Correction Tables

1. Explain to students that they will be using correction tables in a tide book.
2. Explain the need for a correction table.
3. If not using a tide book, distribute Student Handout #1. Direct students to look at the

tide tables for a specific district. Locate the correction table for the district you have chosen.

4. Choose a location listed in the correction table that is close to your community or known by students in your class, if possible.
5. Distribute and explain Student Handout #2.
6. Have students complete Student Handout #2
7. Discuss any problems and reinforce the value of correction tables.

Part 3. Tide Curve

1. Explain to students that they will be graphing a tide curve.
2. Distribute graph paper.
3. Distribute and explain Student Handout #3.
4. Have students complete Student Handout #3.
5. Discuss any problems and reinforce the value of being able to predict tides based on phases of the moon.

This activity addresses Alaska Content Standards:

Language Arts A-6 Using visual communication, B-1 Meaning from text, B-2 Investigations in oral, visual, and written text

Mathematics A-1 Numeration, A-2 Estimation, A-3 Basic arithmetic functions, A-4 Using tables and graphs, A-6 Statistics and data analysis, B-2 Investigations, B-3 Using mathematics in real life situations, C-1 Pictures, graphs and charts, D-1 Analyze situations, D-2 Draw logical conclusions, D-4 Deductive reasoning, E-2 Practical application of mathematics, E-3 Mathematics across the curriculum

Science A-4 Observable natural events, A-15 Using local knowledge, C-5 Collaboration, D-1 Practical applications of scientific knowledge, D-1-C Identifying information sources

Geography A-1 Using maps, globes, and graphs, A-2 Making maps, globes, and graphs, A-5 Interpreting geographic patterns, B-6 Making informed decisions of place, C-1 Physical systems of earth

1998 Thompson's Tide Tables for the Southeastern District of Alaska

KETCHIKAN DISTRICT Ketchikan, Alaska

January 98	HIGH TIDES				LOW TIDES			
	A.M.	FT.	P.M.	FT.	A.M.	FT.	P.M.	FT.
1 Thu	2:28	16.0	2:11	17.5	8:10	2.5	8:39	-2.1
2 Fri	3:11	16.0	2:58	16.7	8:58	2.6	9:24	-1.3
3 Sat	3:57	15.9	3:50	15.5	9:51	2.8	10:11	-0.2
4 Sun	4:48	15.7	4:50	14.2	10:52	3.0	11:05	1.2
5 Mon	5:44	15.4	6:01	13.1	.....	.....	12:01	3.0
6 Tue	6:46	15.4	7:22	12.4	0:06	2.5	1:17	2.6
7 Wed	7:51	15.6	8:44	12.4	1:15	3.4	2:31	1.7
8 Thu	8:55	16.0	9:56	13.0	2:27	3.9	3:36	0.6
9 Fri	9:53	16.6	10:55	13.8	3:33	3.9	4:31	-0.5
10 Sat	10:45	17.1	11:45	14.6	4:30	3.6	5:20	-1.4
11 Sun	11:32	17.5	.....	.....	5:21	3.2	6:03	-2.0
12 Mon	0:28	15.2	12:15	17.6	6:06	2.9	6:43	-2.2
13 Tue	1:08	15.6	12:55	17.4	6:47	2.7	7:20	-2.1
14 Wed	1:45	15.7	1:33	17.0	7:26	2.7	7:56	-1.7
15 Thu	2:21	15.6	2:10	16.3	8:04	2.8	8:31	-0.9
16 Fri	2:56	15.3	2:47	15.3	8:42	3.1	9:06	0.0
17 Sat	3:32	14.9	3:25	14.2	9:22	3.5	9:41	1.1
18 Sun	4:08	14.4	4:07	13.1	10:05	4.0	10:19	2.3
19 Mon	4:48	13.9	4:56	11.9	10:55	4.3	11:01	3.5
20 Tue	5:32	13.5	5:58	10.9	11:55	4.5	11:53	4.6
21 Wed	6:25	13.3	7:19	10.4	.....	.....	1:06	4.4
22 Thu	7:26	13.4	8:44	10.6	0:57	5.3	2:19	3.7
23 Fri	8:29	13.8	9:52	11.4	2:08	5.6	3:22	2.5
24 Sat	9:26	14.6	10:45	12.5	3:14	5.3	4:13	1.2
25 Sun	10:18	15.6	11:29	13.7	4:10	4.6	4:58	-0.2
26 Mon	11:04	16.7	.....	.....	4:59	3.7	5:40	-1.5
27 Tue	0:09	14.8	11:49	17.6	5:44	2.7	6:20	-2.5
28 Wed	0:48	15.8	12:32	18.2	6:28	1.8	7:00	-3.1
29 Thu	1:27	16.6	1:16	18.4	7:12	1.1	7:40	-3.2
30 Fri	2:07	17.1	2:01	18.1	7:57	0.7	8:21	-2.7
31 Sat	2:48	17.2	2:48	17.2	8:44	0.5	9:04	-1.7

5 ● 12 ○ 20 ● 27 ● 36 Lat 55° 20' N Lon 131° 38' W
 tidal information courtesy of Alaska Tidal Book Co.,
 Kenai, Alaska, (907) 283-1990

TIDAL CORRECTIONS

LOCATION	TIME		HEIGHT	
	High	Low	High	Low
KETCHIKAN				
CLARENCE STRAIT . . . continued				
KASAAN BAY				
Entrance	-0:02	-0:01	-0.1	-0.1
Saltery Cove, Skowl Arm	+0:04	+0:02	-0.1	0.0
Polk Inlet, (South End)	+0:03	+0:06	+0.2	0.0
Kasaan	+0:06	+0:01	0.0	0.0
Karta Bay	+0:03	+0:04	+0.5	-0.1
Hollis Anchorage	+0:02	-0:05	+0.2	+0.1
Hadley, Lyman Anchorage	+0:10	+0:07	+0.5	-0.1
Union Bay, Ernest Sound	+0:11	+0:17	+1.1	0.0
Dewey Anchorage, Etolin Is.	+0:13	+0:14	+0.6	-0.1
Ratz Harbor, Prince of Wales Is.	+0:13	+0:14	+0.6	-0.1
Lake Bay	+0:09	+0:01	+0.5	-0.1
Thorne Island, Whale Passage	-0:07	0:00	+0.2	0.0
Exchange Cove	+0:08	+0:04	-0.4	-0.1
Steamer Bay, Etolin Island	+0:08	+0:03	+0.9	-0.1
Olive Cove, Zimovia Strait	+0:12	+0:14	+1.2	0.0
Blake Island, Bradfield Canal	+0:10	+0:06	+1.1	-0.1
Wrangell, Wrangell Island	+0:11	+0:02	+0.3	0.0
STIKINE RIVER ENTRANCE				
Port Rothsay	+0:27	+0:32	-1.5	+0.1
SUMNER STRAIT				
Red Bay, Prince of Wales Island	+0:03	+0:07	-0.8	0.0
Level Islands	+0:03	+0:04	-0.4	0.0
Butterworth Island, Duncan Canal	-0:04	+0:03	0.0	0.0
Duncan Canal, Kupreanof Island	+0:15	+0:16	-0.2	-0.1
Grief Island, Duncan Canal	+0:15	+0:12	+0.1	-0.1
Castle Island, Duncan Canal	+0:27	+0:12	+0.1	-0.1
St. John Harbor, Zarembo Island	+0:09	+0:05	-0.7	-0.2
Greys Island	+0:06	+0:04	+0.2	0.0
WRANGELL NARROWS				
Point Lockwood, Woewodski Island	+0:20	+0:15	+0.2	+0.1
Finger Point, Lindenber Peninsula	+0:29	+0:41	+1.2	0.0
Anchor Point	+0:20	+0:35	+0.6	0.0
Petersburg	+0:09	+0:26	+0.3	-0.1
KEKU STRAIT				
Monte Carlo Island	+0:02	+0:03	-2.8	-0.1
Seclusion Harbor, Kuiu Island	+0:05	+0:02	-3.0	-0.2
Beck Island	+0:08	+0:31	-1.6	-0.1
The Summit	+0:31	+0:37	+0.3	+0.1
Entrance Island	+0:22	+0:31	-0.7	0.0
Pt. Camden, Kuiu Island	+0:03	+0:04	-1.5	0.0
Hamilton Bay, Kupreanof Island	+0:03	+0:04	-1.6	0.0
Kake	+0:05	+0:12	-1.4	-0.1

DIRECTIONS FOR TIDE CORRECTIONS
 Add or subtract TIMES & FEET from the Ketchikan District to arrive at corrected TIMES & FEET for the following subordinate stations. X: Multiply height of Ketchikan District by ratio, then add given correction for total height correction.

tidal information courtesy of Alaska Tidal Book Co.,
 Kenai, Alaska, (907) 283-1990

Tidal information courtesy of Alaska Tidal Book Co., Kenai, Alaska, 907-283-1990.

Name: _____ Date: _____

Correction Tables

Use the _____ district tide table and its correction table to make a new tide table for _____ (a location specified by your teacher).

1. Write the corrections below. Remember to use a + or – sign before each correction.

Time Correction in Hours and Minutes		Height Correction in Feet and Inches	
High Tide	Low Tide	High Tide	Low Tide

2. Identify the higher high and lower low tides in the district tide table. Add or subtract the values above to those values to make a tide table for the new location. Do this for each day of a three-week period and record in the chart below.

Date	Higher High Tide		Lower Low Tide	
	Corrected Time	Corrected Height	Corrected Time	Corrected Height

Name: _____ Date: _____

Tide Curve

1. Use graph paper to graph the data from the chart on Student Handout #2. The graph will be a tide curve—a curved line illustrating the daily higher and lower tides for a three week period.
 - Draw an x-axis and a y-axis on your graph. Label the y-axis “depth in feet,” the x-axis “day.”
 - On the tide table locate the **highest** high tide and the **lowest** low tide for each day of the period you are charting. Decide on a scale for y-axis allowing for both extremes of depth, including minus tides.
 - Label the x-axis to correspond with the days charted.
 - Plot the tides in chronological order. You may have a 24-hour period that has only three tide changes.
 - Connect the first point to the second, the second point to the third, etc. for the three-week period.
2. Describe the pattern you see.
3. Look at the lunar cycle for the same time period. How do the lunar cycle and the tide curve compare?
4. What is the lunar stage during the highest and lowest tides?
5. Can you use the phases of the moon to predict tides? Explain your answer.
6. The tidal range (the difference between high and low tides) during a new moon is
 - a. Large
 - b. Small
7. Two days after a full moon, the tidal range is
 - a. Increasing
 - b. Decreasing
 - c. Peaking
8. Two days after a quarter moon, the tidal range is
 - a. Beginning to increase
 - b. Beginning to decrease
 - c. Peaking

Bonus Questions

1. Compare and contrast the curve from your data to a 3 week period that is 6 months earlier or later.
2. Compare and contrast the curve from your area to that of other parts of the state, nation, or world.

Tide Curve

2. Describe the pattern you see.

It is a series of curving “mountains” and “valleys” with the highest high points and the lowest lows points occurring during the same 24-hour period.

3. Look at the lunar cycle for the same time period. How do the lunar cycle and the tide curve compare?

In general, the answers should indicate that the highest highs and the lowest lows occur near the full and new moons. This is because the sun and the moon are in direct alignment with the earth when the moon is new and full, exaggerating the gravitational pull on the tides. The lowest high tides and the highest low tides occur on the first quarter and last quarter moons because the sun and moon are not aligned and their gravitational forces partially offset one another.

4. What is the lunar stage during the highest and lowest tides?

The moon is near full or new during the greatest tidal range.

5. Can you use the phases of the moon to predict tides? Explain your answer.

Yes. New and full moons have the highest high and lowest low tides. Quarter moons have the lowest highs and highest lows.

6. The tidal range (the difference between high and low tides) during a new moon is

Large

7. Two days after a full moon, the tidal range is

Peaking

8. Two days after a quarter moon, the tidal range is

Beginning to increase

Bonus Questions

1. Compare and contrast the curve from your data to a 3 week period that is 6 months earlier or later.

2. Compare and contrast the curve from your area to that of other parts of the state, nation, or world.

Possible answers include differences in tidal ranges, tide height, and frequency (diurnal, semi-diurnal, mixed semi-diurnal), and the shape of the ocean floor in a given area. This question may elicit many questions about why this happens, requiring complex explanations of oceanography. Be prepared!

Air Pressure and Tides

Time: 20 minutes

Overview

Use an experiment to illustrate the effect of air pressure on tides.

Objective

After completing this activity, students should be able to describe how a drop in air pressure affects water level.

Materials

- 1 per station, candle
- 1 per station, saucer or container with low sides that can hold water
- 1 per station, lighter or matches
- 1 per station, glass taller than the candle by at least 2 inches
- 1 per station, marking pen for wet glass

Procedure

Before Class

1. Set up each station.
2. Attach each candle to the middle or low point of the saucer by dripping hot wax and holding the candle bottom to the wax until the candle is stable.

During Class

1. Explain to students that they will be doing an experiment to illustrate the effect of air pressure on tides.
2. Remind students that tide heights printed in tide tables are **predictions** based on lunar cycles and historical observations.
3. Review the concept of atmospheric pressure. Discuss local weather when the barometric pressure is higher and lower than normal.

4. Discuss what happens to tides during a storm. Discussion points should include that storms are low pressure systems, and that low air pressure allows water to rise more than high air pressure.
5. Describe the experiment, explaining that students will create a mini low-pressure system to observe how it affects water level. The lower pressure occurs when combustion causes oxygen to bond with carbon, forming carbon dioxide. This takes up less space than oxygen and results in a lower pressure inside the glass.
6. Distribute and have students complete Student Handout #1.
7. Debrief.

This activity addresses the following subject areas:

Science A-4 Observable natural events, A-5 Forces of nature, A-15 Using local knowledge, B-1 Scientific processes, B-2 Scientific investigations, B-6 Safety procedures, C-2

Knowledge through experimentation, C-5 Collaboration, D-1, 3 Practical applications of scientific knowledge

Name: _____ Date: _____

Air Pressure and Tides

1. What happens to water levels (tides) when air pressure decreases? State your hypothesis and explain your reasoning.
2. Create your own mini-low pressure system and observe how it affects water levels.
 - Pour about a half inch of water into the saucer.
 - Place the glass upside down over the unlit candle and onto the saucer, allowing water to enter the glass.
 - Mark the height of the water in the glass with the marking pen.
 - Remove the glass.
 - Light the candle.
 - Replace the glass over the candle as you did before, allowing water to enter the glass.
 - Mark the height of the water inside the glass just as the candle burns out from lack of oxygen.
3. Did the water level change? If so, was it higher or lower?
4. How do the observed results compare with your hypothesis?

River System Cautions

Time: 60 minutes

Overview

Use maps and build models to analyze rivers for navigation routes and hazards.

Objectives

After completing this activity, students should be able to:

1. List at least eight potential river hazards to a boater.
2. Describe at least one problem posed to a boater by each hazard.

Materials

- Overhead #3 **River System Cautions**
- 1 per student, Student Handout #1 **River System Cautions**
- Materials to make a table-top river with hazards—string or tape to mark river edges, rocks, small branches or model trees
- Toy boats

Procedure

1. Explain to students that they will be using maps and building a model of a river to analyze rivers for navigation routes and hazards.
2. Use Overhead #3 to explain bend, joining tributary, strainer, widow maker, rocks, shoal/sandbar, rapids, and tide flats.
3. Use students' experiences on rivers to illustrate hazards, problems, and ways to avoid them.
4. Distribute and have students complete Student Handout #1.
5. Discuss Student Handout #1, including safe travel routes.
6. Divide the class into groups of 2-4.
7. Have each group create their own river model illustrating the features studied.
8. Have groups move from model to model to identify the features, the deepest navigable channel in the river model, and other safe travel routes. Use toy boats to travel the routes.
9. Debrief.

Variations

1. Bring in village Elders or those with local knowledge of your local river to identify hazards.
2. Plan a field trip to your local river to observe the features.

This activity addresses Alaska Content Standards:

Language Arts B-1 Meaning from written, oral, and visual text, D-1-D Analyzing information

Science A-5 Forces of nature, D-6 Using reasoned decisions

Geography A-1 Using maps, A-5 Interpreting geographical patterns, A-6 Geological problems and solutions, B-1 Geographical characteristics

of place, C-3 Regional environments, E-3 Physical systems

Skills for a Healthy Life A-3 Injury prevention, B-1 Risk and consequences

Art A-5 Collaborate with others

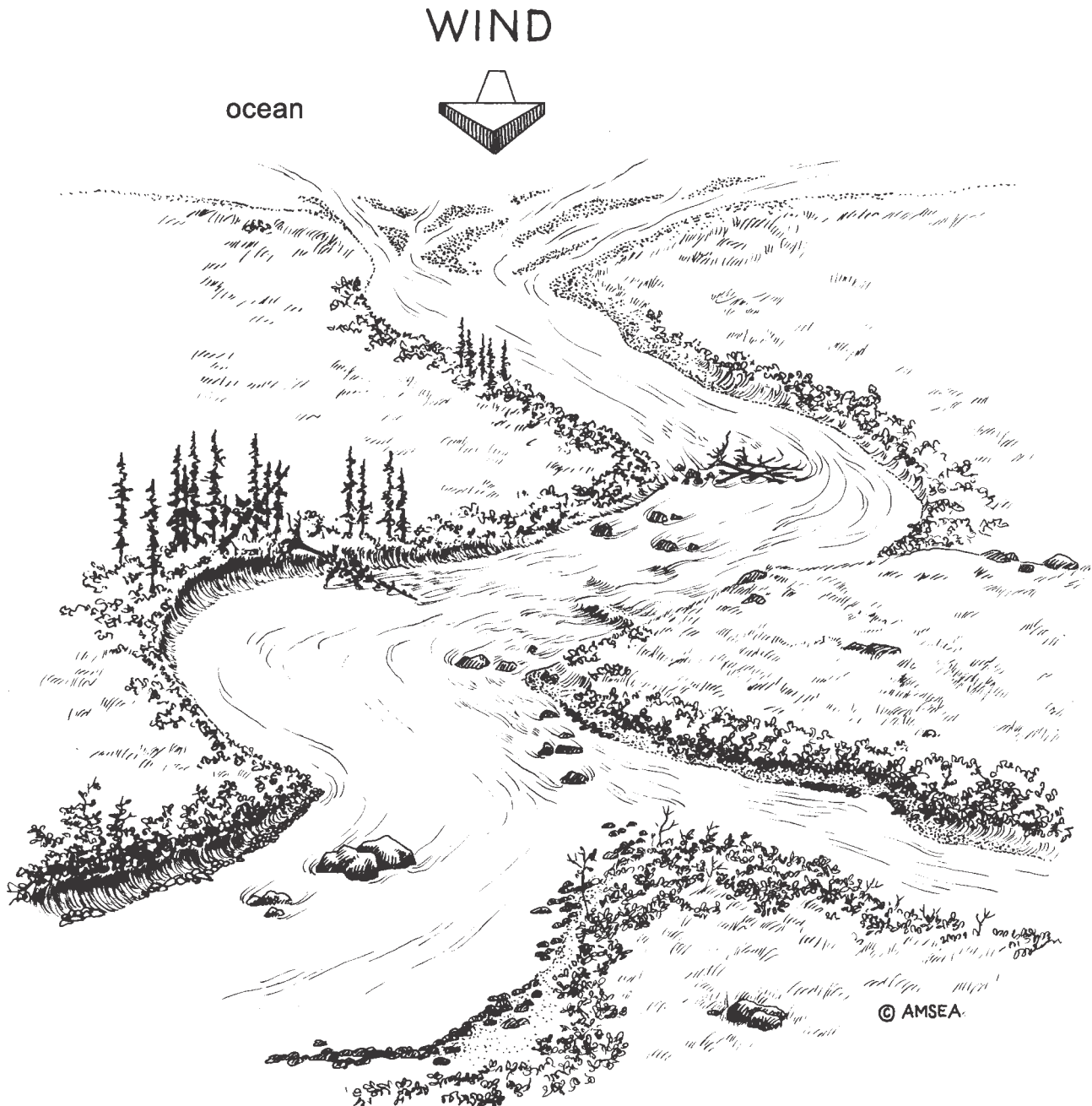
Cultural Standards D-1 Interaction with Elders

Name: _____

Date: _____

River System Cautions

1. Circle and name the hazards on this river. State at least one problem each hazard could pose for a boater.
2. How could you avoid these problems and hazards while boating?
3. Draw a line along the deepest navigable channel of the river.



River System Cautions

1. Circle and name the hazards on this river. State at least one problem each hazard could pose for a boater.



2. How could you avoid these problems and hazards while boating?
Local knowledge, appropriate speed, plan ahead, act in sufficient time, expect the unexpected, stay sober
3. Draw a line along the deepest navigable channel of the river.
The channel should generally be within one-quarter of the river's width from the outside bank (cut bank) avoiding the hazards. The rapids present the most challenging area of the river in the drawing. Paths may vary. Students should justify their path. Make sure students give themselves sufficient room upstream of the hazards to avoid being swept into them.

Writing Float Plans

Time: 30 minutes

Overview

Students write float plans for actual search and rescue cases.

Objective

After completing this activity, students should be able to write a float plan including four critical elements for a given scenario.

Materials

- Overhead #4 **Float Plan**
- 1 per group, Student Handouts #1 **Float Plan Scenarios** and #2 **Writing a Float Plan**

Procedure

1. Explain to students that they will be writing a float plan for a boat trip.
2. Ask students if they think leaving a note explaining where they are going is enough information for someone to find them if there is trouble.
3. Brainstorm with your class the information they would need to find a friend or family member overdue from a boating trip. List the ideas on the board.
4. Describe what information a float plan should contain. Show Overhead #4. Compare with student lists.
5. Divide class into small groups and distribute Student Handouts #1 and #2. Have students complete Student Handout #2 based on one of the scenarios in Student Handout #1. Imagination is needed to fill in some of the missing details.
6. Discuss students' float plans and reinforce the need for them.

This activity addresses Alaska Content Standards:

Language Arts A-6 Using visual communication, D-1-D Analyzing information

Skills for a Healthy Life A-1 Personal well-being, A-3 Injury prevention, A-5 Well-being of the family, D-1 Making responsible decisions

Float Plan Scenarios

Excerpts from the Sinking of the Passenger Vessel *Cougar* off the Coast of Oregon

*National Transportation Safety Board Marine
Accident Report (NTSB/MAR-90/02)*

In September of 1988, a 46-foot boat took some passengers on a tuna fishing trip off the coast of Oregon. Onboard were three crewmembers and six passengers, for a total of nine people. They also had about 20 lifejackets, one lifering, one buoyant foam platform, six hand-held flares and six smoke flares. They had no immersion suits, liferaft, EPIRB, skiff. Although they were equipped with a VHF and CB radio, it is not known with certainty if the radios were working. There was no list of passengers that were onboard and no record of the *Cougar's* destination and route.

They headed out very early in the morning since they had to go to the 1,000 fathom line to find the fish. When they failed to return at 7 PM that night, a friend reported them missing at 9:30 that night.

Search and Rescue was then started with the U.S. Coast Guard taking the lead. One friend of the captain of the *Cougar* told the Coast Guard that he thought they were fishing 60 or 65 miles west-northwest of Depoe Bay, Oregon. The husband of one of the passengers told the Coast Guard that he thought they would be 45 miles due west of Depoe Bay. The Coast Guard calculated that their search area was 3,600 square miles.

At 5 PM the vessel flooded and sank. No MAYDAY was heard. All nine people had to leave the vessel and enter the 55 degree temperature water. They were able to take the little survival gear they had with them into the water. Despite the fact that numerous helicopters, planes and boats searched for them, they were not picked up until 11:30 am the next day, after spending 17.5 hours in the water. During this time, two of the crew and another two of the passengers had died of hypothermia.

Float Plan Scenarios

Shipwrecked Man Rescued after Two Weeks on Island

Anchorage (AP)—An Anchorage fisherman was rescued Monday after surviving nearly two weeks on berries and kelp while shipwrecked on Nunivak Island. His two companions managed to make their way to safety.

Roy Kayoukluk, 39, was picked up after a four-day search begun when his brother and a friend reached Mekoryuk. The three men were heading from Bristol Bay to Unalakleet to fish for herring when they ran into a storm. High winds and heavy seas nearly capsized their 32 foot gillnetter. But the Alaska State Troopers said they managed to find shelter in Dooksook Lagoon on the west side of Nunivak Island.

The men began walking to Mekoryuk on the northern side of the island after the storm washed the fishing boat up on the beach. After about a week, Kayoukluk said he grew tired and cramped, and he lagged behind while the others continued toward the village. “They walked ahead of me while I was having trouble with my legs,” Kayoukluk said, “I was lying down resting my legs. I was hurting pretty bad.”

Kayoukluk said he lost his way because of snow and fog and began walking in the opposite direction. “I was pretty hungry. Those were leftover berries from last year, but they were still pretty good.” His weight dropped from 130 pounds to 102 pounds by the time he was rescued. An airplane finally spotted him Monday night.

Used with permission, Daily Sitka Sentinel, June 1, 1989

Float Plan Scenarios

Missing Boaters Found Safe

by Allen Sykora

A man and woman from Klawock were rescued from a remote Coronation Island shoreline Saturday after 16 days alternately adrift in their powerless 16 foot boat and stranded on the uninhabited island. The two, Winnie Monta, 60, and Doug Taylor, 38, had not been reported missing until May 15, when they were overdue returning from an extended camping trip. But their troubles had begun 11 days earlier, when the engines on their 16 foot boat quit and they were adrift and being blown out to sea.

They said they were adrift a number of days before being washed up on Coronation Island, the last landfall before the open ocean.

Cmdr. Bruce Merchant, pilot of the Air Station Sitka Coast Guard helicopter that located the two, said the pair told him they subsisted on gumboots—intertidal sea creatures—edible plants and the small amount of dried fish they had in the boat.

After the two were reported overdue on May 15, a Coast Guard helicopter spent two days searching the area around Klawock where they were believed to have gone. Also involved in the search was a Coast Guard cutter. The search was then suspended after no trace of the couple nor their boat was found.

The search was resumed Friday night after a pilot of a commercial floatplane from Ketchikan spotted a raft near Whale Head Island, said the Coast Guard. . . . A Sitka air crew left at first light on Saturday morning to resume searching, extending the search area to islands far to the northwest of the area previously covered.

“We were flying along and all of a sudden there were two people,” related Merchant. The man was waving a large orange float on the rocky shoreline of Coronation Island. . . .

For the first two days adrift all they had to eat and drink was a can of pop and some dried fish. Finally it rained and they were able to collect water in a tarp.

Merchant said they were not sure how many days they were adrift before they finally washed up on Coronation Island. They rode out two storms in the boat before making the landfall, about 25 miles northwest of where the raft was found. . . . The Coast Guard said the survivors had two rifles and fired them at times to try to signal boats they had seen in the distance, but they were never able to attract anyone’s attention. . . .

Used with permission, Daily Sitka Sentinel, May 22, 1989

Name: _____ Date: _____

Writing a Float Plan

Write a float plan for one of the trips described in Student Handout #1. Use your imagination to fill in the details not provided in the handout.

I will give this plan to: _____

Who is going? List their names and phone numbers: _____

Where are you going? _____

How will you travel, what route will you take, and what will you do along the way?

When will you arrive at your destination?

Day: _____

Time: _____

When will you return home?

Day: _____

Time: _____

Describe your boat: _____

What survival and camping gear are you taking?

What is your vehicle's description, license number, and where you are going to leave it (if applicable)? _____

Who to contact in case we don't return when expected: _____

Alcohol and Drug Dangers

Time: 20-60 minutes

Overview

Use a video and an obstacle course to reinforce that alcohol and boating are a bad mix.

Objective

After completing this activity, students should be able to list eight reasons why alcohol should not be used while boating.

Materials

- *Alcohol and Boating? It's Your Choice* video (20 minutes) [AMSEA](#)
- 1 per student, Student Handout #1 **Alcohol and Boating? It's Your Choice Video Worksheet**
- Overhead #4 **Why Alcohol and Boating Don't Mix**
- Several pylons or other safe obstacles for marking an obstacle course
- 1 per course, wheeled chair (such as office chair)
- 1 pair per course, clear safety glasses
- Petroleum jelly

Procedure

Part 1

1. Explain to students that they will be watching a video about the effects of alcohol and boating.
2. Distribute Student Handout #1 and read through the questions together.
3. Show *Alcohol and Boating? It's Your Choice*. Have students take notes to help complete Student Handout #1.
4. Review answers, emphasizing the increased risk of death from using alcohol in outdoor activities, and other pertinent alcohol information the video may not have covered.
5. Summarize the discussion using Overhead #4.

Part 2

1. Explain to students that they will be simulating the effects that alcohol has on their ability to safely navigate.
2. Set up one or more meandering obstacle courses marked by soft objects. Have some fun identifying what obstacle each object represents.
3. Tell students they must stop immediately at your command during the activity.
4. Review the physiological effects of alcohol.

5. Smear safety glasses lenses with a layer of petroleum jelly thick enough to distort vision.
6. Select a volunteer to wear the glasses to experience some of the physiological effects of alcohol—impaired vision and dizziness. They will be the “alcohol impaired” driver.
7. Select a second volunteer to play the part of the non-drinking passenger. He/she will sit in the wheeled chair. Keep a close eye on the activity to maintain a safe environment.
8. Turn the “alcohol impaired” driver around three times and have him/her push the passenger in the chair through the course at a safe speed. The goal is to get to the destination, keeping the passenger safe, without hitting any of the obstacles.
9. Alternate volunteers.
10. Reinforce the dangers of drinking and driving a boat (or car).

Variations

1. Draw or tape a 25-foot long line on the floor. Have students wear the safety glasses with the petroleum jelly smeared on the lenses while walking the line, placing one foot in front of the other. This simulates impaired balance and is shown in the video.

2. Place black paper over the side-guards of the safety goggles. This simulates the reduced peripheral vision associated with alcohol consumption.
3. Have students collect articles on boating accidents from newspapers, especially ones that discuss whether alcohol was involved. (Note: Sometimes alcohol is not mentioned as the cause of death for privacy reasons.)
4. Have students interview someone who has been involved in a boating and alcohol accident, or is a relative of a victim. Try to find out what happened, what could have been done to prevent the accident, and the impact the accident had on the family and friends of the person involved.
5. Have students interview a police officer, doctor, emergency medical services provider, search and rescue volunteer, or U.S. Coast Guard personnel about what they have seen alcohol do to people.
6. Diagram how alcohol travels through and affects different parts of the body.
7. Have students write a review of *Alcohol and Boating? It's Your Choice* for the school newspaper.
8. View television and print alcohol advertisements. Have students write a report summarizing:
 - The ways advertisers appeal to youth
 - How many of the hazards associated with drinking alcohol are shown in ads
 - How many of the negative effects of drinking alcohol while engaged in outdoor activities are shown in ads
9. Have students create a new ad that shows the dangers of alcohol and boating.

This activity addresses Alaska Content Standards

Language Arts A-1 Effective writing

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-5 Well-being of the family, A-6 Making informed choices, B-1 Identifying risks

and consequences, B-2 and C-2 Effective communication, C-5 Effects of attitude and behavior, D-1 Responsible decisions, D-2 Safe and healthy environments

Name: _____ Date: _____

Alcohol and Boating? It's Your Choice Video Worksheet

1. What are the penalties for drinking and operating a watercraft while intoxicated?
2. What happened to some of U.S. Coast Guardsman Rick McElrath's friends who drank?
3. Why is it harder to rescue yourself if you have been drinking?
4. What part of your body is affected first by alcohol?
5. What are some of the effects of alcohol on your body?
6. What did Dr. Parker say about the effects of alcohol on your ability to operate a boat?
7. When driving a boat, what factors can make it seem like you have been drinking?
8. Are the effects of alcohol more noticeable when on a boat than on land? Why?
9. How did Dennis' death affect his wife Heather, son Levi, and nephews Rick and Robbie?
10. What things do you have a choice about in your life?

Alcohol and Boating? It's Your Choice Video Worksheet

1. What are the penalties for drinking and operating a watercraft while intoxicated?
Same as for driving an automobile (AS 05.25.060)
2. What happened to some of U.S. Coast Guardsman Rick McElrath's friends who drank?
They died
3. Why is it harder to rescue yourself if you have been drinking?
Because your reactions are slow, your vision is reduced, and your balance and judgment are affected
4. What part of your body is affected first by alcohol?
Your brain
5. What are some of the effects of alcohol on your body?
Loss of judgment, reduced vision, poor balance, slowed reaction time, increased risk of hypothermia, compounds boater's hypnosis
6. What did Dr. Parker say about the effects of alcohol on your ability to operate a boat?
It affects your balance and vision
7. When driving a boat, what factors can make it seem like you have been drinking?
Noise, vibration, wind, and glare
8. Are the effects of alcohol more noticeable when on a boat or on land? Why?
They are more noticeable when on a boat due to boater's hypnosis.
9. How did Dennis' death affect his wife Heather, son Levi, and nephews Rick and Robbie?
His death affected them very negatively
10. What things do you have a choice about in your life?
The friends you make, the things you do with them, etc.

Alcohol Stories and Refusal Skill™

Time: 60-90 minutes

Overview

Analyze newspaper articles and practice The Refusal Skill™ to avoid dangerous alcohol situations.

Objectives

After completing this activity, students should be able to:

1. State that loss of judgment is one effect of alcohol consumption.
2. Demonstrate one technique to avoid participating in activities where alcohol is consumed.

Materials

- 1 per student, Student Handouts #1 **Alcohol and Boating Stories**, #2 **The Refusal Skill™**, and #3 **Alcohol and Boating Stories Question Page**

Procedure

1. Explain to students that they will be examining how alcohol consumption affects judgment, and will be practicing a way to refuse to participate in activities where alcohol is consumed.
2. Distribute Student Handout #1, assigning one story to each student. Have students take turns reading the stories aloud.
3. Discuss the role alcohol played in each story.
4. Discuss local situations where the combination of alcohol and outdoor activities have led to disaster.
5. Distribute Student Handout #2. Review The Refusal Skill™, demonstrating the technique with an assistant. Refusing may be a difficult task for some students whose cultural upbringing has taught them to be quiet and cooperative. This is particularly true in the Yupik culture. If cultural values prohibit students from being assertive or even from suggesting alternatives, they should not be pushed to do so, nor should they be criticized. It may be necessary to discuss this activity with adults of the culture to determine a more culturally sensitive approach. Also, be aware that role playing is not an effective learning strategy for some groups.
6. In small groups or as a class, take one or two situations or create a scenario, and practice using The Refusal Skill™.
7. Distribute and have students complete Student Handout #3.
8. Have students read their re-written stories. Discuss what it would have taken in real life to have changed the story to the happier ending.
9. Conclude with a discussion of the skills needed to be safe in a real life situation involving alcohol.

This activity addresses Alaska Content Standards:

Language Arts B-1 Meaning from written text, B-2 Investigations in written materials, C-5 Project collaboration, D-1 Developing a logical position, E-1 Understanding perspective

Science A-14 Living things and their environments

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, B-1 Risk and consequences, B-5 Evaluating information, C-5 Effects of attitude and behavior, D-1 Analyzing situations, D-2 Drawing logical conclusions

Alcohol and Boating Stories

NTSB Recreational Boating Study (SS-93-01, 1993)

Swissville, Colorado, May 26, 1991

Three men in a six-foot inflatable boat headed down the Arkansas River. They hit a class II rapid and were thrown into the water. The men wearing PFDs survived. The third man was not wearing a PFD although one was in the boat. The third man drowned.

Earlier in the day a Colorado State Ranger saw them and recommended to the man not wearing a PFD that he put his PFD on. The man asked, “Is it required that I wear it?” The ranger said no but that it was a good idea. The man then said he would not wear it. This is despite the fact that he couldn’t swim. This is the man who drowned. It was found that he had a Blood Alcohol Content (BAC) of 0.125%.

Man Drowned, Another Arrested, in Boat Incident

Anchorage (AP)—One man drowned and another was taken into custody after a fishing boat ran aground off the Homer Spit, Alaska State Troopers said. The incident occurred about 7:15 p.m. Tuesday when the fishing boat *Vigor* ran up on shore near the Lands End Resort, troopers said.

An extensive search began after the Coast Guard received a report that at least one person was in the water and that a small fishing boat had been going around in circles and eventually grounded. The search involved troopers, two Coast Guard cutters, two fishing vessels, the Alaska Marine Highway ferry *Tustamena* and Homer police.

Search parties found one person unconscious on the beach. Rescuers began CPR until medical teams could arrive. Rudolph Carlson, 57, was pronounced dead at Homer Hospital. Aarron Ellison, 26, of Homer was arrested for driving while intoxicated and operating a watercraft, resisting arrest, assault on a police officer and misconduct involving a weapon, troopers said.

*Used with permission, Daily Sitka Sentinel,
January 27, 2000*

Two Drown

Bethel (AP)—Rescue teams dragged opposite ends of the Kuskokwim River over the holiday weekend searching for two men lost in separate incidents, each involving alcohol.

Alaska State Troopers said 31-year-old Henry Nicholai was with a group of boaters returning from Bethel’s Fourth of July celebration when he took off his lifejacket near Napakiak and dove in.

Investigators say Nicholai had been drinking heavily. His body was retrieved Saturday a few miles downriver from Bethel.

*Used with permission, Daily Sitka Sentinel,
July 5, 1997*

The Refusal Skill™

The goal of this activity is to both keep friends and stay out of a dangerous situation. You will be working in pairs. One of you will play the role of the person who wants to participate in some dangerous behavior. The other person will play the role of the person who doesn't want to. The one who doesn't want to will use The Refusal Skill™ to decline to participate. Debrief at the end.

The Refusal Skill™ has several steps:

1. Ask questions.
“What . . .?” “Why . . .?” This clarifies the situation.
2. Name the trouble specifically.
“That’s . . .”
3. State the physical and emotional consequences.
“If I do that . . .”
4. Suggest an alternative that communicates that you are rejecting the activity and not the person.
“Instead, why don’t we . . .”
5. Move it, sell it, and leave the door open to persuade your friend that your position and/or alternative is attractive.
“If you change your mind . . .”

Allow yourself to maintain control of your situation, try to persuade the other person(s) that you are serious, make alternatives look doable and attractive, and emphasize the importance of your friendship and maintaining it.

Here’s an example:

Scenario: Your friends are leaving in a skiff for an overnight campout a couple of miles from

home. Everyone is in the boat. You notice there is beer in the boat and everyone is talking about a big party.

For this scenario, there are many ways you could use The Refusal Skill™ if you were the person trying to keep friends and avoid a dangerous situation. One possibility is:

1. Ask questions.

Once you see beer in the boat, you know that at least some of your friends intend to drink either on the way or during the trip. This will affect the safety of the whole group. Although there are many other questions to ask about the trip to determine how safe it might be, you need to know first if your friends are determined to drink on the trip. You could ask, “Do you guys really want to take the beer on the trip?” “Is the driver going to drink and drive?”

2. Name the trouble specifically.

“Remember when _____ went out in the boat and drank? They found the boat but they never found him. Drinking is really dangerous around boats.”

3. State the consequences.

“What if something happens to one or more of us out there? Think how awful it would be to have to tell our parents that something bad happened because we were drinking. And you know what? I really don’t want to put myself in a position to tempt me to do something I’ll regret later.”

If they keep pressuring you, you could say something like, “Your pressuring me makes me feel angry. It’s like you really don’t care about me. I don’t want to feel responsible if something happens.”

4. Suggest an alternative.

“Why don’t we just leave the beer here and go like we’d planned?”

5. Move it, sell it, and leave the door open.

“It would be great to just go have fun like we used to. We could play football on the beach, then make s’mores over the fire and stay up late. We’d be safe, not worry anybody, and feel a lot better than if we’d have stayed up drinking all night.”

If they say they are taking the beer along anyway, you could say something like, “I care a lot about all of you and wish you’d change your mind. If you do, I’d love to go. You can find me at the house.”

Now you can make up your own scenario and practice using The Refusal Skill™. It may be awkward to do it at first, but it may save your life some day!

Name: _____ Date: _____

Title of Article: _____

Alcohol and Boating Stories Question Page

Use your imagination to write a short story expanding on the events in the incident in one article from Student Handout #1. Write from the perspective of the victim. Include:

1. How alcohol use encouraged risk taking and other negative choices.
2. How their companions might have influenced their decisions or safety.
3. An ending so the person avoided the incident.

Wahoo! Game

Time: 30-60 minutes

Overview

Play a board game reviewing alcohol facts.

Objective

After completing this activity, students should be able to describe at least six effects of alcohol on the body's physiology.

Materials

- 1 per group of 4 students, Wahoo! game board (make from Templates #1 and #2 or borrow whole game from AMSEA) **AMSEA**
- 2 per group of 4 students, pieces of 8 1/2" x 11" cardboard (if making own game boards)
- Glue and a way to laminate (if making own game boards)
- 1 per group of 4 students, set of Wahoo! cards (make from Template #3) **AMSEA**
- 1 per group of 4 students, white die and red die **AMSEA**
- 1 per group of 4 students, Student Handout #1 **Directions for Play**

Procedure

Before Class

1. Activity #8 should be completed prior to this activity. Be sure you have covered all the information on the Wahoo! cards.
2. Make Wahoo! game boards. For each board, make a copy of the Wahoo! game board top and bottom, and glue each to a piece of cardboard so the 6 rows and 6 columns of squares line up. Color the dice along the top red. Laminate.
3. Make a set of Wahoo! cards for each board. If making multiple sets, use different colors to help keep sets separate. Shuffle cards before using.

During Class

1. Explain to students that they will be playing a board game to review alcohol facts.
2. Divide class into groups of 4 and distribute one copy of Student Handout #1 to each group. Each group forms 2 teams.
3. Provide each group with a game board, 1 red and 1 white die, and one set of cards.
4. Place cards face down to cover every square on the board.
5. Follow the directions on Student Handout #1 **Directions for Play**.

This activity addresses Alaska Content Standards:

Language Arts B-1 Meaning from written, oral, and visual text

Science D-1 Practical applications of scientific knowledge

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed choices, B-1 Risk and consequence, D-2 Safe and healthy environments

**Wahoo! Game
Board Top**



WAAHOO!



Wahoo! Game Board Bottom

Wahoo! Cards

<p>What are the penalties for drinking and operating a watercraft while intoxicated?</p> <p><i>The same as for driving an automobile while intoxicated</i></p>	<p>Is alcohol a stimulant or a depressant?</p> <p><i>Depressant</i></p>	<p>When driving a boat, what environmental factors can make it seem like you have been drinking alcohol?</p> <p><i>Wind, motion, glare, noise, vibration</i></p>
<p>In what percentage of boating fatalities is alcohol involved?</p> <p><i>Over 50%</i></p>	<p>What aspects of vision are impaired by alcohol consumption?</p> <p><i>Peripheral vision, ability to focus, depth perception, night vision</i></p>	<p>Why is it harder to rescue yourself if you have been drinking alcohol?</p> <p><i>Alcohol causes lack of coordination, decreased judgment, increased susceptibility to hypothermia</i></p>
<p>Name at least three ways alcohol negatively affects your ability to operate a boat.</p> <p><i>Balance, judgment, reaction time, vision, intensifies effects of boater's hypnosis, increases risk of hypothermia</i></p>	<p>____ hours of wind, motion, glare, sun, vibration, and noise can cause "boater's hypnosis."</p> <p><i>Four</i></p>	<p>What do search and rescue people risk when they look for someone who is missing?</p> <p><i>Their lives</i></p>
<p>True or false? Drinking alcohol is a good treatment for hypothermia.</p> <p><i>False</i></p>	<p>Name four things that can intensify the effects of alcohol on someone on a boat trip.</p> <p><i>Wind, vibration, noise, glare and sun, sea motion</i></p>	<p>What part of your body is first affected by alcohol?</p> <p><i>Your brain</i></p>
<p>How many drinks in a 2 hour period does it take for a 150 pound person to lose some judgment?</p> <p><i>One</i></p>	<p>How many beers in a 2 hour period does it take to alter your reaction time, coordination or judgment?</p> <p><i>One</i></p>	<p>Name four effects alcohol has on your body.</p> <p><i>Affects judgment, impairs vision, affects coordination, affects balance, increases risk of hypothermia, increases risk of sudden drowning syndrome</i></p>
<p>Does a cold shower, coffee, or physical exercise sober a person up?</p> <p><i>No</i></p>	<p>Are the effects of alcohol more or less noticeable on a boat compared to being on land?</p> <p><i>More</i></p>	<p>Where in your body is alcohol absorbed into the blood stream?</p> <p><i>Stomach</i></p>

<p>Is alcohol absorbed faster or slower when you have an empty stomach? <i>Faster</i></p>	<p>Does alcohol make you handle situations better? <i>No</i></p>	<p>Is one 12 ounce beer as intoxicating as a glass of wine? <i>Yes. 4 ounces of wine = 12 ounces beer.</i></p>	<p>How can being intoxicated be dangerous when confronted with a speed boat heading for you? <i>Reaction time is slowed, judgment is impaired</i></p>
<p>Does carbonation affect how quickly you feel the affects of alcohol? <i>Yes. It increases the speed of absorption</i></p>	<p>Does alcohol make people think they handle situations well? <i>Yes</i></p>	<p>Will drinking a cup of coffee sober you enough to handle your boat safely? <i>No</i></p>	<p>How does alcohol affect your ability to notice hazards, judge speed, and judge distance? <i>Reduces all; reduces peripheral vision, depth perception, and ability to focus</i></p>
<p>What mental abilities does alcohol affect negatively? <i>Judgment, attitude, thinking, decision making, processing information</i></p>	<p>If you have been drinking alcohol, will you react faster or slower? <i>Slower</i></p>	<p>What is the most widely used drug by teenagers in the U.S.? <i>Alcohol</i></p>	
<p>Does alcohol speed up hypothermia, have no effect on it, or slow it down? <i>Speeds it up</i></p>	<p>What does alcohol do to the health of your brain? <i>Alcohol kills brain cells.</i></p>	<p>What drug causes the most deaths every year in the U.S.? <i>Alcohol</i></p>	
<p>How does alcohol affect your ability to operate a boat? <i>Slows reaction time, affects judgment, distorts depth perception, affects peripheral vision, decreases alertness, impairs balance</i></p>	<p>Is a person who has been drinking more, or less, likely to fall overboard? Explain. <i>More. Impaired sense of balance.</i></p>	<p>When you drink alcohol, are you more likely to take risks? <i>Yes</i></p>	
<p>How do boaters' hypnosis and alcohol interact? <i>They intensify each other</i></p>	<p>If a person has been consuming alcohol and falls into the water, how does alcohol affect them? <i>They are more likely to succumb to sudden drowning syndrome, effects of hypothermia are speeded up, more prone to disorientation, poor judgment, poor coordination, slower reaction time.</i></p>	<p>What is "boaters' hypnosis?" <i>Condition of being less alert and reacting more slowly after 4 hours exposure to wind, motion, noise, vibration, and glare</i></p>	

Directions for Play

1. Place one card face down on each square on the board.
2. The first team rolls the dice. Place the red die at the top of the corresponding red **column** on the Wahoo! board. Place the white die next to the corresponding white **row** of the Wahoo! board. For example, if the team rolls a red 6 and a white 3, the red die would be placed at the top of the sixth column and the white die would be placed to the left of the third row.
3. A member of the **opposite** team reads out loud the question on the card located in the box where the row and column marked by the dice intersect. In the example, the card to read is at the intersection of the third row and the sixth column.
4. If the question is answered correctly, the team that answered keeps the card, says, “Wahoo!” and gives the dice to the other team.
5. If the team gives the wrong answer, **the correct answer is read aloud**, the card is returned to the game board face down, and the team passes the dice to the other team.
6. If the question you are supposed to answer has already been correctly answered, roll again.
7. The team with the most cards after the board has been cleared, or time runs out, wins.

High Heat Loss Areas

Time: 15 minutes

Overview

Do an experiment to illustrate heat loss from the high heat loss areas.

Objectives

After completing this activity, students should be able to:

1. List the five high heat loss areas.

2. Describe the effect of exposing high heat loss areas to cold air.

Materials

- Overheads #6 **High Heat Loss Areas** and #7 **Heat Gain-Heat Loss**
- 1 per student, warm hat
- 1 per student, scarf
- Windy or cold day

Procedure

1. Explain to students that they will be learning about high heat loss areas.
2. Using Overhead #6 explain where the high heat loss areas are and have students locate their own.
3. Show Overhead #7 and discuss heat gain and loss.
4. Have the class put on hats and scarves and walk outdoors. Have the group squat (**not** sit on the ground) with arms against their sides and legs, protecting the groin. They should hold this position for 3-5 minutes. Discuss feelings of warmth or cold.
5. Have everyone stand up and remove their hats and scarves. Then have students stand for 3-5 minutes with their hands on their hips and their legs apart so none of their high heat loss areas are well-protected. Have them compare the feeling of warmth and cold with the first situation.
6. Debrief back in the classroom, applying the lessons learned to dressing for a boat trip.

This activity addresses Alaska Content Standards:

Language Arts A-4 Speaking with purpose

Science A-4 Observable natural events, A-14 Living things and their environments, A-15 Using local knowledge, C-2 Knowledge through experimentation, D-1,3 Practical applications of scientific knowledge

Geography B-6 Making informed decisions about place

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed decisions, B-5 Evaluating information

Survival Kits

Time: 45 minutes

Overview

Assemble a personal survival kit that contains essential items.

Objectives

After completing this activity, students should be able to:

1. List the four categories of essential items for a personal survival kit.
2. Select items for a personal survival kit based on the four essential categories.
3. Assemble a personal survival kit.

Materials

- Overhead #8 **Personal Survival Kits**
- Story #1 **Stranded Boater Found after 3-Day Adventure**
- 1 per student, Student Handout #1 **Some Suggested Items for Personal Survival Kits**
- 2 boxes large enough to hold the collection of survival kit items below
- Enough items to provide at least one item from each essential category for each of the groups (see Student Handout #1 for suggestions)
- Inappropriate or items too large to fit in personal survival kits
- 1 per group, quart-size Ziploc™ plastic bag

Procedure

Before Class

1. Distribute the survival kit items between the two boxes.

During Class

1. Explain to students that they will be assembling a personal survival kit.
2. Define survival kit for students, but don't tell them what should be in it yet.
3. Read Story #1.
4. List items the boater had with him that were important for survival. List some items that he would have found useful.
5. Write the headings for the four essential categories for survival kits on the board and explain that a good personal survival kit has items from all four categories. Sort listed items into these categories.
6. Show Overhead #8. Emphasize that a personal survival kit should be individual, activity specific, and small enough to fit in a pocket so it is **always** with you.
7. Divide the class into groups of three or four and distribute a quart-size Ziploc™ bag to each group.
8. Have groups assemble a personal survival kit in the bag using items from the boxes.
 - Have each group send one person at a time to choose one item.
 - Time limit is 5 minutes.
 - When time is up, groups review their completed kits and zip them shut.
 - Give groups one minute to change one item, if they want.
9. Point to each category on the board and poll groups to learn which of their items fit the category. (More lengthy option: Each group shows its kit and tells which category each item belongs to.) Emphasize that the most useful items often fall under more than one category, kits should have items from the four categories, and the kit must fit into a pocket.
10. Collect the kits.
11. Distribute Student Handout #1. Have students write ideas for additional items on their lists and take the lists home.
12. Describe comfort kits and list items that might be in them. Emphasize:

- Most people who find themselves in an emergency have only their clothes and the contents of their pockets. Buckets and other containers with emergency gear are often left behind or float away in an emergency.
- Always carry a personal survival kit in your pocket. You can also carry a comfort kit, but don't count on it.

This activity addresses Alaska Content Standards:

Language Arts C-3 Group decision making, C-5 Project collaboration, D-4 Explain and defend a position

prevention, A-6 Making informed choices, B-2 Effective communication, C-5 Effects of attitude and behavior

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury

Survival Kits is based on an activity submitted by Juneau, Alaska, school teacher Dennis Early.

Stranded Boater Found after 3-Day Adventure

Anchorage (AP)—A man who was trying to reach Deshka Landing on the Susitna River over the weekend got an unexpected adventure when an ice floe caught up to his small boat and swept him downstream and out into Cook Inlet.

When Tom Beltran tried to make his way back, his skiff ran out of fuel and he spent three days lost in the marshy wilds of Flat Horn Lake. Beltran was in a boggy area about three miles from his boat when Alaska State Troopers found him Tuesday. Beltran told rescuers that he drank swamp water to survive and fired his rifle so many times to frighten the bears that he ran out of ammunition.

Beltran was tired, dehydrated and cold, but otherwise unhurt when found. He had spent two chilly nights outside without a tent or sleeping bag and had only a pair of insulated pants, a coat, and a T-shirt to keep warm. “He was very relieved to see us,” said the trooper John Cyr. “He shook our hands a couple of times.”

Beltran, reached by telephone Tuesday at a friend’s house in Big Lake, said he didn’t feel up to discussing his ordeal in detail. “It was an adventure,” he told the *Anchorage Daily News*, “But I’m real, real hungry and I’ve got a bad case of the shakes. I need to eat some dinner.”

Beltran’s adventures started Saturday when he left a group of cabins on Fish Lake Creek, where he had been staying for the winter, and headed for Deshka Landing. He told his brother-in-law Ed Aberle that he planned to be in Anchorage Saturday night.

Aberle said he warned Beltran. “I told Beltran, ‘You better hold up because there is still ice on the Big Su,’ ” he said.

Beltran left anyway, in an 18 foot aluminum boat with a small outboard motor. He made his way down the Yentna River, but got caught in an ice jam as he reached the Susitna. “How do you explain it?” Beltran said. “There was all different sizes of chunks of ice and this and that around, and you’re stuck in it and you have to keep going with the river. All you can do is look for a way to make an out.”

By the time he was free of the ice he was past the Beluga power lines that stretch across the mouth of the Susitna River. He started heading back upstream, but got lost and ended up in Alexander Creek. He ran into a man there who told him how to get back to the Susitna River. He made it back to the river, but about 3 miles later he ran out of gas, he told troopers. Cyr estimated he was about 12 miles downstream from the mouth of the Yentna by then.

He pulled the boat to shore, grabbed a gas can, started hiking and spent the next two days looking for a place to get some gas. He slept outside on any dry patch of ground he could find.

Troopers launched a search Monday. They found the boat with the empty fuel tanks by that night and figured that Beltran was trying to hike out. Cyr described the area as about 70% marsh with lots of standing water. Meanwhile Beltran had found a cabin Monday where he was able to dry out.

Used with permission, *Daily Sitka Sentinel*.

Some Suggested Items for Personal Survival Kits

You obviously cannot fit all these items in your personal survival kit. Choose items that have more than one use, and that work for you and your activity. They need to fit into a sturdy waterproof container small enough to fit in your pocket.

Shelter

- Large garbage bags
- Space blankets
- Twine or cordage
- Knife
- Folding saw
- Bug head-net

Signals

- Whistle
- Surveyors flagging tape
- Signal mirror
- Strobe signal
- Small flares
- Chemical lights
- Paper and short pencil
- Foil

Personal health considerations

- Prescription medications
- Tampons/pads
- Water purification tablets
- Bug repellent
- Spare disposable contacts, contact cleaner/holder
- Energy bars, bouillon cubes

Fire

- Matches—“strike anywhere” type or “life boat survival matches”
- Candles
- Magnesium or other commercially available fire starter
- Steel wool

Other

- Ziploc™ storage bags

Legal Requirements

Time: 20-30 minutes

Overview

Familiarize students with the federal requirements for recreational boaters.

Objective

After completing this activity, students should be able to select the correct answers to commonly asked questions about recreational boating safety requirements.

Materials

- 1 per student, *Federal Requirements and Safety Tips for Recreational Boats* booklet **AMSEA** available from the U.S. Coast Guard, or *Alaska Boater's Handbook* from Alaska Division of Parks and Outdoor Recreation, Office of Boating Safety (or your state's safe boating office publication)
- 1 set per group, **Legal Requirements Questions cards** (make from Template #1)
- 1 set, **Legal Requirements Answers cards** (make from Template #2)

Procedure

1. Explain to students that they will be answering questions about the legal requirements for recreational boaters.
2. Explain that the federal and state governments have requirements for recreational boaters.
3. Divide students into groups.
4. Distribute *Federal Requirements and Safety Tips for Recreational Boats* booklet or your state's safe boating publication to each student, and one or two **Legal**

5. Allow 5-10 minutes for groups to find the answers. Ask each group to read their question(s), tell the class what page(s) the answer can be found on, and read their answer(s) aloud. Confirm answers with **Legal Requirements Answers cards**.

This activity addresses the following subject areas:

Language Arts B-1 Finding meaning in written text, D-1 Developing a logical position, D-1-C Identifying information sources, D-1-D Analyzing information

Government and Citizenship A-1 Purpose of government, A-2 Fundamental political ideas

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-5 Well-being of family, A-6 Making informed choices, D-1 Responsible decisions, D-2 Safe and healthy environments, D-3 Effects of public policy, D-4 Community well-being

Name: _____ Date: _____

Legal Requirements Questions Cards

1. What information should you include in a float plan?	6. How can you determine the maximum load for your boat?	11. In an overtaking situation, which boat must give way?
2. How many PFDs are recreational boats larger than 16' required to carry?	7. An individual is legally considered to be operating a boat while intoxicated if their Blood Alcohol Content (BAC) is _____?	12. Which recreational boats must be registered?
3. List the 10 criteria the U.S. Coast Guard uses to determine whether or not to terminate a recreational boating trip.	8. How many fire extinguishers are required on recreational boats less than 26'?	13. What agency registers recreational boats in your state?
4. What boats are not required to carry day signals, but must carry night signals when operating from sunset to sunrise?	9. What size recreational boats are required to carry sound producing devices?	14. In your state, children under what age are required to wear a PFD?
5. List six conditions that require a recreational boat to carry fire extinguishers.	10. When are recreational vessels required to display navigation lights?	

Name: _____ Date: _____

Legal Requirements Answers Cards

Answers are from the *Federal Requirements and Safety Tips for Recreational Boats (FRRB)* 8/98 edition, and the *Alaska Boater’s Handbook (ABH)*.

<p>1. What information should you include in a float plan? <i>Names and phone #s for everyone onboard; boat name and description; type of survival gear; automobile license, description, and where left; trip time, route, and destination; when due back; when and who to call for help. (FRRB & ABH)</i></p>	<p>6. How can you determine the maximum load for your boat? <i>By reading the boat’s capacity plate and following its guidelines. (FRRB & ABH)</i></p>	<p>11. In an overtaking situation, which boat must give way? <i>The overtaking boat. (FRRB & ABH)</i></p>
<p>2. How many PFDs are recreational boats larger than 16’ required to carry? <i>One Type I, II, III, or V PFD (wearable) for each person aboard. For Type V PFDs to be counted they must be used according to their label requirements. Any boat 16’ and longer (except canoes and kayaks) must also carry one Type IV (throwable) PFD. (FRRB)</i></p>	<p>7. An individual is legally considered to be operating a vessel while intoxicated if their Blood Alcohol Content (BAC) is _____? <i>0.08 in Alaska; 0.10 in some states, but is being reduced to 0.08. Implementation date depends on state. (FRRB)</i></p>	<p>12. Which recreational boats must be registered? <i>All undocumented boats equipped with propulsion machines (FRRB). In Alaska, kayaks and canoes must also be registered. (ABH)</i></p>
<p>3. List the 10 criteria the U.S. Coast Guard uses to determine whether or not to terminate a recreational boating trip. <i>Insufficient number of PFDs, insufficient fire extinguishers, overloading, improper navigation lights, inadequate ventilation, fuel leakage, fuel in bilges, improper backflame control, operating in regulated boating areas during predetermined adverse conditions (WA and OR only), manifestly unsafe voyage (FRRB)</i></p>	<p>8. How many fire extinguishers are required on recreational boats less than 26’? <i>One (FRRB)</i></p>	<p>13. What agency registers recreational boats in your state? <i>In Alaska, registration is with the Alaska Division of Motor Vehicles. (ABH)</i></p>
<p>4. What boats are not required to carry day signals, but must carry night signals when operating from sunset to sunrise? <i>•Recreational boats less than 16’ •Boats participating in organized events such as races, regattas, or marine parades •Open sailboats less than 26’ not equipped with propulsion machinery •Manually propelled boats</i></p>	<p>9. What size recreational boats are required to carry sound producing devices? <i>All vessels are required to carry a sound producing device. If over 12 meters (39’) in length a bell is also required. (FRRB)</i></p>	<p>14. In your state, children under what age are required to wear a PFD? <i>In Alaska, under 13 years of age. (ABH)</i></p>
<p>5. List six conditions that require a recreational boat to carry fire extinguishers. <i>Inboard engines, closed compartments containing portable fuel tanks, double bottoms not sealed to hull or not completely filled with flotation, closed living spaces, closed compartments that contain combustible or flammable materials, permanently installed fuel tanks (FRRB)</i></p>	<p>10. When are recreational boats required to display navigation lights? <i>Between sunset and sunrise, and other periods of reduced visibility (fog, rain, haze, etc.) (FRRB & ABH)</i></p>	

Keep Your Boat Afloat

Time: 20-30 minutes

Overview

Explore stability with two experiments with play boats and weights.

Objectives

After completing this activity, students should be able to:

1. Explain why people need to stay in the center of a small boat.

2. Explain why people need to board a small boat one at a time.
3. Explain why putting too much weight in a boat is dangerous.

Materials

- Story #1 **Hauling Sand**
- Container with 3" to 5" of water in it (fairly low sides allow more students to observe)
- Small rocks or other weights
- 1 (or more) toy boats that work with rocks, weights, and container

Procedure

1. Explain to students that they will be using toy boats to examine stability issues.
2. Introduce the activity by reading Story #1.
3. Discuss what the boaters did that caused them to end up in the water with one person dying from hypothermia. What was the probable effect of the sand on the skiff's freeboard?
4. Explain that they will see how weight affects a boat's ability to stay afloat.

Experiment 1

1. Set the container with water in it so all can see and place your boat in the water.
2. Place rocks or other weight in the center of the boat and note how it floats.
3. Move the weight to one side and note how it tips.
4. Place more weight to one side until the boat capsizes.
5. Discuss how this could happen to a small boat. Emphasize that stepping on the

gunwale (edge) of a small boat may make it capsize and that taking turns boarding a small boat is very important.

6. If time permits, allow students to experiment.

Experiment 2

1. With the same container, water, and boat, load weight evenly until the boat sits very low in the water.
2. Make waves until the boat swamps (fills with water).
3. Explain that the toy boat is like a real boat. Discuss the dangers of waves, swell, moving people, etc., especially in a heavily loaded boat.
4. If time permits, allow students to experiment.

Variation

Have students figure out how to demonstrate these principles.

This activity addresses Alaska Content Standards:

Science A-5 Understand the strength of nature, A-6 Understand the forces of nature, B-1 Use the processes of science, C-3 Knowledge through experimentation, D-1 Practical applications of scientific knowledge

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed choices

Hauling Sand

Safety Alert 03-01

17th U.S. Coast Guard District, U.S. Coast Guard, P.O. Box 25517, Juneau, Alaska 99802

On February 11, 2001 a couple left Ketchikan in calm clear conditions to get a load of sand from nearby Stack Island. Upon departure from the island, the loaded skiff, with very little freeboard, capsized. The couple swam to shore, but had no survival gear or shelter. The husband died during the night from hypothermia. The next morning the wife flagged down a passing boat, who placed an emergency call to the U.S. Coast Guard. The wife was transported to the hospital for treatment, and the Alaska State Troopers responded to transport the deceased victim back to Ketchikan.

The U.S. Coast Guard gives the following tips learned from this incident.

1. Careful loading of skiffs is essential to survival on the water. Skiffs quickly capsize if overloaded.
2. Boaters should carefully consider their plans when using their vessel for transportation of heavy cargo. Use of a second skiff as a “barge,” or a “buddy system” with another skiff operator may provide an extra measure of safety needed to save a life.
3. Mariners should keep a careful eye on the weather when transiting with heavy loads in open skiffs. Even small waves or vessel movements can quickly capsize a heavily loaded vessel.

Other survival factors:

1. Float plans are essential to boating so a search can be started in case of unforeseen emergencies.
2. Boaters should carry survival equipment in a waterproof bag that can be quickly released from a boat, in case emergencies arise.
3. Boaters should carry a variety of emergency signaling devices including a VHF radio.
4. Boaters should always wear lifejackets while boating. Flotation coveralls are the best resistance to cold Alaskan waters.

Note: This article was paraphrased from the original USCG Safety Alert.

Boat Safety Orientation

Time: 40-60 minutes

Overview

Using the school building and a boat visit, demonstrate the importance of a safety orientation when boarding a boat.

Objective

After completing this activity, students should be able to demonstrate at least 10 points of a boat's safety orientation.

Materials

- Overhead #9 **Boat Safety Orientation**
- Safety equipment for orientation in classroom (optional)
- Boat (optional)

Procedure

1. Explain to students that they will be doing an activity today. Don't tell them it will be about boat safety orientation immediately as that will give away the surprise element of the first part of your lesson.
2. Divide students into groups, and have groups walk to one exit in the building and return to the classroom ready to report on "anything they found." This part of the activity is to see how observant they are about all items without telling them specifically what to look for.
3. In the classroom, ask each group to draw the route they just explored. Have them identify safety features such as fire extinguishers and hoses, smoke and fire alarms, exit signs, working or blocked exits, and other safety features or hazards of their building.
4. If these features were missed, have students repeat the route and locate them.
5. Discuss the importance of knowing where safety features are in an emergency and the difficulty of finding them in the dark or in smoke. Note how often they may have passed them without noticing their presence.
6. Discuss the importance of doing the same orientation when on a plane or boat, or when sleeping in an unfamiliar hotel or house. Have students identify other features that are important to note in these situations.
7. Review Overhead #9 or brainstorm ideas with class on what passengers on an unfamiliar boat should know about the boat's safety equipment and/or procedures before departure. Discuss the problem of just one person onboard knowing how everything works and where emergency equipment is located.
8. Divide students into 2 groups. Have each group set up a "boat" for a safety orientation, locating safety equipment and hazards. When the "boat" is ready, have students give a safety orientation to others as if they were getting ready to go on a trip. Each student should present at least one orientation point.
9. Have the class critique the orientations and add what was missing. Review overhead.

Variation

Set up a field trip to an actual boat. Have the owner or operator of the boat give a safety orientation to the class as if they were about to go on a trip. Be sure to review this with the owner/operator before class so a good example is given. Back in the classroom, have students critique the orientation, using the overhead to help review.

This activity addresses Alaska Content Standards:

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, B-1 Risk and consequences, D-1 Responsible decisions, D-2 Safe and healthy environments

Choices

Time: 20-30 minutes

Overview



Use sets of cards to choose items to take on a day boat trip.

Objective

After completing this activity, students should be able to choose the most appropriate items or

actions for a safe boat trip when presented with options.

Materials

- 1 per group of 3-5 students, **Scenario card** (make from Template #1) 
- 1 set per group of 3-5 students, **Choices cards** (make from Template #2) 

Procedure

Before Class

1. Make **Choices cards**. Copy pages duplex-to-duplex to produce 2-sided cards. Consider copying each set onto a different color paper so they will be easier to keep track of and sort. Blank cards are included so you can offer other options. Laminate the pairs of choices back-to-back.
2. Make **Scenario cards** (they are single-sided).

During Class

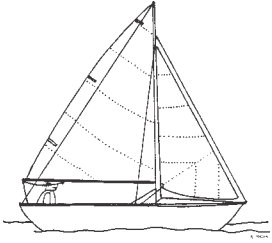
1. Explain to students that they will be choosing actions to prepare for and equipment to take on a boat trip.
2. Review factors leading to a safe boating activity, including clothing, PFDs, personal survival kits, comfort kits, and float plans.
3. Divide students into groups of 3-5.
4. Give each group a **Scenario card** and a corresponding set of **Choices cards**.
5. Explain that each group will plan the trip described on their **Scenario card**, and then make a list of what to do and pack for that trip based on the options offered on their set of **Choices cards**.
6. When they are done, have each group describe their scenario to the class, what they chose and why. Discussion points:
 - Each **Choices card** presents two things to choose from. Students may choose one thing or neither.
 - They should consider space and weight considerations for their scenario. For example, items for an all-day boating trip must be carried on the boat, but you can take much more in a skiff than on a kayak or canoe trip.
 - Help students decide what items are reasonable to take given real-life constraints.
 - What is the most important thing they carry on their person and why?
 - Which was the most difficult choice they had to make and why?
 - Which was the easiest choice they had to make and why?
 - What else would they have wanted on the boat and why?

This activity addresses Alaska Content Standards:

Language Arts A-6 Using visual communication, D-1-A Personal experience and prior knowledge

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed decisions, B-1 Risk and consequences

Scenario Cards

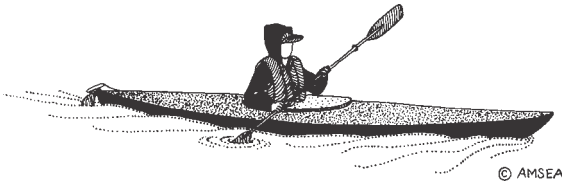


You are going on an overnight sailing trip.

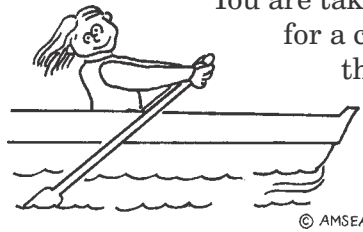
You are going out with your friends for the weekend in your 26 foot power boat with a cabin.



You are leaving on a 5-day kayak trip to a remote area.



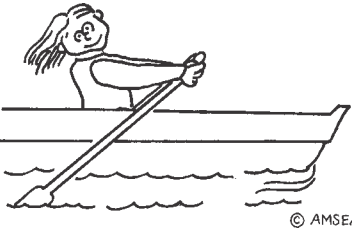
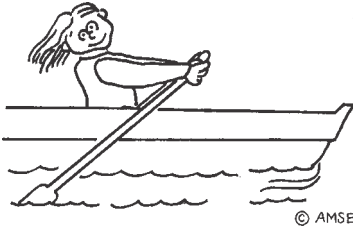
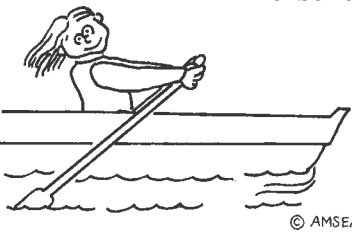
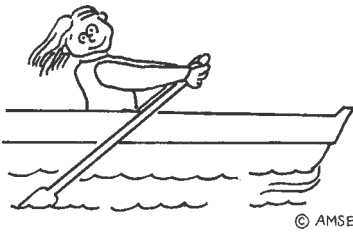
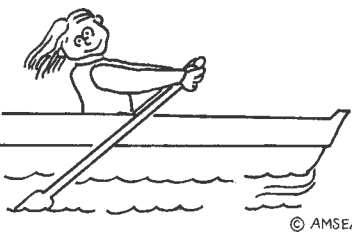
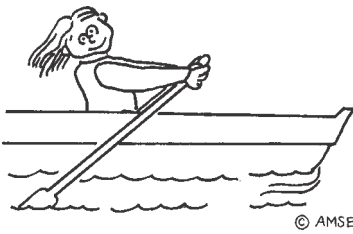
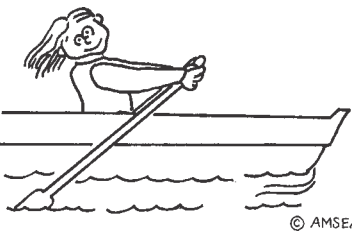
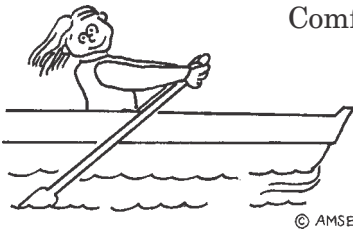
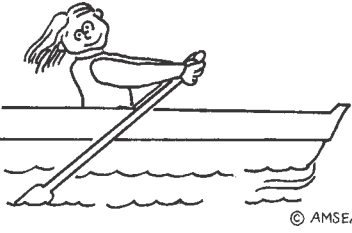
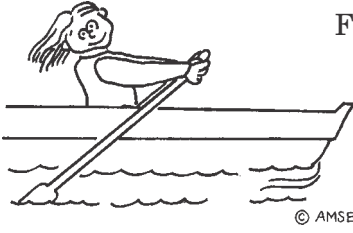
You are taking your rowboat for a couple hour trip in the afternoon.

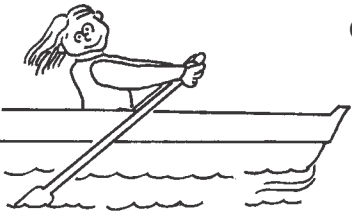
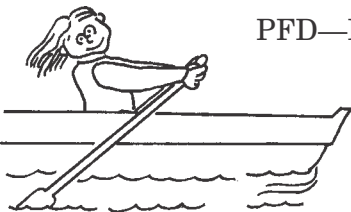
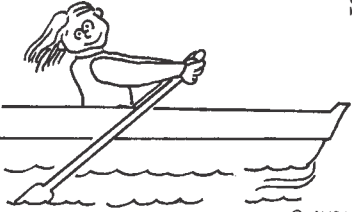
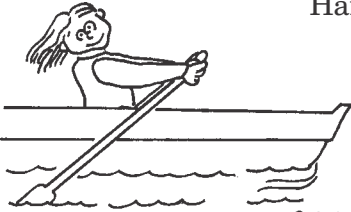
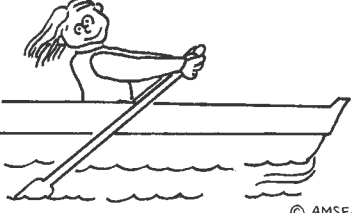
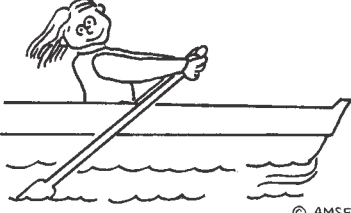
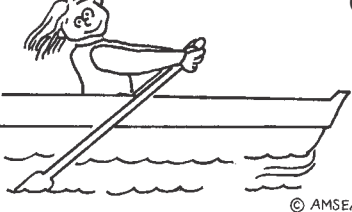
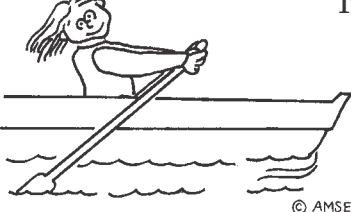
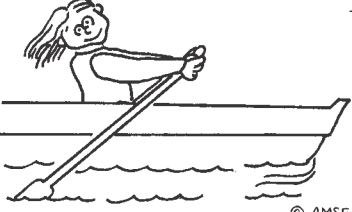
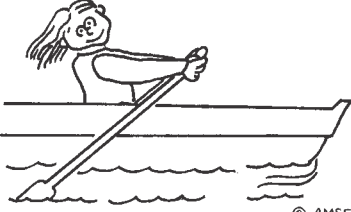


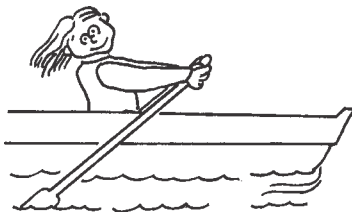
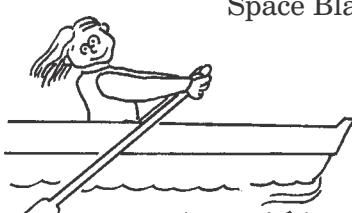
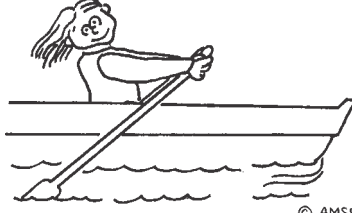
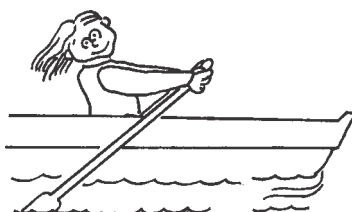
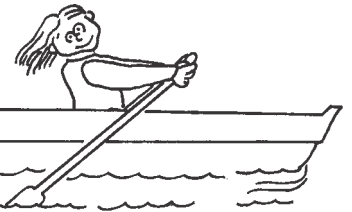
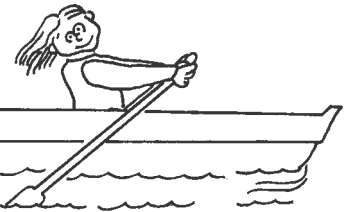
You are going on an all-day trip to fish camp 25 miles away in a small open boat.

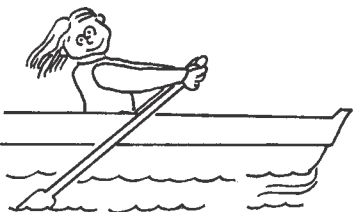


Choices Cards

 <p>PFD—Inflatable Suspenders</p> <p>© AMSEA</p>	 <p>Mirror</p> <p>© AMSEA</p>
 <p>Personal Locator Beacon</p> <p>© AMSEA</p>	 <p>Set of Wrenches</p> <p>© AMSEA</p>
 <p>Personal Survival Kit</p> <p>© AMSEA</p>	 <p>Foil-Packed Freeze Dried Dinner</p> <p>© AMSEA</p>
 <p>Sleeping Bag</p> <p>© AMSEA</p>	 <p>Comfort/Equipment Kit</p> <p>© AMSEA</p>
 <p>Type IV Lifering</p> <p>© AMSEA</p>	 <p>Fleece Hat</p> <p>© AMSEA</p>

 <p>Orange Flagging</p> <p>© AMSEA</p>	 <p>PFD—Flotation Coveralls</p> <p>© AMSEA</p>
 <p>Spare Paddle</p> <p>© AMSEA</p>	 <p>Hand-held VHF Radio</p> <p>© AMSEA</p>
 <p>Sandwich</p> <p>© AMSEA</p>	 <p>Wallet</p> <p>© AMSEA</p>
 <p>Camp Lantern</p> <p>© AMSEA</p>	 <p>Insulated Sleeping Pad</p> <p>© AMSEA</p>
 <p>Baseball Cap with Visor</p> <p>© AMSEA</p>	 <p>Flotation Cushion</p> <p>© AMSEA</p>

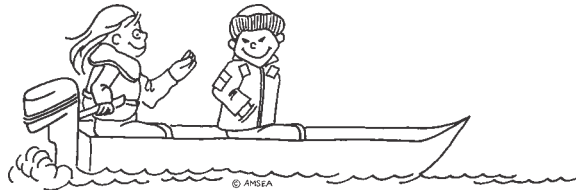
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 <p>Flashlight</p> <p>© AMSEA</p>	 <p>© AMSEA</p>
 <p>Space Blanket</p> <p>© AMSEA</p>	 <p>© AMSEA</p>
 <p>Fire Starter</p> <p>© AMSEA</p>	 <p>© AMSEA</p>
 <p>© AMSEA</p>	 <p>© AMSEA</p>

 <p>© AMSEA</p>	<p>Sweatshirt</p>  <p>© AMSEA</p>
 <p>© AMSEA</p>	<p>Candle and Matches</p>  <p>© AMSEA</p>
 <p>© AMSEA</p>	<p>Plastic Garbage Bag</p>  <p>© AMSEA</p>
 <p>© AMSEA</p>	<p>Hand-Held Flare</p>  <p>© AMSEA</p>
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Sweatshirt



Space Blanket



Rain Gear



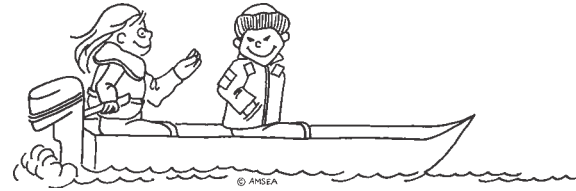
PFD—Flotation Coveralls



Camera



Baseball Cap



Oars



Juice



Sneakers



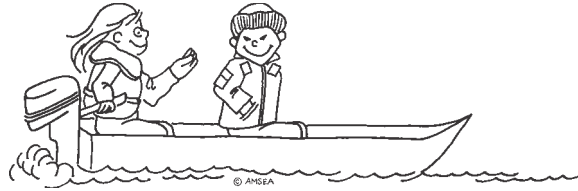
Flares



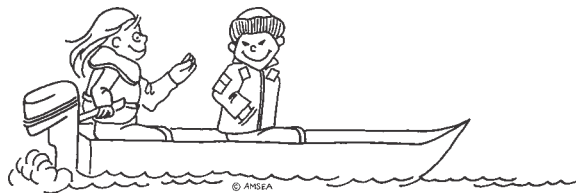
Plastic Garbage Bag



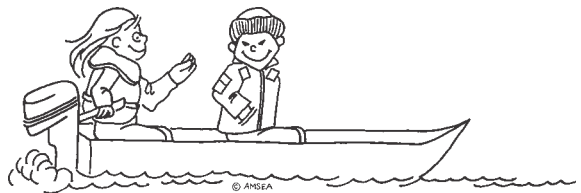
Wool Sweater



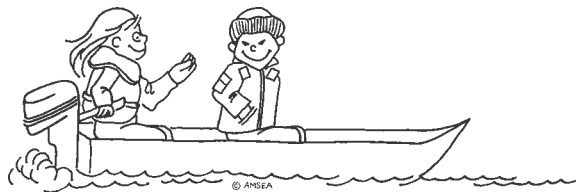
PFD—Inflatable Jacket



Wind Breaker



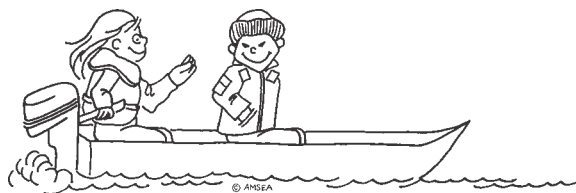
Fleece Hat



Compass



Beer



Extra Gas



Orange Flagger



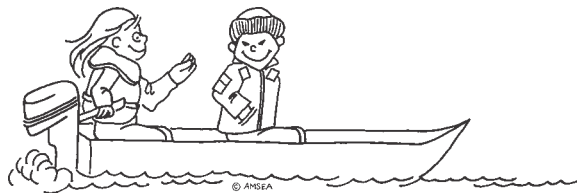
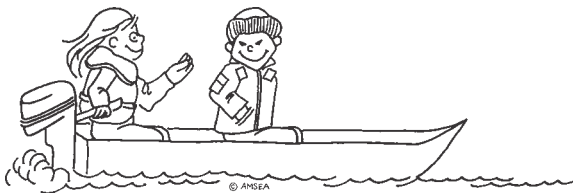
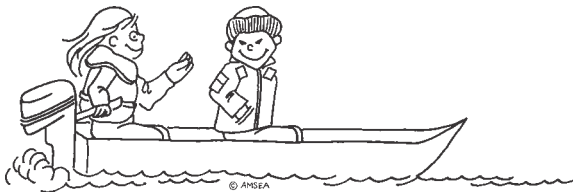
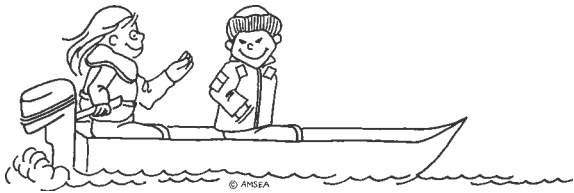
Boots



Leave a Note Saying Where You Are Going



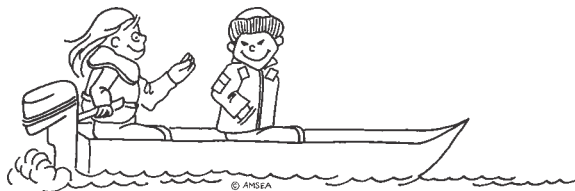
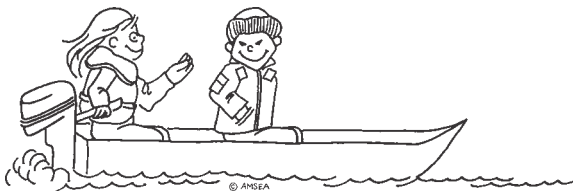
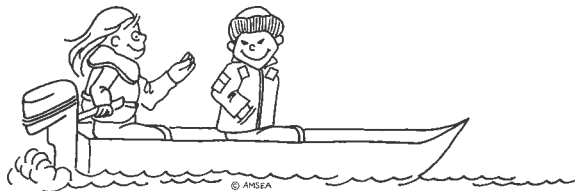
Half-pound of Trail Mix

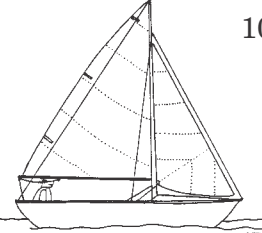
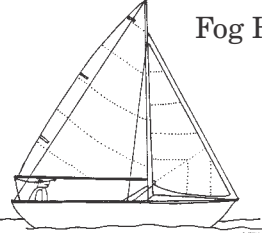
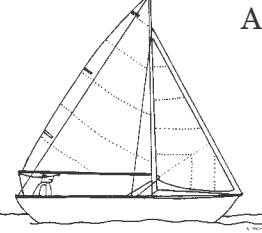
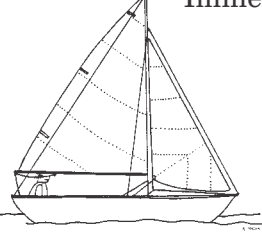
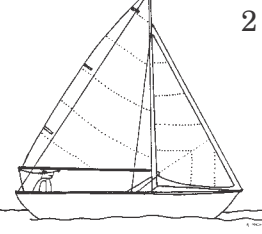
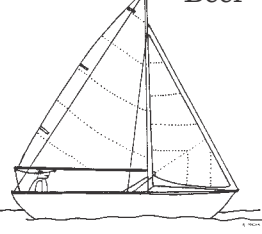
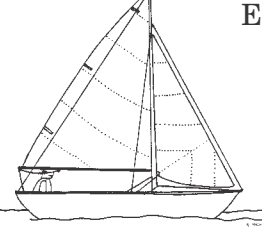

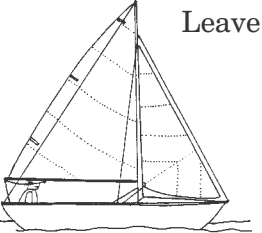
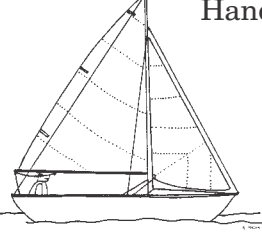


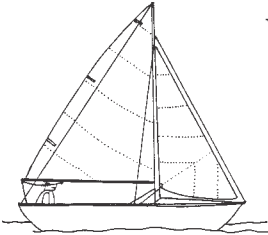
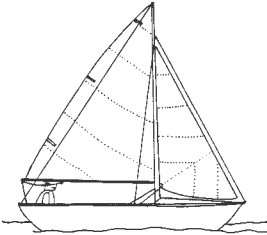
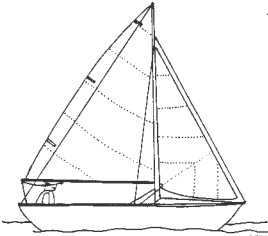
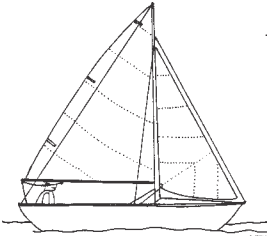
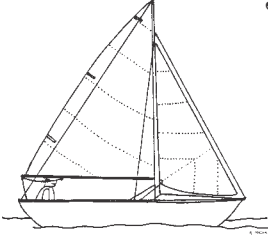
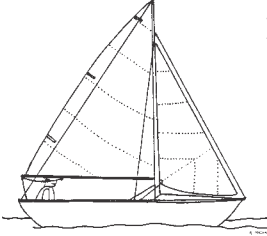
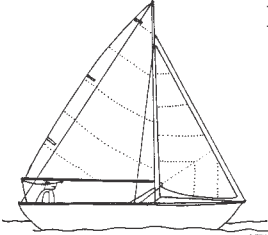
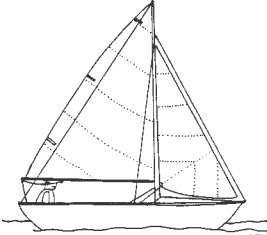
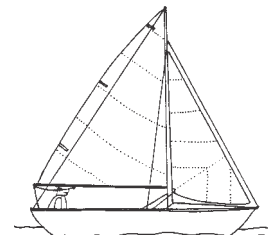
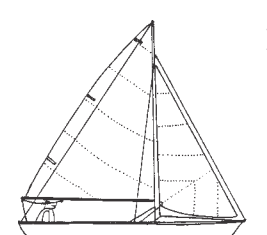
Half-Pound of Candy

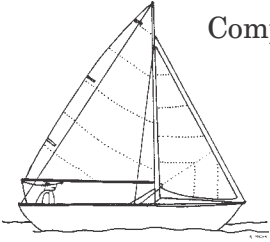
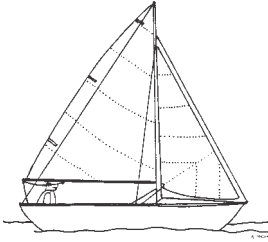
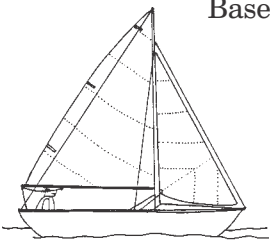
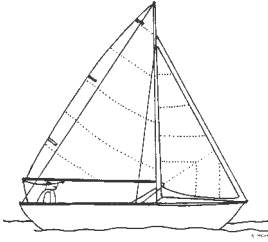
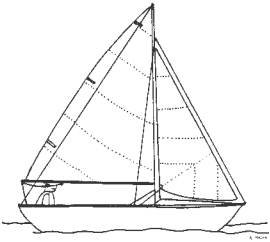
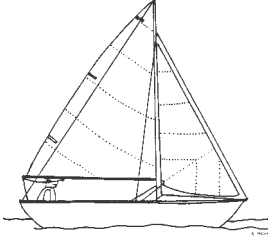
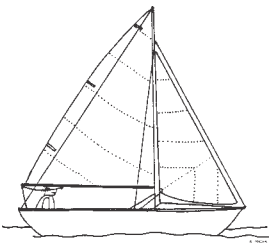
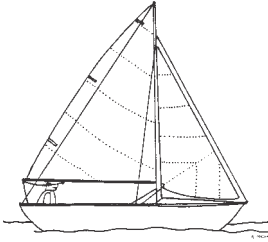
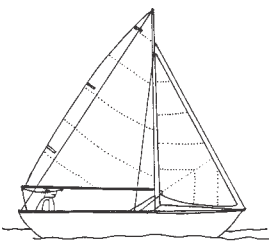
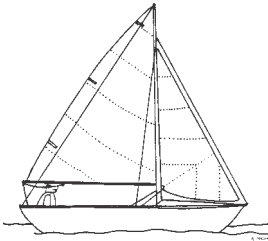


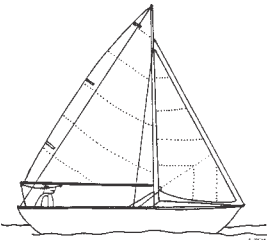
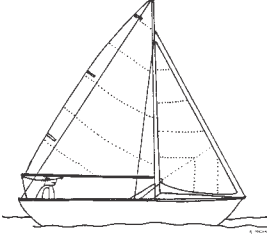
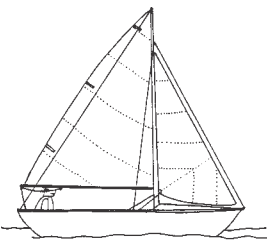
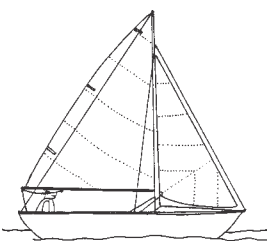
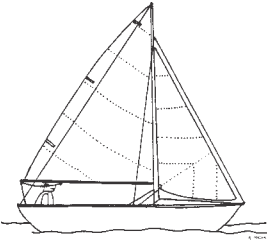
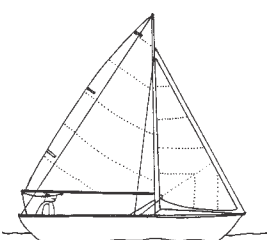
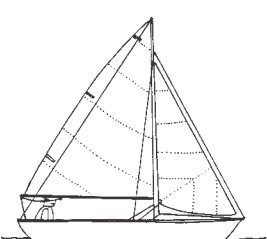
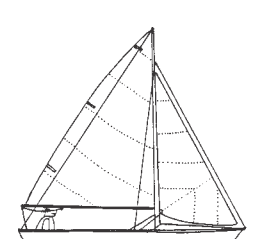
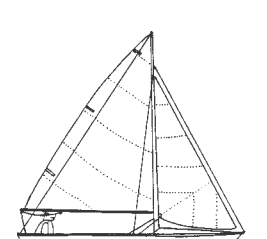
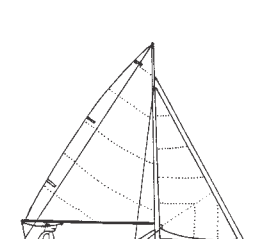
Leave Float Plan



 <p>100' of 1/2" line</p>	 <p>Fog Horn</p>
 <p>Anchor Line</p>	 <p>Immersion Suit</p>
 <p>2 Band-Aids™</p>	 <p>Beer</p>
 <p>EPIRB</p>	 <p>Half-Pound of Candy</p>
 <p>Leave Float Plan</p>	 <p>Hand-Held VHF Radio</p>

 <p>Whistle</p>	 <p>10' of 1" Line</p>
 <p>Flotation Coverall</p>	 <p>Anchor Chain</p>
 <p>Juice</p>	 <p>First Aid Kit</p>
 <p>Half-Pound Dried Fish</p>	 <p>CB radio</p>
 <p>Cell Phone</p>	 <p>Leave a Note Saying Where You Are Going</p>

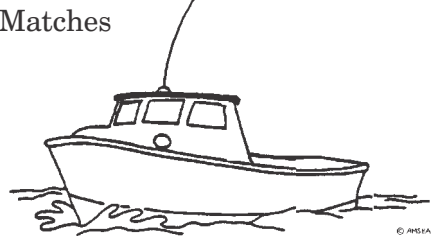
<p>Compass</p> 	
<p>Baseball Cap</p> 	
	
	
	

	 <p>Camera</p>
	 <p>Wool Hat</p>
	
	
	

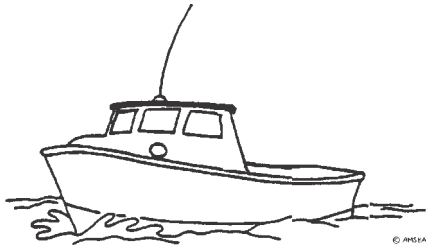
Rain Gear



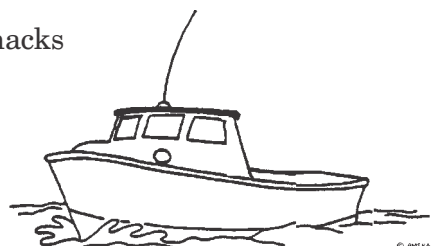
Candle and Matches



Float Coat



Food and Snacks



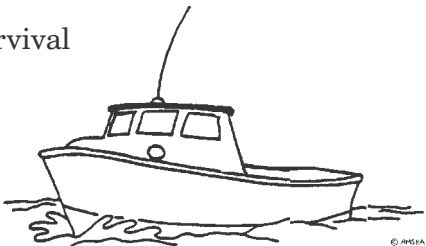
Wool or Fleece
Pants



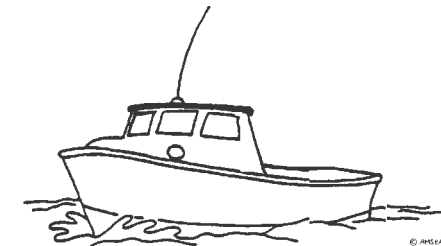
Baseball Cap



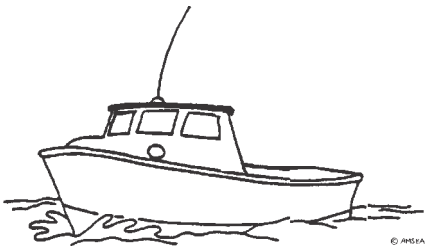
Personal Survival
Kit



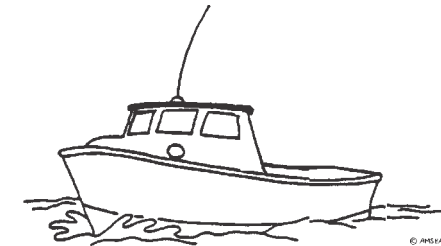
Beer



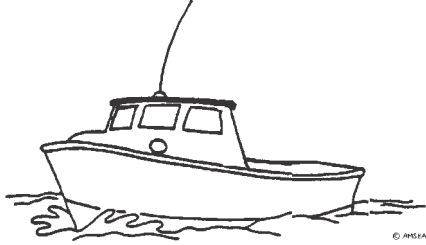
Flares



Boots



Flashlight



Wind Breaker



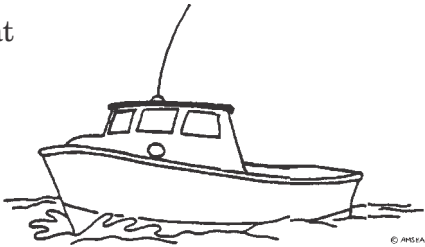
Pocket Knife/
Leatherman™ Tool



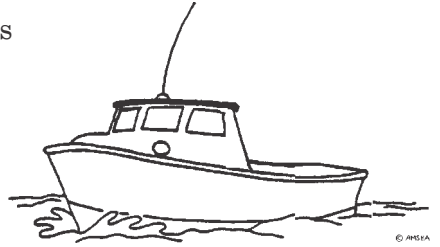
PFD—Inflatable
Vest



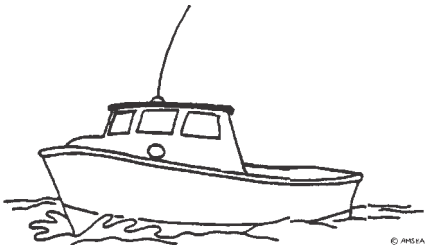
Wool Hat



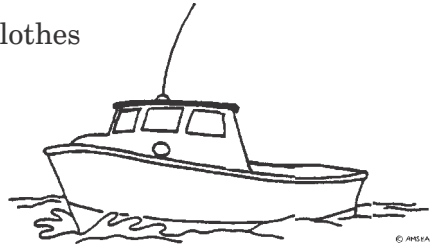
Cotton Jeans



Juice



Change of Clothes



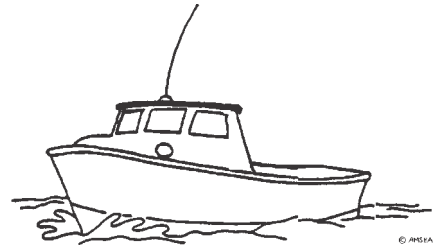
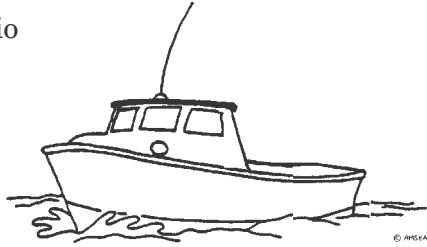
Sneakers



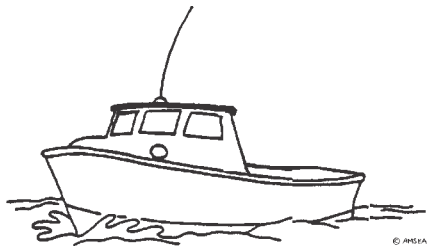
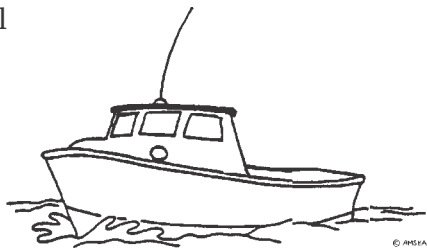
Mirror



Marine Radio

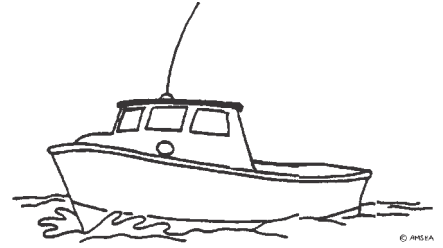


Extra Fuel

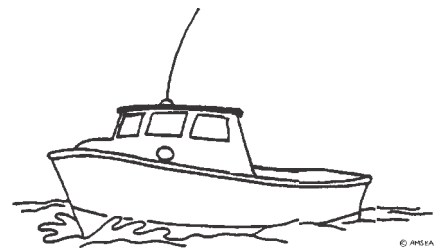
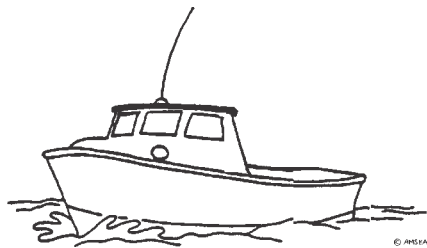
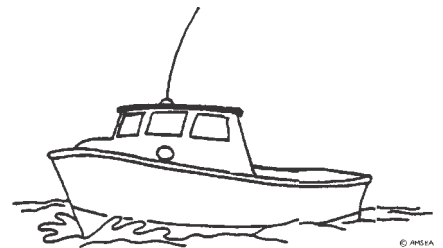
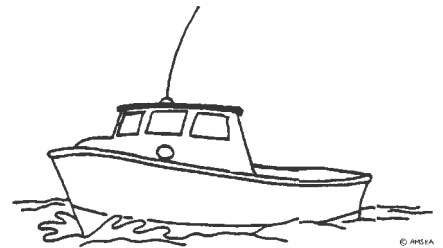




Engine Tools



Wallet



Wool Socks



Wool Hat



PFD—Inflatable Jacket



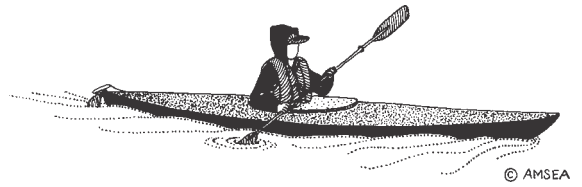
Flashlight



Cotton Jeans



Space Blanket



Leave Float Plan



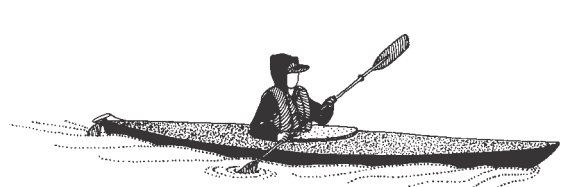
Fire Starter



Whistle



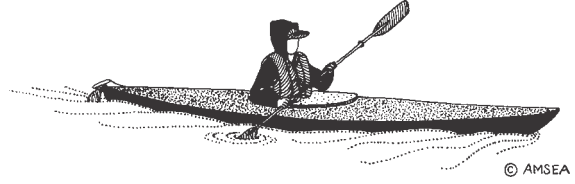
Hand-Held VHF Radio



Baseball Cap



Cotton Socks



Candle and Matches



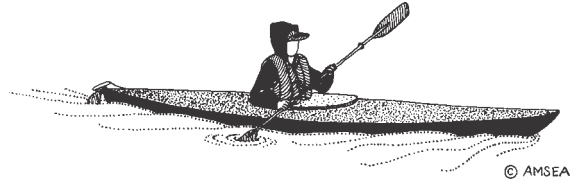
Wind Breaker



Plastic Garbage Bag



Wool or Fleece Pants



Hand-Held Flare



Leave Note Saying Where You Are Going



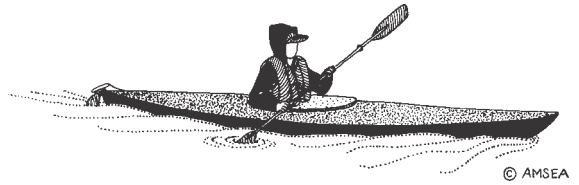
Tape Deck



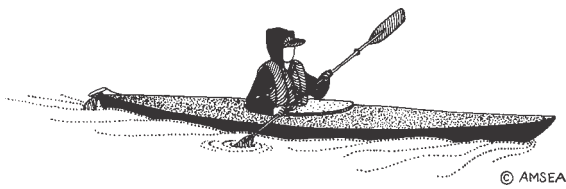
Mirror



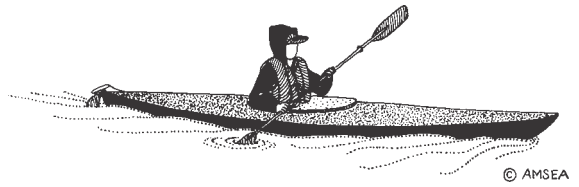
Aerial Flares



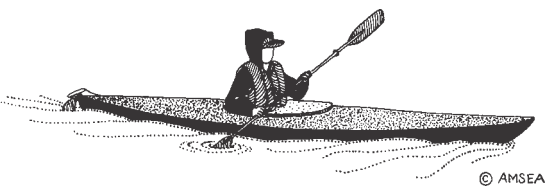
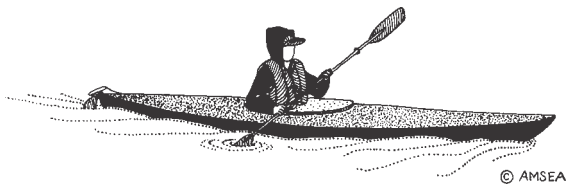
Extra Food

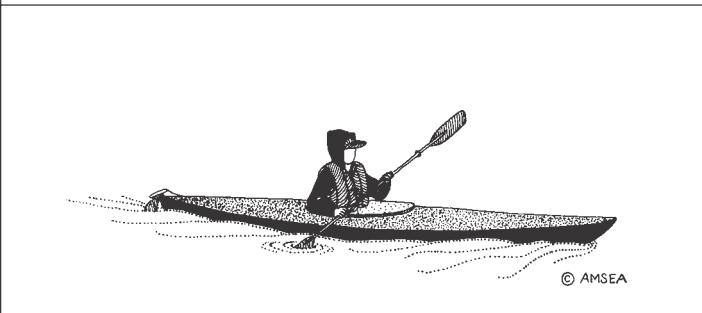
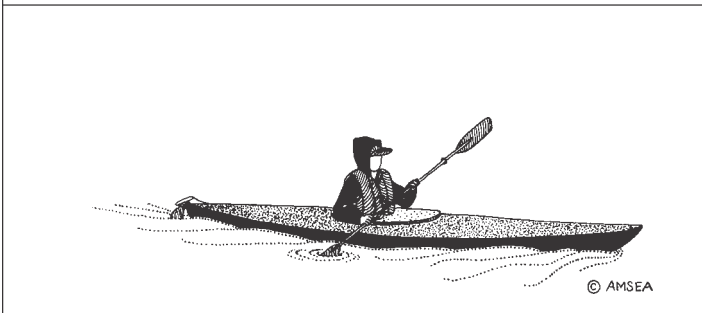
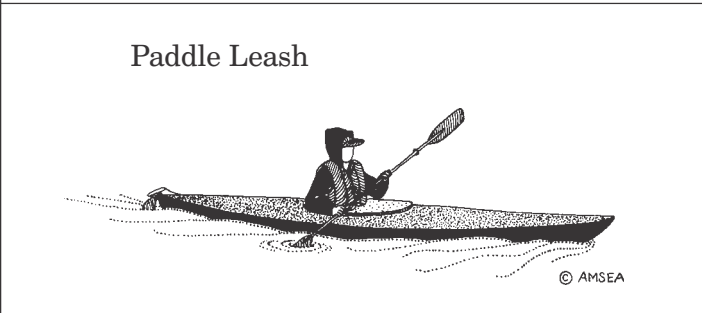
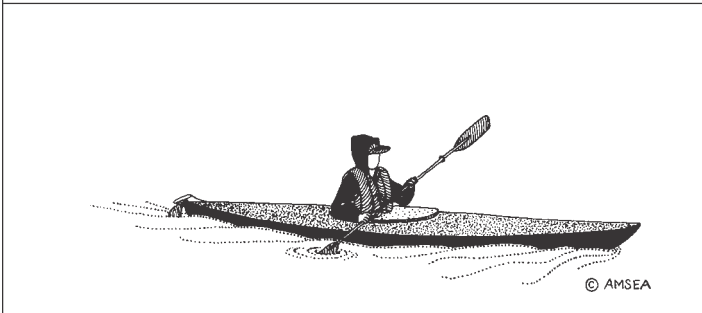
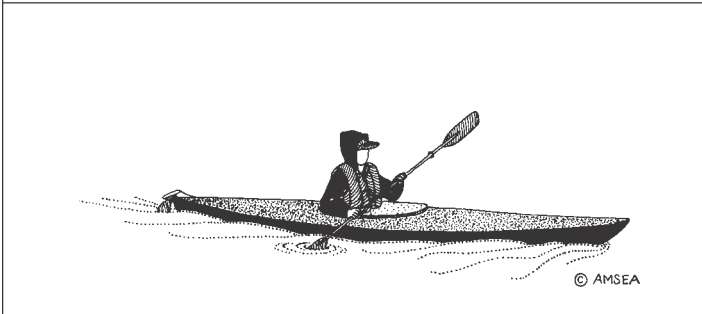
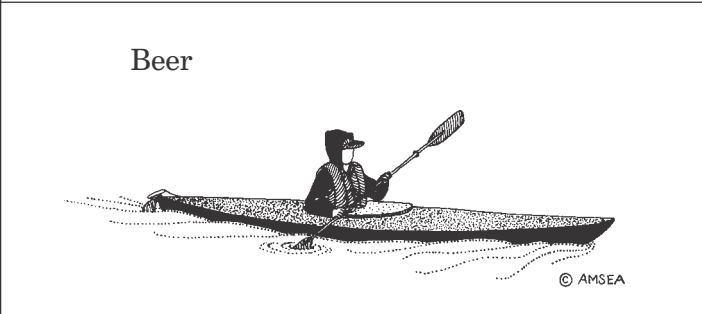
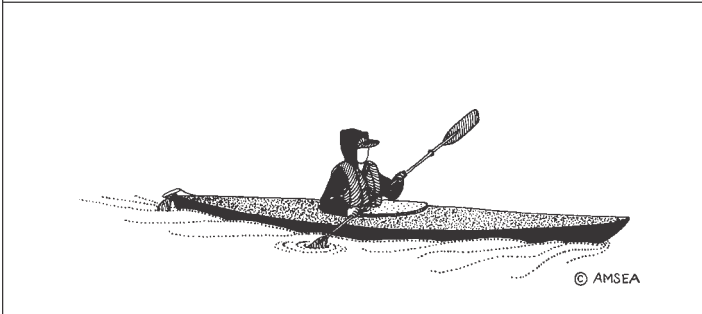


Float Coat



Extra Paddles







Unit 2: Small Boat Skills

Unit Rationale

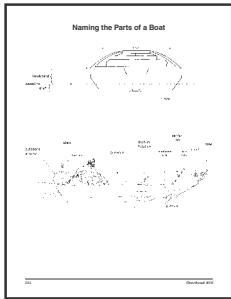
Using small boats involves a number of skills from a variety of disciplines. Mastery of these basic skills helps prevent many emergencies at sea. Before using small boats, people should understand basic boating terminology, know how to read charts and use navigation tools, and be able to safely navigate the waters they are using.

Unit Goal

To provide students with a foundation upon which to build life-long safe boating skills.

Small Boat Skills: Teacher Information

The information in this section gives teachers a background in the topic. Use your judgment when presenting this material; some concepts may not be suitable for younger children.



Overhead #10

Boat Terminology (See Overhead #10)

- Understanding maritime terms and vocabulary improves your ability to communicate when boating
- A. Aft = toward stern or back of boat
- B. Abeam = at right angles to boat's keel
- C. Aft = toward stern or back of boat
- D. Ahead = in a forward direction
- E. Amidships = center part of boat
- F. Beam = greatest width of boat
- G. Bilge = lowest point of boat's interior hull
- H. Bow = most forward part of boat
- I. Cleat = anvil-shaped fitting to which lines are made fast
- J. Forward = toward front or bow of boat
- K. Draft = vertical distance from waterline to boat's keel
- L. Freeboard = vertical distance from waterline to top of gunwale
- M. Displacement = weight of the water displaced by a floating hull
- N. Gunwale = upper edge of boat's side
- O. Hull = structural body of boat; does not include superstructure, masts, or rigging
- P. Keel = main structural member of boat, running fore and aft like a backbone on lower part of hull; it provides stability and reduces boat's sideways drift
- Q. Port = left side of boat when facing forward
- R. Starboard = right side of boat when facing forward
- S. Stern = after (back or rear) portion of boat
- T. Transom = transverse part of stern (where an outboard motor is mounted)
- U. Waterline = intersection of boat's hull and water's surface

Knots

- Knowing some basic knots can save your life
- Boats must be securely fastened while moored or anchored

Knot Tying Terminology

- A. Bight = loop or slack part of rope
- B. Bitter end = extreme end of a line
- C. Cast off = to untie all mooring lines
- D. Rope = cordage made of fiber or steel that is twisted or braided

- E. Line = rope in use aboard a boat
- F. Running end = end of line being used
- G. Standing part = part of a line around which a knot may be tied
 - Being able to tie correct knots in an emergency can be critical

Different knots work best for different purposes—see Activity #2 for illustrations of each of the following knots

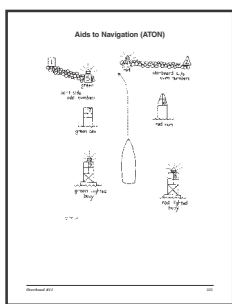
- A. Bowline
 1. One of most useful knots on a boat
 2. Used to form a loop in end of line
 3. Never slips or jams
 4. Can always be untied
- B. Clove hitch
 1. Used to tie line to rail or piling
 2. May slip unless finished with a half-hitch or two
- C. Half-hitch
 1. Quick and easy way to fasten a line to an object
 2. Will slip unless two half-hitches are used
- D. Sheet bend
 1. Excellent way to join two lines together
 2. Good for joining lines of two different sizes
- E. Cleat hitch
 1. Quick, easy way to tie up to or cast off from dock
 2. Consists of taking turns around cleat with line

Charts

- Being able to use a chart is basic to any boating activity

Terminology

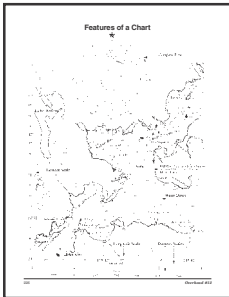
- A. ATON = Common abbreviation for “aids to navigation” (See Overhead #11)
- B. Buoy = anchored aid to navigation of various shapes and colors
- C. Can = green, cylindrical buoy
- D. Chart
 1. Nautical map showing water depths, aids to navigation, hazards, and other features of sea and shore useful to mariners
 2. Emphasizes coastal and underwater features
 3. Shows only those land features useful for navigating on water
 4. Different from topographic maps, which are used for navigation on land
- E. Chart datum = the baseline from which heights and depths of water are measured on a chart; in U.S. baseline is mean lower low water
- F. Compass rose = circular feature on a chart indicating true and magnetic north



Overhead #11

- G. Declination = angle of difference, from your position, between true pole and magnetic pole; changes with location on earth and over time; sometimes called variation
- H. Fathom = a unit of measure equal to 6 feet, used principally to measure water depth
- I. High tide = highest level reached by an ascending tide
- J. Higher high tide or higher high water = higher of the two high tides in a mixed semi-diurnal tide cycle
- K. Latitude lines
 - 1. Imaginary lines around earth parallel to equator
 - 2. Mark distance north and south of equator
 - 3. Latitude lines are equidistant on earth
 - 4. Distance is expressed in degrees ($^{\circ}$), minutes ($'$), and seconds ($''$)
 - a. One degree (1°) of latitude is equal to 60 minutes
 - b. One minute ($1'$) of latitude is equal to one nautical mile (6,076.12 feet)
 - c. Equator is 0° latitude
 - d. North Pole is 90° N latitude
 - e. South Pole is 90° S latitude
 - f. Juneau, Alaska is $58^{\circ}22'N$
- L. Longitude lines
 - 1. Imaginary lines around earth, running from pole to pole
 - 2. Mark distance east or west on earth's surface
 - 3. Longitude lines are not equidistant on earth
 - 4. Distance is also expressed in degrees ($^{\circ}$), minutes ($'$), and seconds ($''$)
 - a. 0° longitude runs through Greenwich, England
 - b. Juneau, Alaska is $134^{\circ}35'W$
- M. Low tide = lowest level reached by a descending tide
- N. Lower low tide or lower low water = lower of the two low tides in a mixed semi-diurnal tide cycle
- O. Magnetic north
 - 1. Compass direction to magnetic north pole
 - 2. Not the same as true north
 - 3. What magnetic compasses point to
 - 4. Location changes
 - 5. Changes are noted on charts
- P. Mean lower low water = average height of lower low water over a 19-year cycle, used in U.S. as chart baseline datum
- Q. Mixed semi-diurnal = twice-daily tide cycle where the two high tides are of different heights as are the low tides
- R. Nautical mile = unit of distance used on charts; equal to 6076.12 feet or 1 minute of latitude
- S. Nun buoy = red, conical aid to navigation

- T. Semi-diurnal = twice-daily tide cycle where the two high tides are same height, as are the low tides
- U. True north = direction to geographic North Pole
- V. Variation
 1. Angle of difference, from your position, between true and magnetic north
 2. Sometimes called declination
 3. Changes with location on earth
 4. Changes over time as magnetic north changes
 5. Local variation and annual change are printed inside compass rose on chart



Overhead #12

Features of a chart (See Overhead #12)

- A. Water depth is given in feet, meters, or fathoms; is based on chart datum
- B. Latitude and longitude are marked on margins of charts
- C. Distance scales are also provided on some charts
- D. Compass rose
 1. Consists of an outer and an inner ring that show true and magnetic direction
 2. Provides information on variation and annual changes in variation
 3. If chart has more than one compass rose, variation may be different for each one
- E. Standard chart symbols—show aids to navigation, obstructions, and markings
 1. Key to these symbols can be found on National Oceanic and Atmospheric Administration (NOAA), National Oceanic Survey (NOS) Chart #1
 2. Key is not reproduced on individual charts

Cautions in chart use

- A. Choose a chart with a sufficient scale to safely navigate
- B. Update charts regularly for safe navigation
- C. Never rely on single aid to navigation to locate your position; they can move
- D. Although equidistant on earth, latitude scales vary on charts due to distortion of Mercator projections
- E. To measure distance, use only latitude scales directly opposite area of interest
- F. **Do not** use longitude (found on top and bottom of charts) to measure distances

Navigation Terminology

- A. Bearing = direction to object or location from observer
- B. Compass course or bearing = direction of travel along magnetic bearing, usually after correcting for deviation of boat's compass
- C. Course = average heading or intended direction boat is traveling

- D. Dead reckoning = method to reasonably determine boat's position based on its last accurately determined location
- E. Heading = direction boat is pointing at any given moment
- F. Knot = unit of speed equal to 1 nautical mile per hour, approximately 1.2 miles per hour; general term for hitch or bend in a rope
- G. Leeway = sideways drift of a boat, primarily caused by wind or current
- H. Line of position (LOP) = line along which observer is located, usually used in sets of threes to locate position on chart, often plotted on chart based on bearing to landmark, ATON, or an electronic position fix
- I. Magnetic bearing = direction to object or location from observer, using earth's magnetic north pole as a reference
- J. Triangulation = technique for determining position by using angles
- K. True bearing = bearing measured with reference to true north; direction relative to observer based on earth's geographic pole as a reference (true north in Northern Hemisphere)
- L. Speed = rate of travel through water, usually expressed in knots
- M. Speed over ground = term used to designate rate of travel over ground underneath water, affected by wind, current, and sea conditions

Navigation Tools

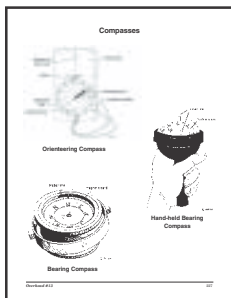
Compasses (See Overhead #13)

A. Terminology

1. Degrees are abbreviated as $^{\circ}$
 - a. Compasses are divided into 360°
 - b. East is 90°
 - c. South is 180°
 - d. West is 270°
 - e. North is 360° (sometimes called 0°)
2. Deviation = error in boat's compass reading caused by boat's magnetic properties
3. Local magnetic disturbance—causes difference between compass reading and magnetic north
4. Lubber line = line on bearing compass at which bearing is read

B. Types

1. Bearing compass
 - a. Magnetic compass used by most small boats for navigation
 - b. Uses magnetized card to indicate direction
 - c. Usually mounted permanently to boat
 - (1) Can be corrected (compensated) for deviation, but rarely to 100%; moving electronics or metal objects can affect correction
 - (2) Deviation table usually needed to correct magnetic reading; extrapolate deviation for magnetic courses between deviation table listings (See Overhead #14)
 - d. Hand-held models also available



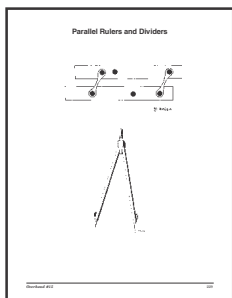
Overhead #13

The image shows a 'Deviation Table' with the following text: 'Extrapolate deviation for magnetic courses between deviation table listings'. Below this is a table with columns for 'Magnetic Course' and 'Deviation'. The table lists magnetic courses from 000 to 315 in 15-degree increments and corresponding deviation values.

Magnetic Course	Deviation
000	0.0
015	0.1
030	0.2
045	0.3
060	0.4
075	0.5
090	0.6
105	0.7
120	0.8
135	0.9
150	1.0
165	1.1
180	1.2
195	1.3
210	1.4
225	1.5
240	1.6
255	1.7
270	1.8
285	1.9
300	2.0
315	2.1

Overhead #14

- (1) Makes taking bearings to landmarks easier than with permanently affixed compass
 - (2) Cannot be corrected for deviation
2. Orienteering compass
 - a. Hand-held magnetic compass generally used for navigation on land
 - b. Not corrected for deviation
- C. Use
1. Mounted bearing compass
 - a. If your compass has two lubber lines, read your bearings at the lubber line farthest from you
 2. Hand-held bearing compass
 - a. Delicate, expensive instruments; should be treated as such
 - b. Be sure to hold compass level at eye level
 - c. If compass has two lubber lines, read bearings at lubber line farthest from you
 3. Orienteering compass
 - a. Must be held carefully parallel to earth's surface to give correct reading
 - b. See *Land Safety and Survival*, Volume 3, for instructions on use



Overhead #15

Parallel rulers (See Overhead #15)

- A. Made up of two connected rulers that can separate from, yet always remain parallel to each other
- B. Uses
 1. Determining bearings of course lines on chart
 2. Transferring bearings from compass rose to other areas of chart
 3. Plotting straight lines on chart

Dividers (spreaders) (See Overhead #15)

- A. Used to determine distance
- B. Use latitude readings found on left and right hand sides of charts, nearest to area of interest
- C. Remember that 1 minute of latitude = 1 nautical mile

Depth sounder

- A. Used to determine depth to bottom of body of water
- B. Can be used with other information to verify your position

Global Positioning System (GPS)

- A. What it is and how it works
 1. Satellite-based radio positioning and navigation system
 2. Uses multiple satellites to determine position by triangulation
 3. Satellites orbit in different orbital paths

4. Each satellite constantly identifies itself, and gives its position and accurate time of signal (has extremely accurate atomic clock)
 5. GPS receiver compares time signal sent to time signal received to determine distance from satellite
 6. With minimum of three satellites, GPS receiver can triangulate a latitude/longitude position
 7. With four or more satellites GPS receiver can determine latitude, longitude, and altitude
 8. Works in all weather in all parts of world
- B. What a GPS unit can tell you within 1 minute
1. Latitude and longitude within 10 meters of accuracy (95% of the time)
 2. Elevation
 3. Speed
 4. Direction to travel to waypoints and along routes
 5. Often have man overboard (MOB) function to mark location of MOB
 6. Can be connected to chart plotter to show progress on chart
- C. Factors affecting accuracy
1. When all satellites are in one portion of sky, satellite geometry is poor
 2. When near tall buildings, or in canyons, mountainous areas, woods, vehicles, or buildings, signals from some satellites can be blocked; antenna needs to be outside, free of obstructions to get good reading
 3. Number of satellites available determines whether or not you even get a reading
 4. Multipath signals
 - a. When radio signal bounces off building or terrain signal takes longer than it should to reach receiver
 - b. Gives receiver impression satellite is farther away than it is
 - c. Usually causes reading error of less than 15 feet
 5. Propagation effect = some atmospheric conditions slow down signal as it passes through ionosphere and troposphere



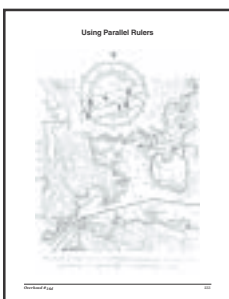
Overhead #16a



Overhead #16b



Overhead #16c



Overhead #16d

Navigation Techniques

Charting a course

- A. Locate starting position on chart
- B. Draw a series of straight lines to define safe route to destination
- C. Determine magnetic bearing for each segment of course (See Overheads #16a, 16b, 16c, and 16d)
 1. Using parallel rulers and compass rose, align edge of parallel rulers with course line
 2. “Side-step” parallel rulers to nearest compass rose until edge of one of rulers intersects center of rose and magnetic bearing ring
 3. Read magnetic bearing on inner ring of compass rose that corresponds with desired direction of travel
 4. Lightly write bearing above course line with the letter M (for magnetic)

5. Only pencils should be used to write on charts
- D. Correct your magnetic bearing for deviation using deviation table and write corrected bearing above course line with the letter C (for corrected magnetic bearing)
1. To convert a magnetic bearing for deviation to a corrected compass bearing you will steer by
 - a. Subtracting easterly deviation
 - b. Adding westerly deviation
 2. It is easier to correct to bearing when you are plotting course on chart rather than when underway
- E. If using out-of-date chart
1. Calculate annual change in variation by multiplying annual variation decrease or increase (found in the center of the compass rose) by number of years that have passed between year printed on chart and the present
 2. If change has been less than 60 minutes (or 1°), this will not be a significant factor for most navigation—it is very difficult to steer to within less than one degree of accuracy
- F. Determine distance of each course segment
1. Two scales found on charts
 - a. Latitude scale



Overhead #17a



Overhead #17b

- (1) Found on east and west edge of chart
 - (2) Use scale **nearest** area of interest—scale varies a little north to south due to Mercator projection
 - (3) One minute of latitude equals 1 nautical mile (6,076 feet or 1,852 meters)
 - (4) **Do not** use longitude (north and south edge of chart) scale to determine distance—distance in a degree of longitude changes depending on proximity to earth's poles
- b. Chart scale—may be easier to use than latitude scale
2. Using dividers to measure distance (See Overheads #17a and #17b)
 - a. If distance is shorter than one spread of the dividers
 - (1) Spread dividers distance to be measured
 - (2) Place dividers on scale and read distance from scale
 - b. If distance is longer than one spread of dividers
 - (1) Spread dividers on scale to convenient measure
 - (2) Without changing spread of dividers, place one point on one end of line and pivot dividers along line counting number of pivots
 - (3) If course is not exactly equal to a whole number of pivots, mark remaining unmeasured section and use “shorter than divider spread” method to measure remainder
 3. Lightly note distance below course line
- G. If you know speed you will be traveling, calculate estimated travel time for each segment, note next to distance
1. Time (hrs) = distance (nautical miles) \div speed (knots)

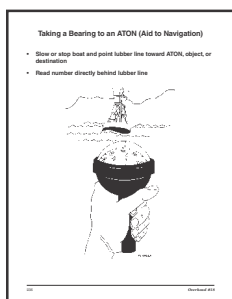
2. Time is approximate, it will be affected by current, wind, and sea conditions

Steering a course

- A. Point and keep boat so compass reads “C” bearing noted on chart
- B. Pick out distant object that you are lined up with and steer toward it, making adjustments as needed to stay on bearing
- C. If no compass deviation table is available, steering adjustments may be needed while underway to offset uncorrected compass deviation
- D. Beware of hazards and effects of winds, tides, currents, etc.
- E. To navigate with GPS, follow instructions included with unit

Finding your position/Verifying where you are

- A. Using a bearing compass
 1. Slow or stop boat and point lubber line toward object, ATON, or destination (See Overhead #18)
 - a. If using a hand-held compass, hold it level at arm’s length
 2. Read number directly behind lubber line (this is your bearing)
 3. If mounted compass is uncompensated, use deviation table to correct
 4. Beware of local magnetic disturbances
 5. Line up edge of one parallel ruler with inner (magnetic) ring of compass rose, and the bearing you took to landmark or ATON
 6. “Side step” rulers toward landmark or ATON, until one ruler reaches landmark on chart
 - a. Extend and close rulers while maintaining firm downward pressure on chart
 - b. **Do not** change orientation of rulers to original line
 7. Draw a bearing line from landmark long enough to cross your estimated position
 8. Repeat with at least two other landmarks or ATONs—accuracy improves if three bearings are taken to landmarks about 90° apart
 9. Your position is approximately where lines intersect
 10. Verify position by checking reported depth on chart with actual depth under boat
 11. Never rely on single aid to navigation to determine position; they can move
- B. Using latitude and longitude coordinates
 1. Determine latitude and longitude from Global Positioning System (GPS) receiver or known location
 2. Find latitude and longitude scale on edges of chart
 3. Use a straight edge to locate point on chart where latitude and longitude lines intersect
- C. You can usually navigate with magnetic courses, but if you are given a true bearing, convert it to a magnetic bearing by
 1. Subtracting easterly variation
 2. Adding westerly variation



Overhead #18

Small Boat Skills: Activities Guide

- The activities in this volume are sequential, and each unit assumes knowledge of the material in the preceding unit.
- Activities are arranged by topic in the same order as the Teacher Information.
- Within a topic activities are organized from easiest to most difficult.
- Detailed Alaska Content Standards are located at the end of each activity's procedures.
- Times needed for activities are approximate.
- Many activities contain true stories; be sensitive to the possibility that they could be written about your students' relatives or friends.
- **AMSEA** This symbol means the equipment is available to borrow from AMSEA.

Topic: Boat Terminology

Activity	Objective	Standards
1. You Name It Name parts of a boat p. 113	<ul style="list-style-type: none">• Identify at least 10 out of 13 parts of a boat	Language Arts Skills for a Healthy Life

Topic: Knots

Activity	Objectives	Standards
2. Knots Tie knots commonly used on boats p. 115	<ul style="list-style-type: none">• Define the terms bight, line, rope, running end, and standing part• Tie at least four knots commonly used on boats	Language Arts Skills for a Healthy Life

Topics: Charts, Navigation Terminology, Navigation Tools, Navigation Techniques

Activity	Objectives	Standards
3. Compass Basics Practice reading a bearing compass in the classroom p. 125	<ul style="list-style-type: none">• Identify three parts of a bearing compass• Demonstrate how to take a bearing with a hand-held bearing compass	Language Arts Mathematics Science Skills for a Healthy Life
4. Steer That Bearing Steer a bearing p. 128	<ul style="list-style-type: none">• Steer a course with a hand-held bearing compass	Language Arts Mathematics Science Skills for a Healthy Life

5. Nautical Charts Explore nautical charts p. 130	<ul style="list-style-type: none"> • Recognize at least four features common to all nautical charts • Identify at least seven symbols commonly found on nautical charts • Plot a course on a chart • List three differences between a nautical chart and a topographic map 	Language Arts Mathematics Geography
6. Compass Rose Determine a course on a chart using the compass rose, parallel rulers, and dividers p. 140	<ul style="list-style-type: none"> • Describe at least three features of a compass rose • Determine a course on a nautical chart using the compass rose and parallel rulers • Demonstrate at least one method to measure linear distance on a chart with dividers 	Language Arts Mathematics Geography
7. Basic GPS Boating Use GPS receivers to find a position around town and locate them on charts p. 144	<ul style="list-style-type: none"> • Use a chart to locate a position obtained from a hand-held GPS 	Mathematics Science Geography Skills for a Healthy Life Technology

Culminating Activity

Activity	Objective	Standards
8. Boating Talk Do a crossword puzzle p. 146	<ul style="list-style-type: none"> • Define at least 80% of the boating terms used in this unit 	Language Arts Skills for a Healthy Life

You Name It

Time: 50 minutes

Overview

Name parts of a boat.

Objective

After completing this activity, students should be able to identify at least 10 out of 13 parts of a boat.

Materials

- Overhead #10 **Naming the Parts of a Boat**
- Toy boat
- 1 per pair of students, copy of Overhead #10 **Naming the Parts of a Boat**
- 1 per student, Student Handout #1 **Name It** (optional)
- Boats, if possible

Procedure

1. Explain to students that they will be naming the parts of a boat.
2. Define parts of a boat by using Overhead #10 and a toy boat. Explain why this is important to know.
3. Divide students into pairs and give one copy of Overhead #10 to each pair. Go to a harbor, if possible, and have them take turns asking their partner to point out the parts of a boat, making sure all students have a chance to identify the boat parts. If real boats are not available, have them complete Student Handout #1.

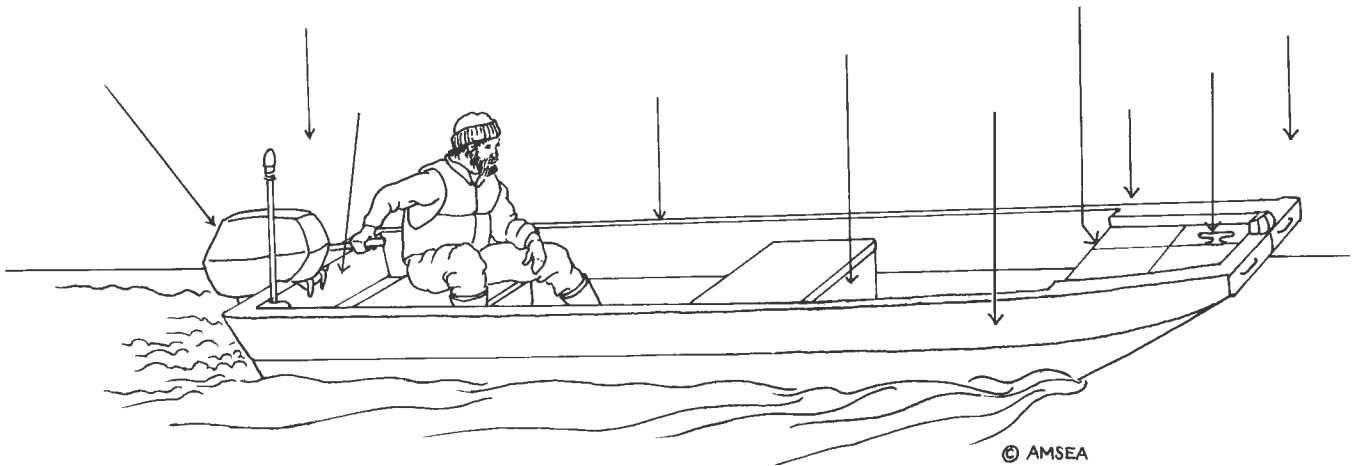
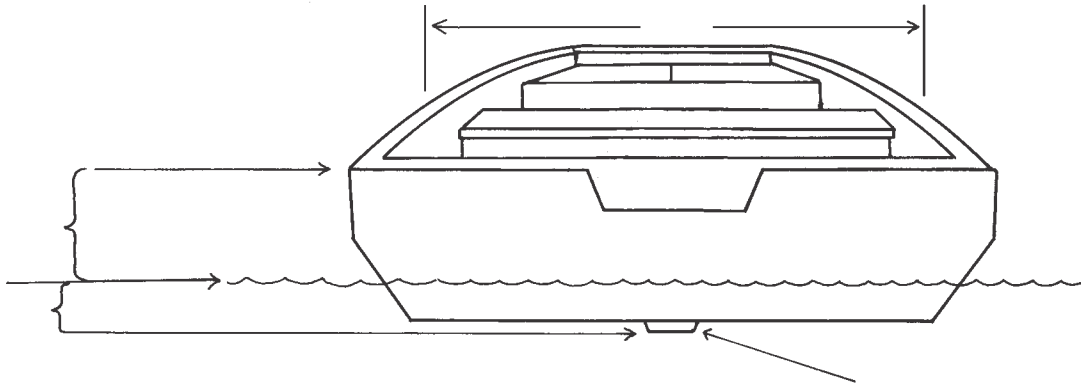
This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing

Name: _____ Date: _____

Name It

Label the parts of the boats.



Knots

Time: 60 minutes

Overview

Students tie knots commonly used on boats.

Objectives

After completing this activity, students should be able to:

1. Define the terms bight, line, rope, running end, and standing part.
2. Tie at least four knots commonly used on boats.
3. Explain the use for each knot tied.

Materials

Station 1. Clove Hitches

- Instructor
- 1 per student at station, **Station Card** (make from Templates #1 and #2)
- 1 per student at station, 5' of rope
- 1 per student at station, tying post (chairs or table legs will work)

Station 2. Sheet Bends

- Instructor
- 1 per student at station, **Station Card** (make from Templates #3 and #4)
- 1 per student at station, 5' length of rope
- 1 per student at station, 5' length of rope of a different thickness than first piece
- 1 per student at station, tying post

Station 3. Bowline and Double Half-Hitch

- Instructor
- 1 per student at station, **Station Card** (make from Templates #5 and #6)
- 1 per student at station, 5' length of rope
- 1 per student at station, tying post

Station 4. Cleat

- Instructor
- 1 per student at station, **Station Card** (make from Templates #7 and #8)
- 1 per student at station, 5' length of rope
- 1 per student at station, cleat
- 1 per student at station, rope with eye

Procedure

Before Class

1. Make station cards from templates. Station 2 knots may be easier for students to tie if one line on their station card is a different color from the second line. Laminate the cards so that the “knot A” is on one side and the “knot B” is on the flip side.
2. Set up the stations around a room or outdoor area. Assign an instructor to each station with the appropriate materials.

During Class

1. Explain to students that they will be tying different knots that are useful on boats.
2. Define the terms bight, line, rope, running end, and standing part.

3. Divide the students into 4 groups, and assign a group to each station.

At the Stations

1. Distribute a piece of rope and station card to each student.
2. Instructors give the name of each knot, explain when the knot is used, demonstrate how to tie “knot A,” and guide the students slowly through each step.
3. Have students tie the knot independently, using the card as a reference, and repeat two or three times.
4. Guide students to attempt “knot B,” using the card as a reference tool. They should tie it several times independently.

5. Allow about 6 minutes per station and rotate clockwise.
6. Students should be able to tie all four of the “knot A” types by the end of the lesson. Remind students who finish quickly that practice is necessary to truly learn and remember how to tie each knot!
7. Debrief by discussing any problems and reinforcing the usefulness of and need to know how to tie these knots.

Note: The illustrations and instructions used in this activity were adapted from the U.S. Coast Guard’s *Boat Crew Seamanship Manual*.

This activity addresses Alaska Content Standards:

Language Arts B-3 Relate to practical purposes

Skills for a Healthy Life A-1 Personal well-being, A-3 Injury prevention

Station 1. Clove Hitches

A clove hitch is a good all-around knot used for tying a line around a piling or to the rail on a dock.

Knot A: Clove Hitch

1. Pass the running end of the line in front of the pole and around it. Then bring the end forward over its own standing part (Figure 1).
2. Pass the running end once more around the post just above the first turn (Figure 2).

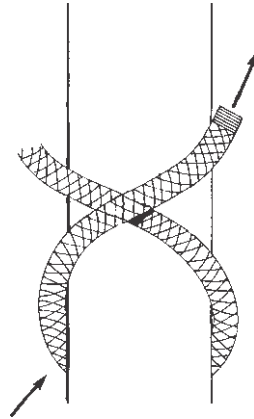


Figure 1

3. Bring the running end under the standing part (Figure 3).

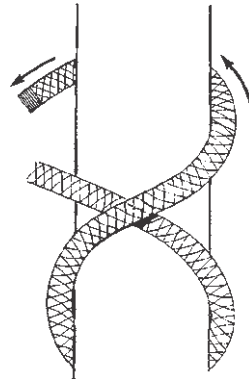


Figure 2

4. Tighten the clove hitch by pushing the loops close together, then pulling hard on both ends of the line.

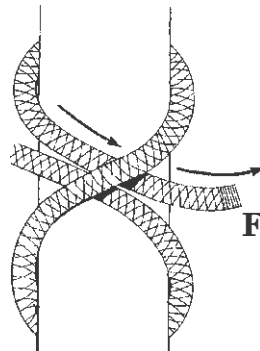


Figure 3

Station 1. Clove Hitches

A clove hitch is a good all-around knot used for tying a line around a piling or to the rail on a dock. This slip clove hitch is easy to untie.

Knot B: Slip Clove Hitch

1. Pass the running end of the line in front of the pole and around it. Then bring the end forward over its own standing part (Figure 1).

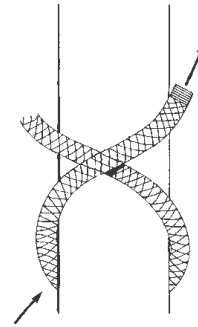


Figure 1

2. Pass the running end once more around the post just above the first turn (Figure 2).

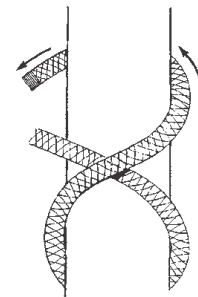


Figure 2

3. Then bring the running end under the standing part (Figure 3)

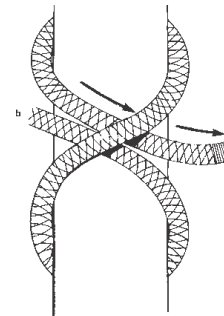


Figure 3

and double it back on itself (Figure 4).

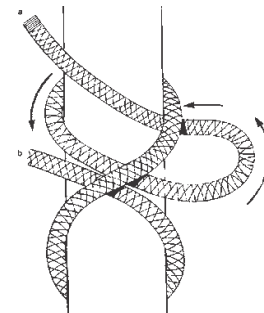


Figure 4

3. Tighten by pulling hard on the standing part and the loop you just created.

Station 2. Sheet Bends

A sheet bend is used to join two ropes or lines together, and is especially useful for joining different diameter ropes or lines.

Knot A: Sheet Bend

1. Form a bight (loop) in one of the lines to be joined together (Figure 1).

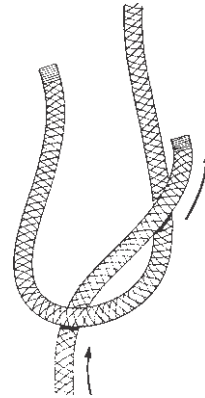


Figure 1

2. Pass the end of the second line up through the bight formed in the first line (Figure 1).

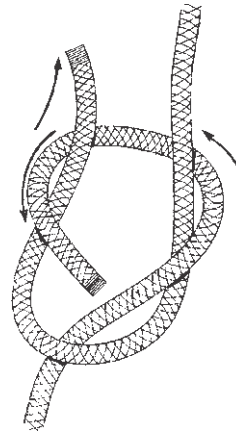


Figure 2

3. Pass the end of the second line behind both parts of the first line (Figure 2).

4. Then pass it under itself and pull tight (Figure 3).

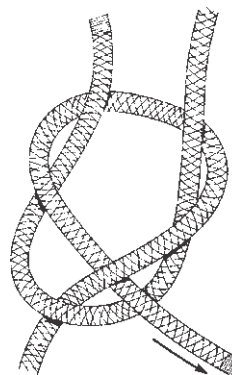


Figure 3

Station 2. Sheet Bends

A sheet bend is used to join two ropes or lines together.

Knot B: Double Sheet Bend

1. Form a bight (loop) in one of the lines to be joined together (Figure 1).
2. Pass the end of the second line up through the bight formed in the first line (Figure 1).

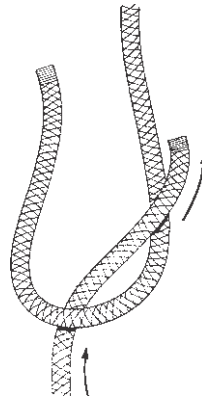


Figure 1

3. Pass the end of the second line behind both parts of the first line (Figure 2).

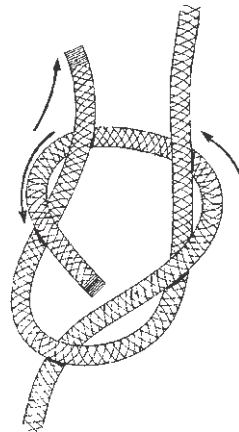


Figure 2

4. Do it again, then pass the running end under its own standing part and pull tight (Figure 3).

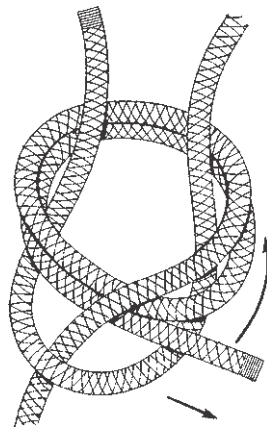


Figure 3

Station 3. Bowline and Double Half-hitch

The bowline (pronounced BOW-lun) is the best knot to use to make a loop in the end of a line. It will not slip or jam, no matter how much tension is put on the line. It is also easy to untie.

Knot A: Bowline

1. Make an overhand loop (Figure 1).
2. Pass the running end up through the loop (Figure 1),
3. then around behind the standing part (Figure 2),
4. and back down through the loop (Figure 3).

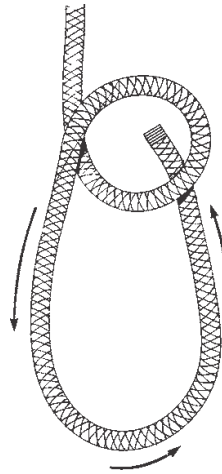


Figure 1

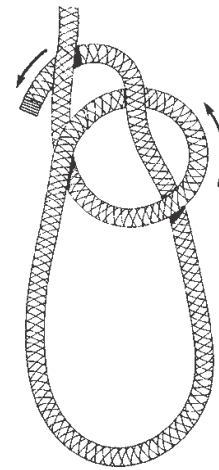


Figure 2

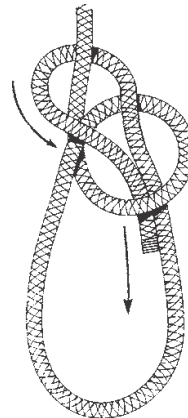


Figure 3

The running end must always come through the overhand loop from the bottom of the overhand loop (bottom = the side opposite the top coil of the loop).

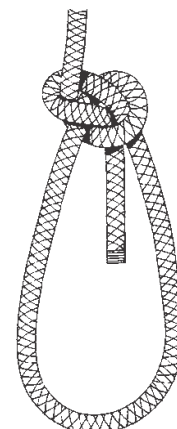


Figure 4

5. Pull tight (Figure 4).

Station 3. Bowline and Double Half-hitch

Knot B: Double Half-hitch

The double half-hitch is a simple knot that can be used to tie a rope around an object like a railing or post.

1. Pass the line around the object.
2. Pass the running end under the standing end, around and back through the loop it just made (Figure 1).

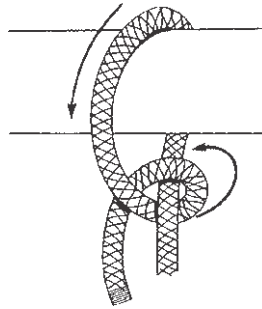


Figure 1

3. Pass the running end a second time under the standing end, around and back through the loop it just made (Figure 2).
4. Pull tight.

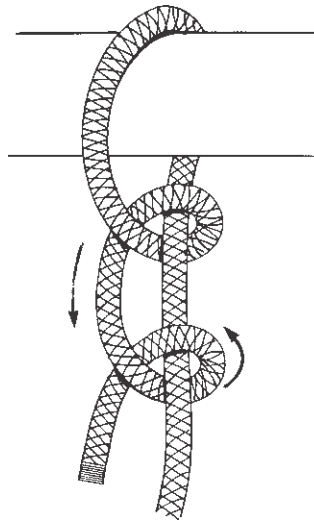


Figure 2

Station 4. Cleats

Knot A: Standard Cleat Hitch

Cleats are found on most boats and docks. Using cleats properly is a quick, easy way to tie up to and cast off from a dock.

1. Wrap the line once around the base of the cleat (Figure 1).

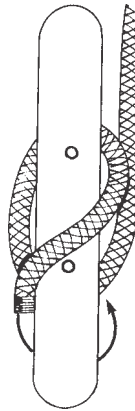


Figure 1

2. Wrap the line over the top of the cleat in a figure-eight pattern at least one time (Figures 1 and 2).

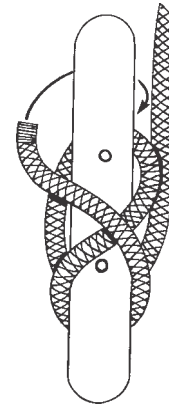


Figure 2

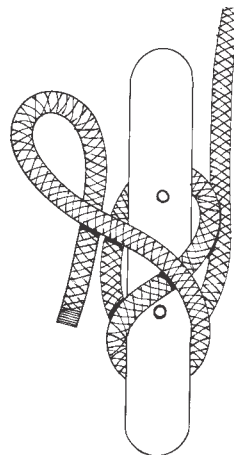


Figure 3

3. To lock the line of the cleat, pass the running end under the last loop made and tighten (Figures 3 and 4).

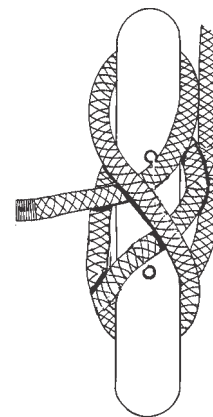


Figure 4

Station 4. Cleats

Knot B: Mooring Cleat

Mooring cleats are used to quickly make a boat's mooring line fast to a cleat. The other end of the line is then available to make fast to another cleat, piling, etc.

1. Pass the eye of the mooring line through the opening at the base of the cleat (Figure 1).

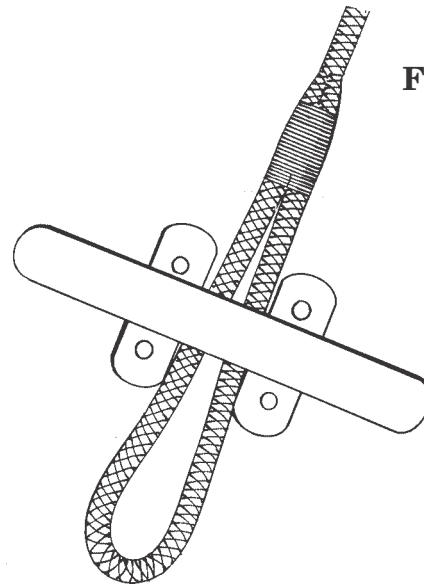


Figure 1

2. Spread the eye's sides over the horns of the cleat (Figure 2).
3. Pull to tighten (Figure 2).

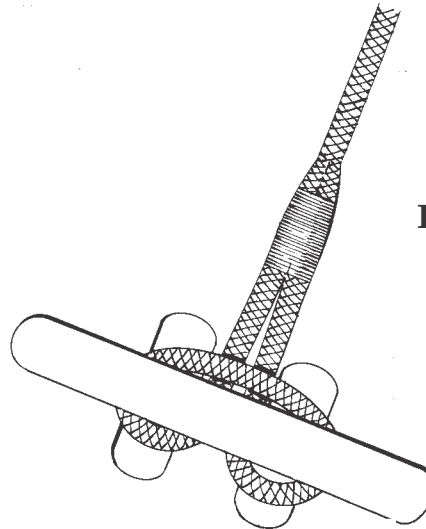


Figure 2

Compass Basics

Time: 35 minutes

Overview

Practice reading a bearing compass in the classroom.

Objectives

After completing this activity, students should be able to:

1. Identify three parts of a bearing compass.
2. Demonstrate how to take a bearing with a hand-held bearing compass.

Materials

- Overheads #13 Compasses and #18 **Taking a Bearing to an ATON**
- 4 hand-held bearing compasses **AMSEA**
- 4 objects students would use to get a bearing (rocks, ATON, lighthouse, prominent building or feature, etc.) or 4 pictures of objects
- 1 per student, Student Handout #1 **Get Your Bearings**

Procedure

Before Class

1. Decide whether you want to do this exercise inside or outdoors.
2. If using the classroom:
 - Use the 4 corners of the room as objects students take a bearing to. Hang pictures of objects students would use to get bearings in each of the 4 corners.
 - Use masking tape to mark four areas as “boats” where students will be when taking their bearings.
 - Name the boats.
 - Use one of the same compasses students will use to find the bearing to the 4 corners of the room from each boat. Be sure to hold the compass level just below eye level to read the bearing accurately. If your compass has two lubber lines, read your bearings at the lubber line farthest from you. If you use 4 boats you will end up with 16 bearings—4 from each boat. Record these bearings for your later use on copies of Student Handout #1.
 - Mark a place in the classroom where students will practice taking a bearing to an object in the room. Take and record a bearing from that place.
3. If doing the activity outdoors:
 - Choose 4 objects that students will take a bearing to.
 - Mark four areas as “boats” where students will be when taking their bearings. Each boat must be able to see all 4 objects.
 - Name the boats.
 - Use one of the same compasses students will use to find the bearing to each of the 4 objects from each boat. Be sure to hold the compass level just below eye level to read the bearing accurately. If your compass has two lubber lines, read your bearings at the lubber line farthest from you. If you use 4 boats you will end up with 16 bearings—4 from each boat. Record these bearings for your later use on copies of Student Handout #1.
 - Mark a place in the classroom where students will practice taking one bearing to an object in the room before they go to their boats. Take and record a bearing from that place.

During Class

1. Explain to students that they will be practicing taking bearings with a bearing compass.
2. Explain why a compass is a useful tool for navigation. Use Overhead #13 to show the parts of a bearing compass.
3. Explain that a compass is divided into 360° and point out the degrees for N, E, S, and W. Explain how to read the degrees in between.
4. Demonstrate how to hold a compass level just below eye level, and take a bearing. Remind students to read their bearings at the lubber line furthest from them.
5. Divide the class into 4 groups and distribute a hand-held bearing compass to each group. Remind students that they should treat it gently; it is an expensive, delicate instrument!
6. Assign each group to a boat. Distribute and explain Student Handout #1. Be sure each group records their boat's name on the handout.
7. One at a time, have each group come to the spot in the classroom where they will practice taking a bearing. Each student should show you where the lubber line is and that he/she can take a bearing to the predetermined object before they proceed with their group to their boat.
8. Have groups go to their boats, and take and record their bearings. They should also answer question #2.
9. Come back together, compare their bearings with the ones you took, and discuss any problems.
10. Discuss question #2.
11. Reinforce the idea with students that when they are in a boat, they should never rely on a bearing to just one aid to navigation because ATONs can move.

This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing

Mathematics A-1 Numeration, E-2 Practical applications of mathematics

Science A-5 Forces of nature

Skills for a Healthy Life B-2 Effective communication

Name: _____ Date: _____

Get Your Bearings

Your boat's name _____

1. Take and record a bearing to each of the 4 objects.

Object Name or Description	Bearing (in degrees)
_____	_____
_____	_____
_____	_____
_____	_____

2. Using complete sentences, describe a realistic situation in which this compass skill might be useful.

Steer That Bearing

Time: 25 minutes

Overview

Steer a bearing using a hand-held bearing compass.

Objective

After completing this activity, students should be able to steer a course with a hand-held bearing compass.

Materials

- 1 per pair of students, hand-held bearing compass [AMSEA](#)
- 1 per student, Student Handout #1
- Large area like a gym, field, or parking lot

Procedure

Before Class

1. Complete Activity #3.

During Class

1. Explain to students that they will be steering a course with a hand-held bearing compass. Ask students when this might be a useful skill to use.
2. Divide students into pairs and distribute a compass to each pair.
3. Remind students that when steering their bearing they should hold the compass level at eye level, and—if their compass has two lubber lines—read their bearings at the lubber line farthest from them.
4. Explain that it may help them stay on course if they pick out a distant object in line with their bearing and steer toward

that, making adjustments as needed to stay on the bearing

5. Remind students that they should treat their compasses gently; they are delicate instruments!
6. Distribute Student Handout #1 to each pair of students and explain it. Students should end up at the point where they started, but don't tell them that ahead of time.
7. Make sure students understand that compasses have 360° and explain what they should do if they get a number more than 360° when they are adding during the second part of the exercise.
8. Have students practice steering their bearings.
9. Discuss any problems and reinforce the usefulness of compasses for boating.

This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing

Science A-5 Forces of nature

Mathematics A-1 Numeration, E-2 Practical applications of mathematics

Skills for a Healthy Life A-1 Effective communication

Name: _____ Date: _____

Steer That Bearing

When you have the bearing compass, your job is to “steer” as if you were in a boat by pacing off four consecutive bearings. Your partner’s job is to tell you what course to steer, and to read these directions to you.

1. Pick a spot far enough away from other students that you won’t crash into them when you are walking 10 paces. The whole time you are pacing the course, your partner needs to stand on the exact spot you start at. This is important!
2. Holding a bearing at 90° , walk 10 paces. Keep your paces even throughout the activity. It doesn’t matter how long your pace is, just that it is consistent.
3. Turn 90° (you should be facing 180°) and walk 10 paces.
4. Turn 90° (you should be facing 270°) and walk 10 paces.
5. Turn 90° (you should be facing $360^\circ/0^\circ$) and walk 10 paces.
6. Where are you?
7. Now do the following:
 - Pick a course to start on: _____ $^\circ$
 - Walk 10 paces in that direction
 - Add 90° to that number = _____ $^\circ$
 - Walk 10 paces in that direction
 - Add 90° to that number = _____ $^\circ$
 - Walk 10 paces in that direction
 - Add 90° to that number = _____ $^\circ$
 - Walk 10 paces in that direction
8. Where are you?
9. Help your partner do his/her two courses.

Nautical Charts and Courses

Time: 60-90 minutes

Overview



Explore nautical charts.

Objectives

After completing this activity, students should be able to:

1. Recognize at least four features common to all nautical charts.
2. Identify at least seven symbols commonly found on nautical charts.
3. Plot a course on a chart.
4. List three differences between a nautical chart and a topographic map.

Materials

- 1 full-scale nautical chart, preferably local
- 1 per group, Student Handout #1 Chart Section or a section of your local full-scale nautical chart with compass rose and map scale
- 1 per group, parallel rulers 
- 1 per group, dividers 
- Overhead of Student Handouts # 1 **Chart Section**, #2 **Chart Symbols**, and #3 **Aids to Navigation**
- 1 per group, Student Handouts #1 **Chart Section**, #2 **Chart Symbols**, #3 **Aids to Navigation**, #4 **Nautical Charts** (adapt for local charts, if necessary), and #5 **Plot It**
- 1 full-scale topographic map, preferably of an area covered by the chart
- 1 per group, photocopy of the topographic map

Procedure

Before Class

1. Hang a full-scale chart in the classroom for student reference.

During Class

1. Explain to students that they will be learning about nautical charts. Explain what a nautical chart is.
2. Distribute Student Handout #1. Using full-scale chart and an overhead of Student Handout #1, review chart features including scale, latitude, longitude, compass rose, notes, water depth, bottom characteristics, and upland topographic features. Review how to measure distance.
3. Distribute Student Handouts #2 and #3. Review the symbols commonly found on a chart. Include aids to navigation, rocks (submerged and awash), kelp, shoals, and foul bottom.
4. Divide the students into groups.
5. Distribute and explain Student Handout #4. Have students complete it.
6. Discuss answers and any questions or problems.
7. Distribute copies of a topographic map. Have students compare the map to the chart, listing at least three differences. (Charts include detail of underwater surface, minimal detail of land surface, aids to navigation, depth of water, latitude distance scale, compass rose, magnetic variation, distance in nautical miles. Topographic maps show detail of land surface, distances in statute miles—5,280 feet.)
8. Explain to students that they will be plotting a course on a chart.
9. Distribute and explain Student Handout #5. Have students complete it.
10. Discuss any problems and emphasize the importance of knowing how to use nautical charts.

This activity addresses Alaska Content Standards:

Language Arts A-6 Using visual communication, B-1 Finding meaning from text

Mathematics A-1 Numeration, A-2 Measurement, A-3 Arithmetic and computation, A-5 Geometry, B-1 Computation as problem solving, B-3 Using mathematics in real-life situations, B-4 Develop problem-solving strategies, C-1 Using pictures, graphs, and charts, D-1 Analyze situations, D-2 Drawing

logical conclusions, D-3 Mathematical reasoning, E-1 Exploring problems using mathematics, E-2 Practical applications of mathematics, E-3 Mathematics across the curriculum

Geography A-1 Using maps, charts, A-3 Maps as changing documents, A-4 Using graphic tools, F-6 Geography across the curriculum

Nautical Charts and Courses is a variation of one submitted by Schoenbar Middle School teacher, Shawn Marie Carpenter, Ketchikan, Alaska.

Chart Section



Chart Symbols

DANGERS		
(25) Rock which does not cover (height above MHW)	Wreck showing any portion of hull or superstructure (above sounding datum)	5½ Obstr Obstruction
* Uncov 2 ft Uncov 2 ft * (2) (2) Rock which covers and uncovers with height above chart sounding datum!	Masts Wreck with only masts visible (above sounding datum)	Obstr Well Subm well Obstr Well Subm well (buoyed)
Rock awash at (near) level of chart sounding datum Dotted line emphasizes danger to navigation	PA Wreck always partially submerged	Obstruction (fish haven) Fish haven (artificial fishing reef)
Rock awash (height unknown) Dotted line emphasizes danger to navigation	Sunken wreck dangerous to surface navigation (less than 11 fathoms over wreck)	Wreckage Wks Wreckage:
Submerged rock (depth unknown) Dotted line emphasizes danger to navigation	5½ Wk Wreck over which depth is known	Subm piling Submerged piling
Submerged rock (depth unknown) Dotted line emphasizes danger to navigation	2½ Wk Wreck with depth cleared by wire drag	Snags Stumps Snags; Submerged stumps
5 Rk Shoal sounding on isolated rock	8 Wk Unsurveyed wreck over which the exact depth is unknown, but is considered to have a safe clearance to the depth shown	3 Rep (1958) Reported (with date) * Eagle Rk (rep 1958) Reported (with name and date)
2½ Rk 2½ Obstr Sunken danger with depth cleared by wire drag	Foul Foul ground, Foul bottom (fb)	Limiting danger line
Reef Reef of unknown extent	Tide Rips Tide Rips Overfalls or Tide rips Symbol used only in small areas	rky Limit of rocky area
Sub Vol Submarine volcano	Eddies Eddies Eddies Symbol used only in small areas	Subm Crib Crib (above water) Crib
Coral reef, detached (uncovers at sounding datum)	Kelp Kelp, Seaweed Kelp, Seaweed Symbol used only in small areas	Platform (lighted) HORN Offshore platform (unnamed)
Coral or Rocky reef, covered at sounding datum	Breakers	Hazel (lighted) HORN Offshore platform (named)

Aids to Navigation

AIDS TO NAVIGATION ON NAVIGABLE WATERS except Western Rivers and Intracoastal Waterway

LATERAL SYSTEM AS SEEN ENTERING FROM SEAWARD

<p>PORT SIDE ODD NUMBERED AIDS □ WHITE OR □ GREEN LIGHTS</p> <p>FIXED FLASHING OCCULTING QUICK FLASHING EQ INT </p> <p>LIGHTED BUOY "P" F G 4sec Ra Ref</p> <p>CAN C "7" Ra Ref</p> <p>DAYMARKS</p> <p>SB "1" ▲ SW "3" ▲ W "3" SG "3" ▲ G "3"</p>	<p>MID CHANNEL NO NUMBERS—MAY BE LETTERED □ WHITE LIGHT ONLY</p> <p>MORSE CODE Mo(A) </p> <p>LIGHTED SW "N" Mo(A) Ra Ref</p> <p>DAYMARK BW "A" Ra Ref</p> <p>JUNCTION MARK JUNCTIONS AND OBSTRUCTIONS NO NUMBERS—MAY BE LETTERED INTERRUPTED QUICK FLASHING</p> <p>□ WHITE OR □ GREEN □ WHITE OR □ RED</p> <p>LIGHTED SB "M" J O k F I G Ra Ref</p> <p>LIGHTED SB "D" J O k F I R Ra Ref</p> <p>PREFERRED CHANNEL TO STARBOARD TOPMOST BAND BLACK CAN SB C "W" Ra Ref</p> <p>PREFERRED CHANNEL TO PORT TOPMOST BAND RED NUN SB N "L" Ra Ref</p> <p>DAYMARKS JB L ▲ RB "L" JR J ▲ RB "J"</p>	<p>STARBOARD SIDE EVEN NUMBERED AIDS □ WHITE OR □ RED LIGHTS</p> <p>FIXED FLASHING OCCULTING QUICK FLASHING EQ INT GROUP FLASHING (2) </p> <p>LIGHTED BUOY R "8" F I R 4sec Ra Ref</p> <p>NUN R N "6" Ra Ref</p> <p>DAYMARK TR "4" ▲ R "4"</p>
BUOYS HAVING NO LATERAL SIGNIFICANCE—ALL WATERS		
<p>SHAPE HAS NO SIGNIFICANCE NO NUMBERS—MAY BE LETTERED MAY BE LIGHTED ANY COLOR LIGHT EXCEPT RED OR GREEN</p> <p>FIXED FLASHING OCCULTING </p> <p>CAN W Or C Ra Ref SPECIAL PURPOSE</p> <p>CAN Y C Ra Ref QUARANTINE ANCHORAGE</p> <p>CAN N C Ra Ref ANCHORAGE</p> <p>CAN SW C Ra Ref FISH NET AREA</p> <p>CAN GW C Ra Ref DREDGING</p> <p>CAN D Ra Ref DANGER</p> <p>CAN E Ra Ref EXCLUSION AREA</p>		
DAYMARKS HAVING NO LATERAL SIGNIFICANCE MAY BE LETTERED		
<p> NW ▲ W Bn</p> <p> NR ▲ RW Bn</p> <p> NB ▲ BW Bn</p>		

Name: _____ Date: _____

Nautical Charts

Part 1. Chart Symbols

Use Student Handouts #1 and #2 to answer the following questions.

1. Locate three rocks on the chart and circle them.
2. Draw the symbol for kelp. Circle any kelp beds found on the chart.
3. Identify a small bay or cove on the chart. Write down its name and give its greatest depth.
4. Circle an elevation on a mountain.
5. Locate the compass rose. What is the magnetic variation for this area?
6. In what year was this variation established? Why is this information important?
7. Calculate the variation as of this year.

Part 2. Aids to Navigation


Use Student Handouts #1 and #3 to complete the following questions. Circle the items on Student Handout #1 as you select them.

1. Locate a red nun buoy.
 - a. What is its number?
 - b. What is its approximate latitude and longitude?
2. Locate a can buoy.
 - a. What is its number?
 - b. What is its approximate latitude and longitude?
3. Locate a lighted buoy. A lighted buoy has FIG or F1R and the number of seconds printed near it.
 - a. What is its number?

- b. How often does it flash?
 - c. What color is it?
 - d. Heading NE, which side of the channel does it mark?
 - e. Why is it important to know this information?
4. Locate a light not on a buoy.
- a. What is the name of the light?
 - b. What color is it?
 - c. How often does it flash?
 - d. Heading NE, which side of the channel does it mark?
 - f. How tall is it?
5. You are traveling NE through Kakul Narrows to spend the night in Haley Anchorage.
- a. What is the first navigational aid you will look for?
 - b. What type is it?
 - c. What is the second navigational aid to look for?
 - d. What type is it?
6. On this same trip, how far away is the second navigation aid from the first? (Hint: 1 minute of latitude is equal to 1 nautical mile.)
7. Traveling at 6 knots, how long would it take you to get from the first navigation aid to the second navigation aid?
8. Why should you use the latitude scale to measure distance on a chart rather than the longitude scale?

Nautical Charts

Part 1. Chart Symbols

1. Locate three rocks on the chart and circle them.
Answers will vary.
2. Draw the symbol for kelp . Circle any kelp beds found on the chart.
Kelp beds located near Haley Rock, Little Island, and east of Liesnoi Shoal.
3. Identify a small bay or cove on the chart. Write down its name and give its greatest depth.
Answers will vary.
4. Circle an elevation on a mountain.
Answers will vary.
5. Locate the compass rose. What is the magnetic variation for this area?
27°15'E
6. In what year was this variation established? Why is this information important?
1982; You need to calculate the variation to the present year you are using the chart.
7. Calculate the variation as of this year.
-6' x # years (from 1982 to this year) = variation change

Part 2. Aids to Navigation

1. Locate a red nun buoy.
 - a. What is its number?
10 or 8
 - b. What is its approximate latitude and longitude?
57°24'30"N, 135°37'30"W
2. Locate a can buoy.
 - a. What is its number?
3
 - b. What is its approximate latitude and longitude?
57°22'30"N, 135°41'20"W
3. Locate a lighted buoy (answers may include any one of the following)

a. Number?	b. Flash?	c. Color?	d. Side of channel?
<i>4</i>	<i>2.5 seconds</i>	<i>red</i>	<i>right</i>
<i>5</i>	<i>2.5 seconds</i>	<i>green</i>	<i>left</i>
<i>6</i>	<i>2.5 seconds</i>	<i>red</i>	<i>right</i>
<i>9</i>	<i>4 seconds</i>	<i>green</i>	<i>left</i>
<i>11</i>	<i>2.5 seconds</i>	<i>green</i>	<i>left</i>

 - e. *The lights flash at different times, allowing you to locate yourself in the fog or dark. Red and green direct you to safe water.*

4. Locate a light.

a. Name?	b. Flashes?	c. Color?	d. Side of channel?	e. Height?
<i>Channel Rks.</i>	<i>2.5 seconds</i>	<i>red</i>	<i>right</i>	<i>27'</i>
<i>Sergius Pt.</i>	<i>4 seconds</i>	<i>green</i>	<i>left</i>	<i>17'</i>
<i>Suloia Pt.</i>	<i>2.5 seconds</i>	<i>green</i>	<i>left</i>	<i>22'</i>

5. You are traveling NE through Kakul Narrows to spend the night in Haley Anchorage.

a. What is the first navigational aid you will look for?

Kakul Rk 2

b. What type is it?

Lighted buoy

c. What is the second navigational aid to look for?

Brad Rk

d. What type is it?

Light

6. On this same trip, how far away is the second navigation aid away from the first? (Hint: 1 minute of latitude is equal to 1 nautical mile.)

One nautical mile

7. Traveling at 6 knots, how long would it take you to get there?

10 minutes

8. Why should you use the latitude scale to measure distance on a chart rather than the longitude scale?

Latitude lines are equidistant all around the earth, longitude lines are not (they meet at the poles and are the farthest apart at the equator).

Name: _____ Date: _____

Plot It

Use Student Handout #1 to plot a course, following these directions.

1. Your current position is $57^{\circ}29'00''\text{N}$, $135^{\circ}42'45''\text{W}$.
2. Locate this position and draw a straight line from that point NE through Kakul Narrows. This is the first segment of your course.
3. From the end of this line, draw a series of additional lines to take you through Sergius Narrows to your fishing hole near Liesnoi Island. This series of straight lines is now your course. End your course between the 14 and 32 fathom lines southeast of Liesoi Island.

Compass Rose

Time: 45 minutes

Overview

Determine a course on a chart using the compass rose, parallel rulers, and dividers.

Objectives

After completing this activity, students should be able to:

1. Describe at least three features of a compass rose.
2. Determine a course on a nautical chart using the compass rose and parallel rulers.
3. Demonstrate at least one method to measure distance on a chart with dividers.

Materials

- Overheads #12 **Features of a Chart**, #14 **Deviation Table**, #15 **Parallel Rulers and Dividers** (optional), #s 16a-16d **Using Parallel Rulers** (optional), and #s 17a and 17b **Using Dividers** (optional)

- 1 per teacher, parallel ruler **AMSEA**
- 1 per group, parallel ruler **AMSEA**
- 1 per teacher, dividers **AMSEA**
- 1 per group, dividers **AMSEA**
- 1 per group, Student Handouts #1 **Using the Compass Rose** and #2 **Finding Distance**
- 1 per student, pencil
- 1 per group, copy of Overhead #14 **Deviation Table**
- Overhead of a marked course on a chart (It would be good if this was a different course from the ones students will be using so you don't give them the answers when demonstrating how to do the exercise.)
- 1 per group, nautical chart (charts can be obtained at bookstores, outdoor equipment stores, hardware stores, or through the National Oceanic Atmospheric Administration)

Procedure

Before Class

1. Activities #3 and #5 should be completed before this activity.
2. Mark a course on each chart. The course should be a series of straight-line segments on a variety of bearings. Ideally, the course should have at least as many segments as there will be students in each group. Mark the first segment of the course A, the second B, etc. It will be easiest on you to use the same course for all students, but more challenging for the students if each has a different course so they can't get their answers from another group.
3. Determine each segment's true bearing, magnetic bearing, and corrected compass bearing, and record them on a copy of Student Handout #1.

During Class

Part 1. Course Bearings

1. Explain to students that they will be determining a course on a nautical chart using the compass rose, parallel rulers, and dividers.
2. Review what magnetic bearing, true bearing, and variation mean.
3. Discuss the function and features of a compass rose using Overhead #12. Include true and magnetic rings, and reading the compass rose in the direction of travel (a course line points in two opposing directions).

4. Show students parallel rulers and explain what they are used for. Demonstrate how to use them to figure true and magnetic course bearings from the course line. You can do this with Overheads #16a-16d or an overhead of a chart specific to your area.
5. Explain what deviation is. Demonstrate how to use a deviation table with Overhead #14.
6. Explain what an annual increase or decrease in variation means, and show how this is marked in the center of the compass rose. Variation is too minor to be a concern for navigation if using up-to-date charts.
7. If using out-of-date charts, calculate the change in variation by multiplying the annual increase or decrease in variation by the number of years that have passed between the year printed on the chart and the present. Explain that this is recorded by using a “+” or “-” sign to signify whether the correction is an increase or decrease. If this change has been less than 60 minutes (or 1°), this will not be a significant factor for most navigation because it is very difficult to steer to within less than 1 degree of accuracy. Explain how this correction would be used.
8. Divide the class into groups.
9. Distribute a marked nautical chart, parallel ruler, dividers, Student Handout #1, and a copy of Overhead #14 to each group.

10. Have students complete Student Handout #1. Each student should do one segment.
11. Check answers and discuss any problems.

Part 2. Distance

1. Explain to students that they will be finding the distance of a marked segment on a chart.
2. Show them what dividers are. Use Overhead #15 if desired.
3. Discuss distance scales. Emphasize that the latitude scale **nearest** a course line should be used for measuring distance, and that longitude scales are **never** used as distance scales.
4. Using either the distance scale on the chart or the latitude scale, demonstrate the use of dividers to measure distance.
5. Distribute and explain Student Handout #2. In order to figure speed, describe the boat students will be taking, including its cruising speed in knots. Explain how to figure speed.
6. Have students complete Student Handout #2, with each student doing one segment.
7. Check answers and discuss any problems.

This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing, A-4 Writing for purpose, A-6 Using visual communication

Mathematics A-2 Measurement, A-3 Arithmetic and computation, A-5 Geometry, A-6 Data analysis and statistics, B-2 Investigating situations, B-3 Using mathematics in real-life situations, C-1 Using pictures, graphs, and

charts, D-1 Analyze situations, D-3 Mathematical reasoning, E-1 Exploring problems using mathematics, E-2 Practical applications of mathematics, E-3 Mathematics across the curriculum

Geography A-1 Using maps, A-3 Maps as changing documents, A-4 Using graphic tools

Compass Rose is based on an activity developed by Schoenbar Middle School teacher, Shawn Marie Carpenter, Ketchikan, Alaska.

Name: _____ Date: _____

Using the Compass Rose

In this exercise you will practice determining course bearings on a nautical chart using the compass rose and common navigation tools. Unless instructed to do so, **do not make any marks on the chart**. If needed, make marks in pencil. Record your answers in the table below.

Find the true and magnetic bearings for each segment of the course marked on your nautical chart. Each student in your group should do one segment.

1. List each student’s name and course segment in the table.
2. Align one edge of the parallel rulers with your course segment.
3. “Side-step” the parallel rulers toward the compass rose until one edge of the ruler is on the center of the rose.
4. Read the **outside** ring **in your direction of travel** to find the true bearing and record it in the third column in the table below.
5. Read the **inside** ring **in your direction of travel** to find the magnetic bearing, and record it in the fourth column.
6. Use the copy of Overhead #14 **Deviation Table** to figure the corrected bearing and record it in the last column.

Name of Student	Course Segment	True Bearing	Magnetic Bearing	Corrected Bearing (With Deviation)

7. Explain why you would convert a magnetic bearing with a deviation table.
8. If you are using an out-of-date chart, you need to calculate the annual change in variation by multiplying the annual variation decrease or increase (found in the center of the compass rose) by the number of years that have passed between the year printed on the chart and the present. If this change has been less than 60 minutes (or 1°), this will not be a significant factor for most navigation because it is very difficult to steer to within less than 1 degree of accuracy.

What is the change in variation? Include a “+” or “-” sign to signify whether the correction is an increase or decrease, and explain how this correction would be used.

Name: _____ Date: _____

Finding Distance

In this exercise you will find the distance of each segment of the marked course on your nautical chart, and figure the time it would take to travel that distance. Record your information on the table below.

If a course segment is shorter than one spread of the dividers:

1. Place one point of the dividers on the start of the course segment.
2. Stretch the dividers and place the second point on the end of the segment.
3. Without changing the spread of the dividers, move them to the chart scale **or** the latitude scale to the right or left of the course segment you are measuring. **Never** use the longitude scale for measuring distance on charts.
4. Place one point of the dividers on a convenient starting point on the scale, the other wherever it lands. Read the distance directly from the scale.
5. Repeat for all course segments.

If a course segment is longer than one spread of the dividers:

1. Place one point of dividers on the chart scale, or latitude scale to the right or left of the course segment you are measuring. **Never** use the longitude scale for measuring distance on charts.
2. Spread the other point to a convenient distance on the scale.
3. Without changing the spread of the dividers, place one point of the dividers on the starting point of the course segment and pivot or “walk” the dividers down the segment, counting the number of units as you go.
4. If the last spread of the dividers ends exactly at the end of the course segment (a miracle!), multiply the number of pivots by the distance set on your dividers.
5. If the last part of the course segment is not a whole spread, make a light pencil mark where the last full unit ended and measure the remaining part using the previous method. Multiply the number of pivots by the distance set on your dividers, and add the last partial distance.

Name	Course Segment	Distance	Time

The boat you will be taking over this course will be a _____ that travels at _____ knots (nautical miles per hour). To calculate the time it will take to travel each course segment use the formula: $\text{Time (hrs)} = \text{distance (nautical miles)} \div \text{speed (knots)}$.

Basic GPS Boating

Time: 10-15 minutes per day until completed (depends on number of students and GPS receivers)

Overview

Use GPS receivers to find positions around town and locate them on charts.

Objective

After completing this activity, students should be able to use a chart to locate a position obtained from a hand-held GPS.

Materials

- 1 or more hand-held GPS receivers, the more the better
- Large scale chart of your local area
- Parallel ruler
- Yard stick

Procedure

Before Class

1. Have students complete Activities #5 and #6.
2. Familiarize yourself with the GPS unit and how it works.
3. Place the chart in a prominent location.

During Class

Part 1

1. Explain to students that they will be using a GPS receiver to find the latitude and longitude of positions around town, and will be locating the positions on charts.
2. Explain what a GPS system is and how it works.
3. Demonstrate how to use the GPS to determine your latitude and longitude.
4. Demonstrate how to plot this position on a chart using the latitude and longitude lines on the sides of the chart.
5. Provide GPS receivers to students. Assign them to use the GPS to find the position of their home's front door, bring the position information to school, and plot it on the chart in the classroom (use pencil). Remind students that the GPS must be outdoors when getting a position so it can "see" the sky.

6. Once all students have plotted where they live on the chart, have them mark the school's front door and plot a course to school from their homes using a series of straight line segments. Have them determine the bearings of these course segments using parallel rulers.

Part 2

1. Explain to students that they will be plotting known positions on charts using data from a GPS.
2. Identify locations in the area that are accessible to students and clearly shown on the chart. Assign one or two to each student.
3. Have students locate the points on the chart and determine their latitude and longitude using the chart.
4. Distribute GPS receivers and have students go to their assigned locations and record the location's latitude/longitude as read by the GPS.
5. Have students plot the positions on the chart.
6. Discuss any differences between the chart's position and the position they plotted. This may include plotting errors, GPS inaccuracies, or chart errors.

This activity addresses Alaska Content Standards:

Mathematics A-1-2 Numeration and measurement

Science A-1-6 Scientific facts, concepts, principles, and theories, D-1 Apply scientific knowledge

Geography A-1 Using maps and globes

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, D-1 Responsible decisions

Technology A-2 Communicating through technology, E-7 Technology in daily living

Boating Talk

Time: 45 minutes

Overview

Do a crossword puzzle on nautical terms.

Objective

After completing this activity, students should be able to define at least 80% of the boating terms used in this unit.

Materials

- 1 per student, Student Handout #1
Boating Talk

Procedure

1. Explain to students that they will be completing a crossword puzzle on nautical terms.
2. Distribute Student Handout #1 and have students complete it.

This activity addresses Alaska Content Standards:

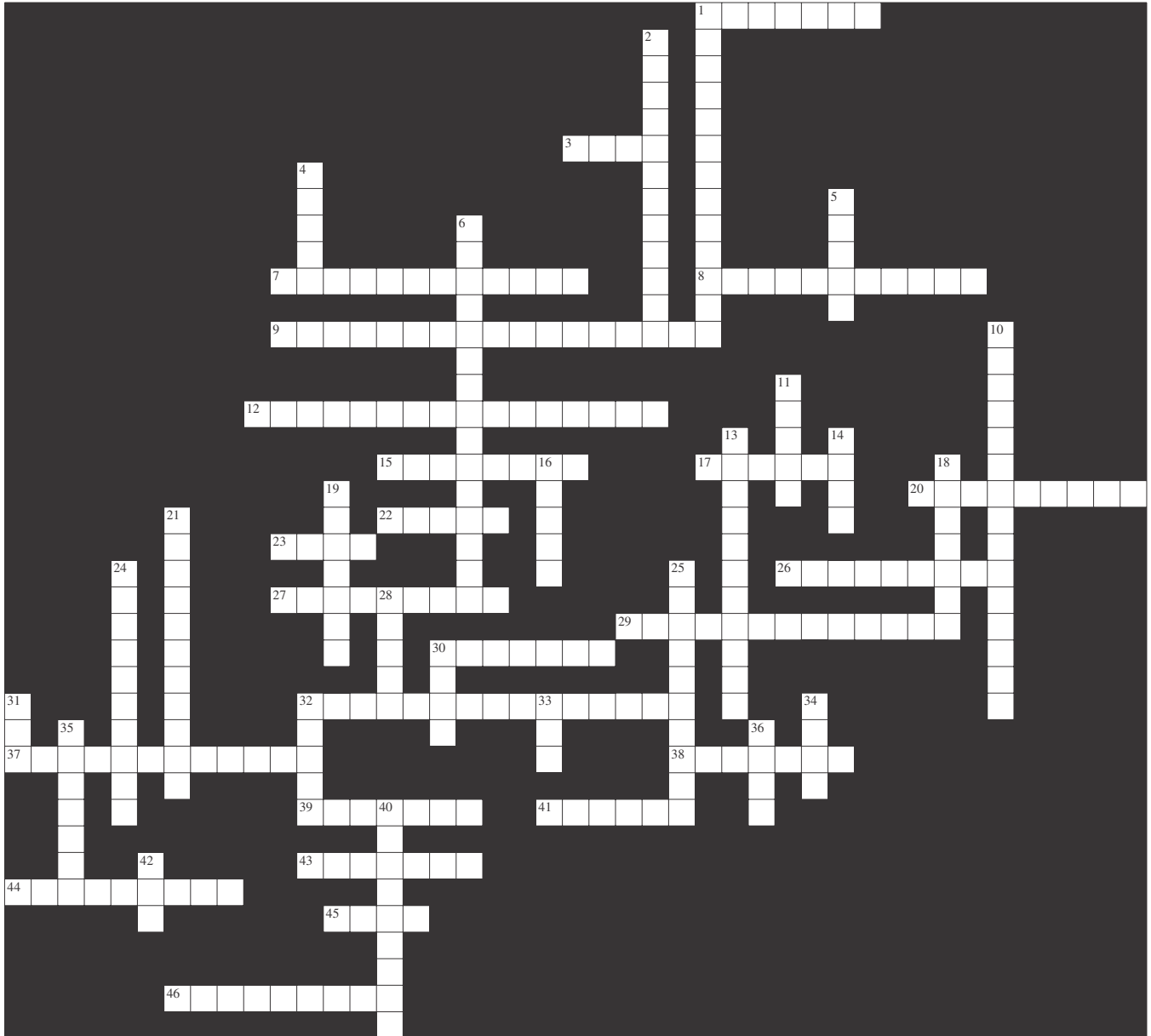
Language Arts A-1 Effective writing, A-3 Writing for purpose

Skills for a Healthy Life C-2 Effective communication, C-5 Individual and group responsibilities

Name: _____

Date: _____

Boating Talk



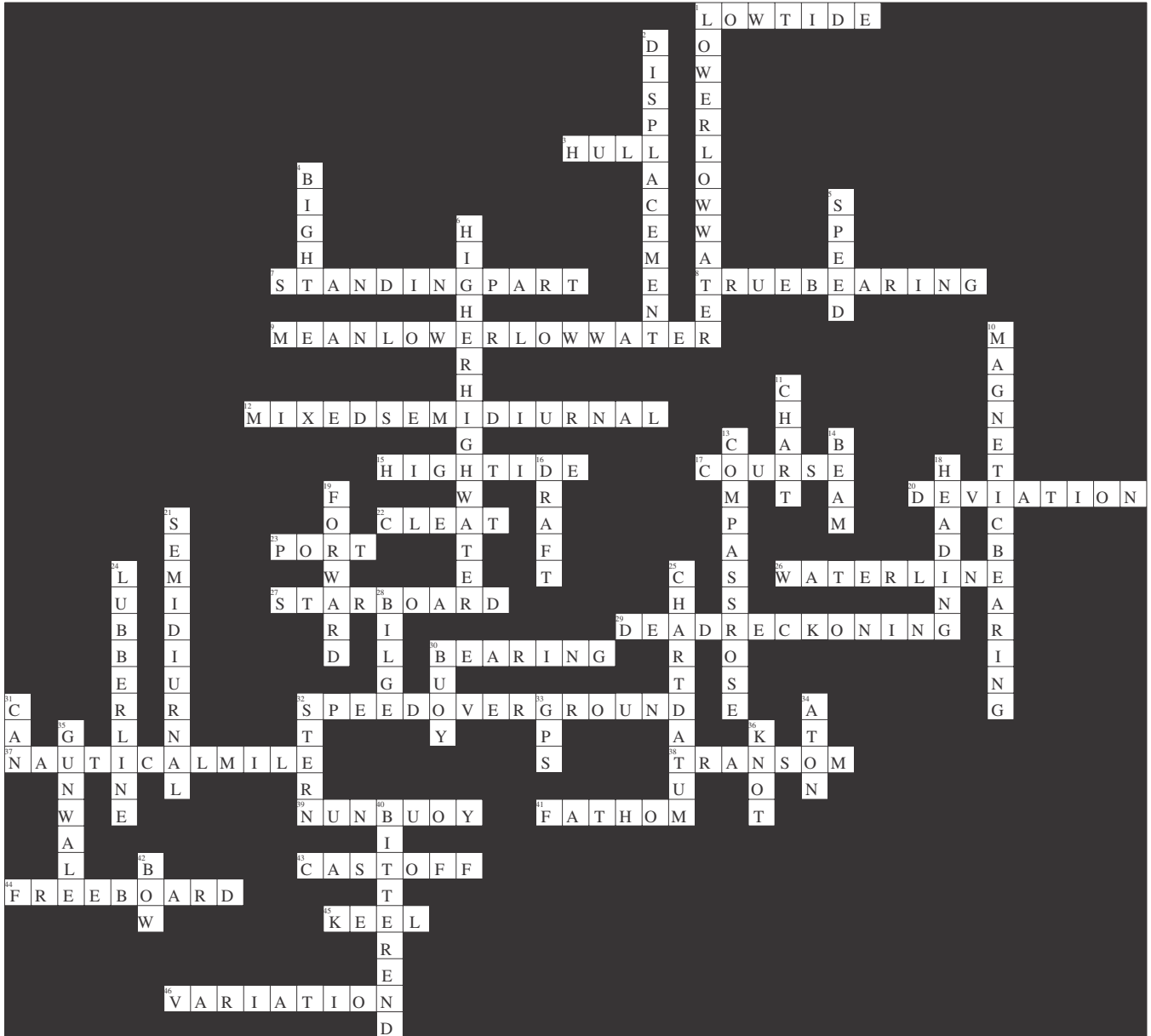
Across

1. Lowest level reached by a descending tide
3. Structural body of boat that does not include superstructure, masts, or rigging
7. The part of a line around which a knot may be tied
8. A direction relative to observer based on earth's geographic pole as reference
9. Used in U.S. as a chart baseline datum
12. Twice-daily tide cycle where the two high tides are of different heights, as are the low tides
15. Highest level reached by an ascending tide
17. Average heading or intended direction boat is traveling
20. Error in a boat's compass reading caused by magnetic properties of the boat
22. An anvil-shaped fitting to which lines are made fast
23. Left side of a boat when facing forward
26. Intersection of a boat's hull and the water's surface
27. Right side of a boat when facing forward
29. A method to reasonably determine a boat's position based on its last accurately determined location
30. Direction of an object or location from an observer
32. Term used to designate rate of travel over ground underneath water, may differ from speed due to effects of wind and current
37. A unit of distance used on charts equal to 1 minute of latitude
38. Where an outboard is mounted
39. A red conical aid to navigation
41. A unit of measurement used principally to measure water depth
43. To untie all mooring lines
44. Vertical distance from waterline to top of gunwale
45. Main structural member of a boat running fore and aft
46. Angle of difference, from your position, between true north and magnetic north; changes with location on earth over time

Down

1. Lower of the two low tides in a mixed semi-diurnal tide cycle
2. Weight of the water displaced by a floating hull
4. A loop or slack part of a rope
5. When referring to boats, usually expressed in knots
6. Higher of the two high tides in a mixed semi-diurnal tide cycle
10. Direction to an object from an observer using earth's magnetic pole as a reference
11. A nautical map showing features of the sea and shore useful to mariners
13. A circular feature on a chart indicating true and magnetic north
14. Greatest width of a boat
16. Vertical distance from waterline to keel of a boat
18. Direction a boat is pointing at any given moment
19. Toward the front or bow of a boat
21. Twice-daily tide cycle where the two high tides are the same height as are the low tides
24. Line on a bearing compass at which a bearing is read
25. The baseline from which heights and depths of water are measured on a chart; in U.S. baseline is mean lower low water
28. The lowest point of a boat's interior hull
30. An anchored aid to navigation of various shapes and colors
31. A green cylindrical buoy
32. After (back or rear) portion of a boat
33. A satellite-based radio positioning and navigation system
34. Common abbreviation for "aids to navigation"
35. Upper edge of the boat's side
36. A unit of speed equal to approximately 1.2 miles per hour
40. Extreme end of a line
42. The most forward part of a boat

Boating Talk





Unit 3: Boating Emergencies

Unit Rationale

In the United States, almost 1,000 people die every year in boating accidents. In Alaska, the boating fatality rate is 10 times the national average. Practicing emergency procedures in a safe, controlled environment using actual emergency equipment builds the skills and confidence to act quickly and overcome panic in an actual emergency. This unit can help make boaters survivors instead of victims should an emergency strike.

Unit Goal

To introduce students to seven prioritized actions needed in an emergency, and to practice with emergency equipment.

Boating Emergencies: Teacher Information

The information in this section gives teachers a background in the topic. Use your judgment when presenting this material; some concepts may not be suitable for younger children.

Types of Emergencies

Immediate onset

- A. Happen suddenly with little or no warning
- B. Examples include collision, capsizing, man overboard

Delayed onset

- A. Start out slowly and accumulate until situation becomes life-threatening
- B. Examples include mechanical failures or overloading a leaky boat with worsening weather conditions

Emotional Factors in Emergencies

Studies show that in emergencies

- A. 12%-25% of people act effectively
- B. 50%-75% are stunned, bewildered, tend to have tunnel vision, and tend to operate in an automatic way
- C. 10%-25% of people show levels of inappropriate behavior including panic

Potentially disabling emotions during emergencies

- A. Fear
 - 1. Normal reaction in an emergency
 - 2. Useful function in keeping people aware, “on their toes,” in dangerous situations
- B. Panic
 - 1. Prevents clear thinking
 - 2. Wastes energy
 - 3. Obstacle in setting priorities
- C. Depression or apathy
 - 1. Recognize that it can be a problem
 - 2. Destroys the will to live
 - 3. Documented cases in POW camps show depression leads to lethargy, which leads to death

Ways to reduce or eliminate fear, panic, depression, and apathy

- A. **Before** emergency
 - 1. Accept the fact that an emergency situation can happen to you
 - 2. Make contingency plans, file float plans, check weather, etc.
 - 3. Acquire relevant training
- A. Gives you procedures to follow that will increase confidence
- B. Practice reduces panic and increases likelihood that “automatic operators” are positive

- C. Best training is hands-on practice with actual equipment
- B. **During** emergency
 1. Recognize your ability to be creative, innovative, and resourceful—your mind is your most powerful survival tool
 2. Develop a positive mental attitude—think like a survivor, not a victim
 3. Do something positive to improve your situation

Will to live

- A. Very important in all survival situations
- B. Thinking about loved ones and things important in your life helps focus on living
- C. Some people have a stronger will to live than others
- D. In identical situations, a strong will to live can make the difference between life and death

Your body's physical condition affects your mental state

- A. Hypothermia, dehydration, and alcohol consumption lead to
 1. Inability to think clearly, leading to poor judgment and decision making
 2. Inappropriate behavior
 3. Denial and apathy
- B. Problems can be difficult to recognize in yourself; watch for signs in others

Avoiding Emergencies

- A. Ask permission before you go
- B. Let people know where you are going by filing a float plan (see Preparing for a Boat Trip unit)
- C. Be well-prepared
 1. Learn survival skills
 2. Practice skills
 3. Carry adequate repair tools and parts, clothing, water, and food, plus comfort and survival kits

Capsizing/Swamping

- Usually happens suddenly
- Largest cause of boating fatalities in Alaska
- A. Avoiding capsizing is more effective than dealing with capsizing!
 1. Stay within operational constraints of your boat/skills
 2. Abstain from alcohol and drugs when onboard
- B. Causes
 1. Overloading
 2. Adverse weather conditions or seas
 3. Improper boat handling—e.g., high speeds, fast turns
 4. Improper passenger behavior
 5. Loss of balance due to intoxication

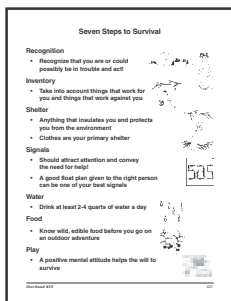
6. Urinating or vomiting over side of boat
7. Poor weight distribution
- C. Training and equipment needs
 1. How to recover others from the water (see detailed information in Volume 2, *Cold Water Safety and Survival*, Cold Water Survival unit)
 2. Have proper equipment (e.g., throwing device, lifting aid)
 3. Always wear a PFD in an open boat or on deck

If You Fall in the Water

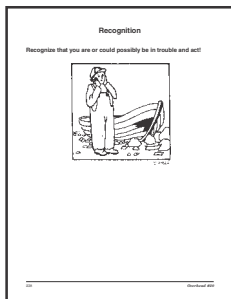
- This is covered in depth in *Cold Water Safety and Survival*, Volume 2, Cold Water Survival unit

Man Overboard

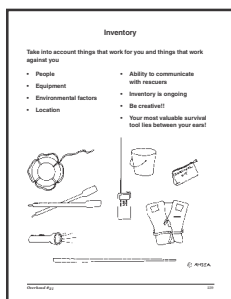
- A. Prevention
 1. Avoid drinking alcohol onboard—it leads to loss of coordination and balance
 2. Keep center of gravity low
 - a. Especially when urinating! Men fall overboard and drown every year when engaged in this activity
 - b. Stay seated when possible
 3. Keep boat trimmed
 4. Avoid slippery surfaces caused by fish slime, kelp, plastic, gear, etc.
 5. Keep one hand for yourself and one for boat
 6. Keep out of loops of line
- B. Recovering a man overboard
 1. Throw a ring, flotation device, or anything that floats as close to victim as possible
 - a. Marks victim’s location and is easier to see than a person
 - b. Gives victim a goal to reach and something to hold onto
 - c. Tells victim he/she has been seen and rescue is in progress
 2. Post a lookout to **keep victim in sight at all times**
 3. Sound the alarm
 - a. This may mean just yelling “Man Overboard!”
 - b. Key in position on electronic navigation equipment, if available
 - c. Make sure person steering boat knows where victim is
 - d. Pointing is simplest form of communicating victim’s position to others—person pointing should **never** take their eyes off victim
 4. Maneuver boat as necessary
 5. Rescue victim carefully—see *Cold Water Safety and Survival*, Volume 3, Cold Water Survival unit for information on how to rescue people in the water
 6. If individual in the water is not immediately located
 - a. Notify U.S. Coast Guard, or nearest search and rescue agency
 - b. Notify all boats in area



Overhead #19



Overhead #20



Overhead #21

Seven Steps to Survival (See Overhead #19)

- Can help you survive an emergency
- Principles developed by U.S. Coast Guard search and rescue personnel after interviewing survivors
- Help identify and prioritize needs in emergency situations
- Review the Seven Steps to Survival every time your situation changes
- They are organized in priority order but be flexible in applying them

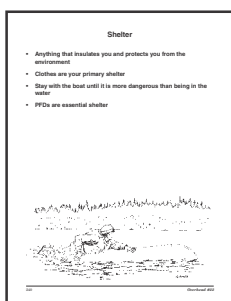
Recognition (See Overhead #20)

- A. Recognize that you are in or possibly could be in trouble
 1. Some people refuse to believe that they can get into or are in a survival situation
 - a. Superstitions can play a role—"If I don't have survival equipment nothing bad will happen to me."
 - b. Many emergencies are unpredictable and can happen to anyone
 - c. Ego, denial, and greed can all be factors in delaying recognition
 2. Refusal to recognize or acknowledge emergency situations
 - a. Limits your options
 - b. Can lead to worsening situations
 - c. Means you will not react logically
 - d. Delays asking for help—rescuers would rather you called early and not need help later than wait too long
- B. Think and act like a survivor!—many emergencies are survivable if you are prepared and act effectively
- C. Accept that you may die if you don't take some action
- D. Don't give up! "Half an inch of water and you think you're going to drown . . ." (John Prine)
- E. You are not a survivor until you are home

Inventory—take into account things that work for you and things that work against you (See Overhead #21)

- A. People
 1. Account for all
 2. Assess and treat injuries
 3. Assess emotional condition
 4. Inventory skills
 5. Elect a leader—decisions must be made and tasks assigned
- B. Equipment—condition and availability
 1. Survival kits
 2. Comfort kits
 3. Look around and on you to determine what can potentially help
- C. Environmental factors
 1. Weather—present and forecasted
 2. Cliffs, rocks, reefs, shore, etc.

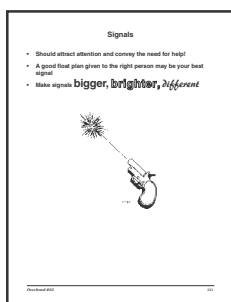
3. Animals—dangerous or food?
- D. Location—do you know where you are?
- E. Ability to communicate with rescuers, etc.
- F. Initial inventory may be rapid
- G. Inventory is ongoing as survival situation changes
 1. Take advantage of positive changes
 2. Be creative!
 3. Your most valuable tool lies between your ears!



Overhead #22

Shelter (See Overhead #22)

- A. Anything that insulates and protects you from environment
- B. Clothes are primary shelter—dress for outside, not inside environment
- C. Stay with boat until it is more dangerous than being in the water
- D. Personal flotation devices are essential shelter in the boat and water
- E. Liferrafts or other emergency floating apparatus provide good shelter
- F. See *Cold Water Safety and Survival*, Volume 2, Cold Water Survival unit for more information on liferafts and in-water survival

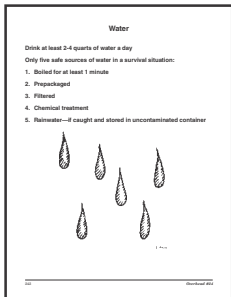


Overhead #23

Signals (See Overhead #23)

- A. Good float plan given to the right person may be your best signal
- B. Multiple signals increase your likelihood of rescue
- C. All personnel, especially those steering, should know proper radio distress procedures
- D. An effective signal must attract attention and convey need for help
 1. Attract attention
 - a. Make signals bigger, brighter, different
 - (1) Bigger—make signal as large as possible, stay with your boat
 - (2) Brighter—wear bright clothes, use orange buoys, signal mirrors, flares
 - (3) Different—manmade objects, ripples in a calm water, orange smoke
 - b. Contrast—light against dark, white Styrofoam against dark water
 - c. Movement
 - (1) Attracts attention more readily than stationary objects
 - (2) Makes you appear larger
 - (3) Makes you stand out from a still or quiet background
 - (4) Use signals that move by themselves, if possible
 - (5) Wave objects when rescuers are in sight
 - d. Signaling is more difficult in precipitation and fog
 2. Convey recognizable message for help
 - a. Signal in groups of three—e.g., three gunshots, three fires
 - b. SOS
 - c. Mayday
 - d. Flares—red and orange; **not** white

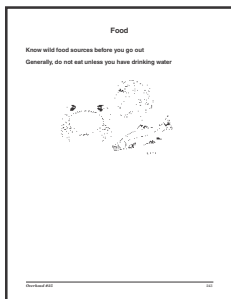
- e. EPIRBs (Emergency Position Indicating Radio Beacons)
 - f. Waving two arms over head means “I need assistance”—one arm waving over head means “All is well”
- E. Signal types
- 1. Passive signals = work without you
 - a. EPIRB, lights, wreckage
 - b. Work continuously
 - 2. Active signal = only work with you
 - a. Flares, whistles, mirrors, waving arms
 - b. Use primarily when rescuers are in sight, but you may attract someone you cannot see
- F. Detailed signal information follows the Seven Steps to Survival



Overhead #24

Water (See Overhead #24)

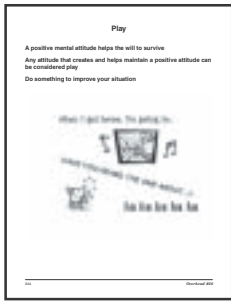
- A. Water is essential for life
- B. 2 to 4 quarts of non-dehydrating fluid per day—recommended **minimum** for most school age children through adults
- 1. Adults 18 years and up—minimum 35 ml/kg body weight
 - a. 150# adult needs 2.4 liters per day
 - b. 250# adult needs 4 liters per day
 - c. 350# adult needs 4.7 liters per day
 - 2. Adolescents 11 through 17 years—minimum 40 to 60 ml/kg body weight
 - a. 100# adolescent needs 1.8 liters per day
 - b. 150# adolescent needs 2.7 liters per day
 - 3. Young children 2 to 10 years—minimum 70 to 110 ml/kg body weight
 - a. 30# child needs 1 liter per day
 - b. 50# child needs 1.6 liters per day
 - c. 75# child needs 2.4 liters per day
 - 4. Infants 0 through 1 year—minimum 100 to 150 ml/kg body weight
- C. Water needs increase with any activity, especially stressful activity
- D. Only five safe sources in a survival situation
- 1. Boiled—Centers for Disease Control recommends at least a 1-minute rolling boil
 - 2. Prepackaged
 - 3. Filtered
 - 4. Chemical treatment
 - 5. Rainwater—if caught and stored in uncontaminated container
- E. Good idea to carry water in comfort kit/abandon ship bag



Overhead #25

Food (See Overhead #25)

- A. Important in order to meet energy needs, generate heat, and to keep up spirits
- B. Generally, do not eat unless you have water

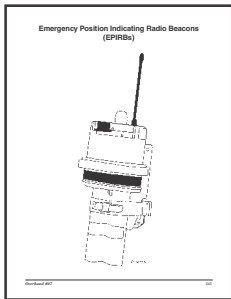


Overhead #26

1. Especially true of survival rations
2. Some foods high in water content, such as berries, are exception

Play (See Overhead #26)

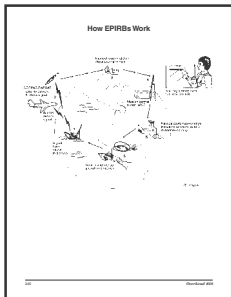
- A. Any activity that creates and helps maintain a positive attitude can be considered play
 1. Improve your shelter and signals
 2. Play games
 3. Sing songs
 4. Tell stories
 5. Think of a happy reunion with family and friends
 6. Pray
- B. Rescues generally happen within 72 hours of incident
- C. Think like a survivor, not a victim!
- D. Do something to improve your situation
- E. Work toward your rescue



Overhead #27

EPIRBs—Emergency Position Indicating Radio Beacons (See Overhead #27)

- For marine use only
 - Broadcast signal to airplanes and satellites—signal type depends on EPIRB type
- A. How 406 MHz EPIRBs work (See Overhead #28)
 1. EPIRB
 - a. Transmits 406 MHz signal to satellites
 - (1) Owner identification and contact information is encoded in 406 MHz signal
 - (2) Registration information must be sent in by owner for this feature to work
 - b. Transmits 121.5 MHz signal to aircraft and SAR boats
 2. COSPAS SARSAT (Search And Rescue Satellite-Aided Tracking) satellites = cooperative international system of polar orbiting satellites
 - a. Receives 406 MHz EPIRB signal
 - b. Stores EPIRB signal if necessary until in “sight” of a Local User Terminal
 - c. Transmits EPIRB signal to Local User Terminal
 3. Local User Terminal (LUT)
 - a. Also called ground receiving station
 - b. Scattered around world—14 in U.S. and its territories, 1 in Alaska
 - c. Receives 406 MHz EPIRB signal from satellites
 - d. Decodes signal
 - e. Calculates location within 1-3 miles accuracy
 - f. Transmits information to Mission Control Center



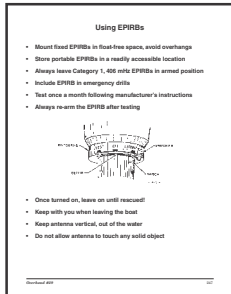
Overhead #28

4. Mission Control Center (MCC)
 - a. One in U.S. near Washington, DC, others around world
 - b. Receives information from LUT
 - c. Looks up boat owner's information using signal's identifier code—may call owner to determine whether it's a false alarm or emergency
 - d. Transmits information to appropriate Rescue Coordination Center
 5. Rescue Coordination Center (RCC)
 - a. Located in regions of U.S. and world
 - b. Receives boat's location and owner's identifier information from MCC
 - c. Notifies local search and rescue responders
 - d. May also get 121.5 MHz EPIRB signal reports from aircraft
 6. Search and Rescue (SAR) Responder
 - a. Responsible for conducting search
 - b. In U.S. operated by U.S. Coast Guard, U.S. Air Force and other organizations
 - c. Receives information from RCC
 - d. Can use 121.5 MHz signal to home in on EPIRB
- B. How 243 MHz EPIRBs (Classes A, B, and S) work
1. Similar to 406 MHz EPIRBs but send 243 MHz signal to satellite
 2. Prone to false alarms
 3. Provides less accurate position than 406 MHz EPIRB
 4. Slower response time than 406 MHz EPIRB
 5. Does not provide owner identification information
 6. Also transmits a 121.5 MHz signal to aircraft
 7. As of late 2001 only B style is still in production
 8. All will be phased out in near future

Classes of EPIRBs

- A. Category 1-406 MHz
1. Required on commercial fishing vessels operating more than 3 miles offshore
 2. Broadcasts on 406 MHz to satellite and low strength on 121.5 MHz
 3. Self-activating and float-free
 4. Signal identifies boat and owner—if registration sent in
 5. Satellite can store data—doesn't require satellite to simultaneously be in sight of both EPIRB and LUT, resulting in faster response time than 121.5/243 MHz EPIRBs
 6. Gives more accurate position than 121.4/243 MHz EPIRBs
 7. More expensive than 121.5/243 MHz EPIRBs
- B. Category 2-406 MHz is the same as Category 1 but not self-activating
- C. Category 3-406 MHz is the same as Category 1 except
1. Hand-held size

2. Not self-activating
 3. Non-floating
- D. Category 121.5/243 mHz EPIRBs (Classes A, B, and S)—will be phased out in near future
- E. Class C EPIRBs broadcast on VHF channel 16/15, are no longer manufactured, and are being phased out



Overhead #29

Using EPIRBs (See Overhead #29)

- A. Install properly
1. Mount fixed EPIRBs in float-free space, avoid overhangs
 2. Store portable EPIRBs in location readily accessible in emergency
- B. Use properly
1. Always leave Category 1-406 mHz EPIRBs in armed (“automatic” or “ready”) position
 2. Include EPIRB in emergency drills
 3. Instruct all crew in operation
 4. In emergency
 - a. Once turned on, leave on until rescued!
 - b. Keep with you when leaving boat
 - c. Keep antenna vertical and out of the water—EPIRB will not transmit if antenna is in water
 - d. Do not allow antenna to touch any solid object

Maintenance

- A. Send in your 406 mHz EPIRB registration card
- B. Test once a month and log
1. 406 mHz EPIRBs
 - a. Follow instructions for self-test
 - b. **Always re-arm EPIRB after testing**
 2. 121.5 and 243 mHz EPIRBs (Classes A, B, and S)
 - a. Test **only** during first 5 minutes of the hour
 - b. Tune an FM radio to 99.5 mHz
 - c. Turn on EPIRB, listen for three audible beeps, **turn off**
- C. Check during and after rough passages
- D. Replace hydrostatic release on float-free models every 2-3 years according to the manufacturer’s recommendation
- E. Replace battery every 2-5 years according to the manufacturer’s recommendation

PLBs—Personal Locator Beacons

- A. Designed for land users
- B. Transmit on 406 mHz to satellite and use LUT, MCC system
- C. Also transmit on 121.5 mHz to aircraft—helps SAR personnel home in
- D. Have to be manually activated
- E. Do not float

ELTs—Emergency Locator Transmitters

- A. Designed for aircraft
- B. Activate on impact
- C. Can be manually activated
- D. System being converted to 406 MHz
- E. Use satellite, LUT, MCC system
- F. Also transmit on 121.5 MHz to aircraft—helps SAR personnel home in
- G. Do not float

Other Electronic Signals

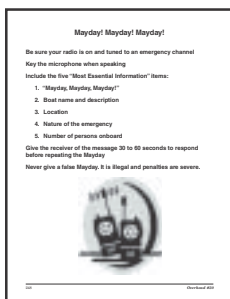
- Should be able to transmit to search and rescue organizations
- Extra radio should have an alternate, independent power supply and spare batteries

Types

- A. VHF (Very High Frequency) radio
 - 1. Emergency frequency—channel 16
 - 2. Range = approximately 20 miles, line of sight
 - 3. Hand-held VHF should be stored in waterproof bag, liferaft, or comfort kit
- B. SSB (Single Side Band or High Frequency) radio
 - 1. Emergency frequency = 2182 MHz (or 4125 MHz in Western U.S.)
 - 2. Range 100+ miles
- C. CB (Citizen’s Band) radio
 - 1. Emergency channel varies—check with local search and rescue group
 - 2. Range depends on many factors
- D. Cellular phone
 - 1. Not universal coverage
 - 2. Other boats cannot hear you
 - 3. Dial *CG [send] to contact U.S. Coast Guard in most locations in U.S.
 - 4. Dial 911 to reach local police in emergency in most of North America

Emergency Radio Broadcasts

- All personnel, especially those steering, should know proper radio distress procedures



Overhead #30

Mayday (See Overhead #30)

- A. Highest priority emergency radio call
- B. Use when immediate threat to life or limb
- C. Be sure radio is on and tuned to emergency channel
- D. Say critical information clearly
 - 1. “Mayday, Mayday, Mayday” (remember, emergency signals come in 3s)
 - 2. Boat name and description

3. Location
 - a. Latitude and longitude are preferred
 - b. If geographic reference is given use proper place names found on maps or charts to avoid confusion; be as specific as possible
 - c. It helps to always know where you are
 4. Nature of distress (medical emergency, lost, stranded, etc.)
 5. Total number of persons onboard
 6. Additional information if time and circumstances permit
 - a. On scene weather
 - b. Any hazards rescuers may encounter on scene
 - c. Safety equipment
- E. Listen for response
1. If response is received
 - a. Provide additional information as possible
 - b. Ask responder to stand by if you need to deal with immediate danger
 2. If there is no response
 - a. Wait long enough for someone to respond
 - b. Be sure microphone has been keyed off (let go of button)
 - c. Repeat message until it is acknowledged or until forced to take other action
- F. Do not practice Maydays on live radios or give false Maydays
1. It wastes search and rescue time and money
 2. You can be fined and jailed

Mayday Relay

- A. If Mayday is heard by another party and search and rescue (SAR) resources do not respond, party hearing call **must** act as relay between party in distress and SAR personnel
- B. Acquire information from party in distress as in Mayday
- C. Transmit Mayday information as follows
 1. “Mayday Relay, Mayday Relay, Mayday Relay”
 2. Your boat’s name and description
 3. Name and description of boat in distress
 4. Location of boat in distress
 5. Nature of problem with boat in distress
 6. Degree of assistance needed
- D. Listen for acknowledgment and continue until acknowledged
- E. Transmit additional information—address and phone of distressed boat’s owner and other relevant information—on secondary frequencies (i.e. VHF channels 21 or 22, or HF 6 mHz)

Pan Pan (pahn pahn)

- A. Second highest priority emergency call

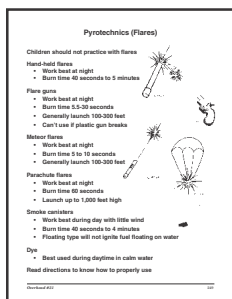
- B. Used mainly by SAR personnel when someone is possibly in trouble (e.g. overdue boater)

Securité (say-CURE-i-tay)

- A. Third highest priority emergency call
- B. Brings attention to weather, navigation hazards, etc.

Advance broadcast

- A. Advises U.S. Coast Guard or other rescuers of situation that could deteriorate into emergency
- B. Gives critical information early
- C. Allows rescuers to monitor your situation and respond more efficiently should an emergency occur



Overhead #31

Pyrotechnics (Flares) (See Overhead #31)

- **Note: Children should not practice with flares**

Types and properties

- A. Hand-held flares
 1. Work best at night
 2. Burn time 40 seconds to 5 minutes
- B. Flare guns
 1. Work best at night
 2. Burn time 5.5-30 seconds
 3. Generally launch 100'-300'
 4. Can't use if plastic gun breaks
- C. Meteor flares
 1. Work best at night
 2. Burn time 5 to 10 seconds
 3. Generally launch 100'-300'
- D. Parachute flares
 1. Work best at night
 2. 60-second burn time
 3. Launch up to 1,000' high
- E. Smoke canisters
 1. Work best during day with little wind
 2. Burn time 40 seconds to 4 minutes
 3. Floating type will not ignite fuel floating on water
- F. Dye—best used during day time in calm water
- G. SOLAS (Saving Of Life At Sea) flares are
 1. Internationally approved
 2. Generally much brighter and sometimes last longer than U.S. Coast Guard approved flares
 3. Flares must also be U.S. Coast Guard approved to meet U.S. requirements for boaters

Flare use

- A. Treat as you would a firearm
- B. Use gloves, if possible, when firing to prevent burns
- C. Turn face away before firing
- D. Know how to launch before emergency
- E. In emergency
 - 1. Fire one parachute flare in case someone is nearby but out of direct sight
 - 2. Conserve others for use when rescuers are in sight
- F. Do not fire directly at other people, aircraft, or boats
- G. Red flares are for emergency use
- H. White flares are for practice
- I. Check expiration date on flares regularly and replace expired ones; contact local fire station for safe disposal options
- J. Hand-held flares
 - 1. Follow directions on flare for igniting
 - 2. Hold horizontally—prevents slag from burning your hand
 - 3. Use caution—flare body gets very hot
 - 4. Hold downwind
- K. Meteor and parachute flares
 - 1. Follow directions on flare
 - 2. Elevate to 60° from horizontal
 - a. Allows flares to reach sufficient height for complete burn
 - b. Launches debris and gases away from you
 - 3. Face away from flare when firing
 - 4. Fire downwind or across wind—keeps exhaust gases and debris away from you
 - 5. Know how to launch before emergency happens
- L. Smoke canisters
 - 1. Hand-held type—follow directions on flare
 - 2. Floating type—follow directions on flare and toss canister into water after activation

Precautions and safety

- A. Students under 18 should not use live flares in a practice situation
- B. Notify all local authorities before using flares in training
- C. Stand by with VHF radio to give Sécurité radio broadcast before and after demonstration

Other Signals

Whistles—3-5 times louder than human voice

Strobe and other “steady” lights

- A. Secure to PFD

- B. Keep batteries up-to-date
- C. Check bulb regularly

Chemical light sticks

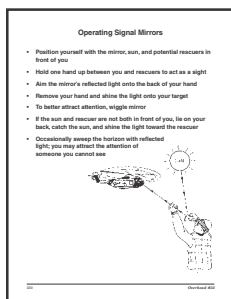
- A. Secure to PFD
- B. Can be very visible when swung on a cord
- C. Glow dimly in below freezing conditions
- D. Don't need batteries
- E. Be sure to check expiration date

Light reflective tape

- A. Attach to clothing and personal flotation devices
- B. Should be attached so it will be visible above waterline

Mirrors

- A. On a clear day visible to aircraft 50 miles away
- B. Still useful if overcast
- C. Can use any reflective surfaces to signal (e.g., metal, reflective glass)
- D. How to use a signal mirror (See Overhead #32)



Overhead #32

1. If sun and potential rescuers are in front of you
 - a. Hold up one hand to act as sight between you and rescuers
 - b. Hold mirror in other hand
 - c. Catch sunlight with mirror and aim reflection so light appears on back of sighting hand
 - d. Keeping light on sighting hand, steer hand to rescuers; then drop sighting hand and shine reflection on rescuers
2. If rescuer and sun are not in front of you, lie on your back and follow procedure above
3. To better attract attention, wiggle mirror to “flash” signal
4. If no rescuers are in sight sweep horizon with reflection; you may attract attention of someone you cannot see

Boating Emergencies: Activities Guide

- The activities in this volume are sequential, and each unit assumes knowledge of the material in the preceding unit.
- Activities are arranged by topic in the same order as the Teacher Information.
- Within a topic activities are organized from easiest to most difficult.
- Detailed Alaska Content Standards are located at the end of each activity’s procedures.
- Times needed for activities are approximate.
- Many activities contain true stories; be sensitive to the possibility that they could be written about your students’ relatives or friends.
- **AMSEA** This symbol means the equipment is available to borrow from AMSEA.

Topics: Types of Emergencies, Emotional Factors in Emergencies

Activity	Objectives	Standards
1. Survival Analyze a true survival story p. 170	<ul style="list-style-type: none"> • List two types of emergencies • List four emotions that can accompany an emergency and steps to eliminate the destructive ones 	Language Arts Geography Skills for a Healthy Life

Topic: Seven Steps to Survival

Activity	Objectives	Standards
2. Seven Steps to Survival Introduce the Seven Steps to Survival using a card activity and word search p. 172	<ul style="list-style-type: none"> • List the Seven Steps to Survival in order of priority 	Language Arts Skills for a Healthy Life
3. Empty Your Pockets Practice “Inventory” by identifying uses for items found in pockets p. 176	<ul style="list-style-type: none"> • Explain how items in their pockets could help them in a survival situation 	Language Arts Skills for a Healthy Life

Topics: EPIRBs, PLBs, ELTs

Activity	Objectives	Standards
4. EPIRB Mania! Use role playing to simulate the route of an Electronic Position Indicating Radio Beacon (EPIRB) signal p. 177	<ul style="list-style-type: none"> • Explain the communications links between an EPIRB and the search and rescue team • Describe the roles of aircraft, boats, satellites, LUT, MCC, and RCC in the EPIRB search and rescue system 	Language Arts Skills for a Healthy Life Technology

Topic: Emergency Radio Broadcasts

Activity	Objectives	Standards
5. Mayday! Mayday! Mayday! Practice Mayday distress calls using dummy microphones p. 181	<ul style="list-style-type: none">List the five elements of an effective MaydayDemonstrate a simulated Mayday	Language Arts Skills for a Healthy Life Technology

Topic: Flares

Activity	Objectives	Standards
6. Advertising with Flare Practice safe operation of flares, then write a PSA about flares p. 188	<ul style="list-style-type: none">Demonstrate the operation of a flare using a dummy flareList three safety procedures for firing flaresWrite a 30-second television public service announcement	Language Arts Skills for a Healthy Life Technology

Topic: Other Signals

Activity	Objective	Standards
7. Operating Signal Mirrors Practice using a signal mirror in the classroom p. 190	<ul style="list-style-type: none">Use a mirror as a signaling device	Skills for a Healthy Life

Topic: Culminating Activities for Small Boat Safety and Survival Volume

Activity	Objectives	Standards
8. Abandon Ship Reinforce the importance of drills and PFD use and storage using a video, discussion, and abandon ship drills p. 191	<ul style="list-style-type: none">Explain the benefits of wearing PFDsExplain the value of practicing emergency proceduresDescribe one consideration for the stowage of immersion suits/PFDs	Language Arts Science Skills for a Healthy Life
9. Williwaw! Analyze a story to apply the Seven Steps to Survival and review weather p. 194	<ul style="list-style-type: none">Describe two signs of potentially dangerous weatherApply knowledge of the Seven Steps to Survival to a boat emergency story	Language Arts Geography Skills for a Healthy Life

10. Culmination Game by Stations

Review dressing, signals, knots, and float plans at activity stations
p. 200

- Demonstrate how to signal for help with a signal mirror
- Say a Mayday that includes the five critical points
- Describe three differences between EPIRBs and Maydays as signals
- State at least one reason why both EPIRBs and Maydays should be used to signal in an emergency
- Tie a bowline, half-hitch, and sheet bend
- Write a float plan

Language Arts
Mathematics
Skills for a Healthy Life

11. Emergency Scenario

Review skills from the volume using a simulated boat emergency
p. 209

- Select proper equipment for a boat trip
- Demonstrate an effective Mayday and Mayday relay
- Plot a course to a location
- Select appropriate emergency signals and demonstrate their use

Mathematics
Geography
Skills for a Healthy Life
Technology

Survival

Time: 50 minutes

Overview

Analyze a true survival story.

Objectives

After completing this activity, students should be able to:

1. List two types of emergencies.

2. List four emotions that can occur in an emergency and steps to eliminate the destructive ones.

Materials

- *Adrift* by Steven Callahan
- Globe or map of the world

Procedure

Before Class

1. Review *Adrift*, “Nerves Exposed” chapter. Look for examples you can relate to emotional factors in an emergency.

During Class

1. Explain to students that they will be learning about types of emergencies and emotions that occur during emergencies by studying a true survival story.
2. Discuss immediate and delayed onset emergencies, and emotions that can occur during emergencies.
3. Read *Adrift*, “Nerves Exposed” chapter aloud to class. While you are reading use a globe or map to point out the various places where the story occurs. Background for the section: Steven Callahan’s goal is to sail in a clockwise direction around the Atlantic Ocean in the Northern Hemisphere. At the start of the book he and a friend arrive in England on the first leg of the journey. In England, Callahan enters a solo sailing race to Antigua, in the Caribbean. He drops out of the race off the coast of Spain because of damage to his boat. He carries a passenger from the Bay of Biscay, on the west coast of France, to the Canary Islands. From there he sails alone toward Antigua, across the Atlantic. It is late in the sailing season, but

the pilot guide to sailing states there is only a 2% chance of gales. On February 4, 1982, 6 days after leaving Tenerife in the Canary Islands, a gale blows up and he abandons his sinking boat into his liferaft.

4. Discuss the following points:
 - Did Mr. Callahan experience an immediate or a delayed onset emergency?
 - What emotions did he feel during that night? How did he struggle to resist depression and panic? Did fear play a positive or negative role?
 - What did he do to deal with the emergency?
 - Relate Mr. Callahan’s emotions and techniques for dealing with the emergency to situations that could occur locally.

Extension

After completing Activity #2 have students use this chapter to identify the parts of the story that correspond to each of the Seven Steps to Survival.

This activity addresses Alaska Content Standards

Language Arts B-1 Meaning from written and oral text, B-3 Relate to practical purposes, D-1-A Personal experience and prior knowledge, D-1-D Analyzing information

Geography A-1 Use maps and globes, B-1 Distinctive geographic characteristics

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed decisions

Seven Steps to Survival

Time: 20 minutes

Overview

Introduce the Seven Steps to Survival using a card activity and word search.

Objective

After completing this activity, students should be able to list the Seven Steps to Survival in order of priority.

Materials

- 1 set per group, **Seven Steps to Survival cards** (make from Template #1)
- Segment from either *Sea Survival* or *Casualties at Sea* videos [AMSEA](#)
- 1 per student, Student Handout #1 **Seven Steps Word Search**

Procedure

Before Class

1. Make Seven Steps to Survival cards sets. Use different color paper for each set for quick sorting.
2. Review the video(s) and select a segment that shows a survival scenario, or choose a survival story.

During Class

1. Explain to students that they will be learning about a way to help survive emergencies: The Seven Steps to Survival. Don't tell them the order of the steps yet; this is part of the lesson.
2. Show one of the video segments or read a survival story of your choice. Discuss the following points and write ideas on the board.
 - What people did that helped them.

3. Divide the class into groups.
4. Distribute a set of Seven Steps to Survival cards to each group. Make sure students understand all terms. Allow 3 minutes for students to arrange them in order of importance.
5. Discuss each group's order and reasoning for it.
6. Write the proper order on the board.
7. Return to the original list on the board, and categorize it according to the Seven Steps.
8. Distribute and have students complete Student Handout #1.

This activity addresses Alaska Content Standards:

Language Arts B-1 Meaning from written text, C-5 Project collaboration, D-1-D Analyzing information

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury

prevention, A-6 Making informed choices, B-1 Risk and consequence, C-2 Effective communication, D-2 Safe and healthy environments

Seven Steps to Survival Cards

Recognition	Water
Inventory	Food
Shelter	Play
Signals	

Name: _____ Date: _____

Seven Steps Word Search

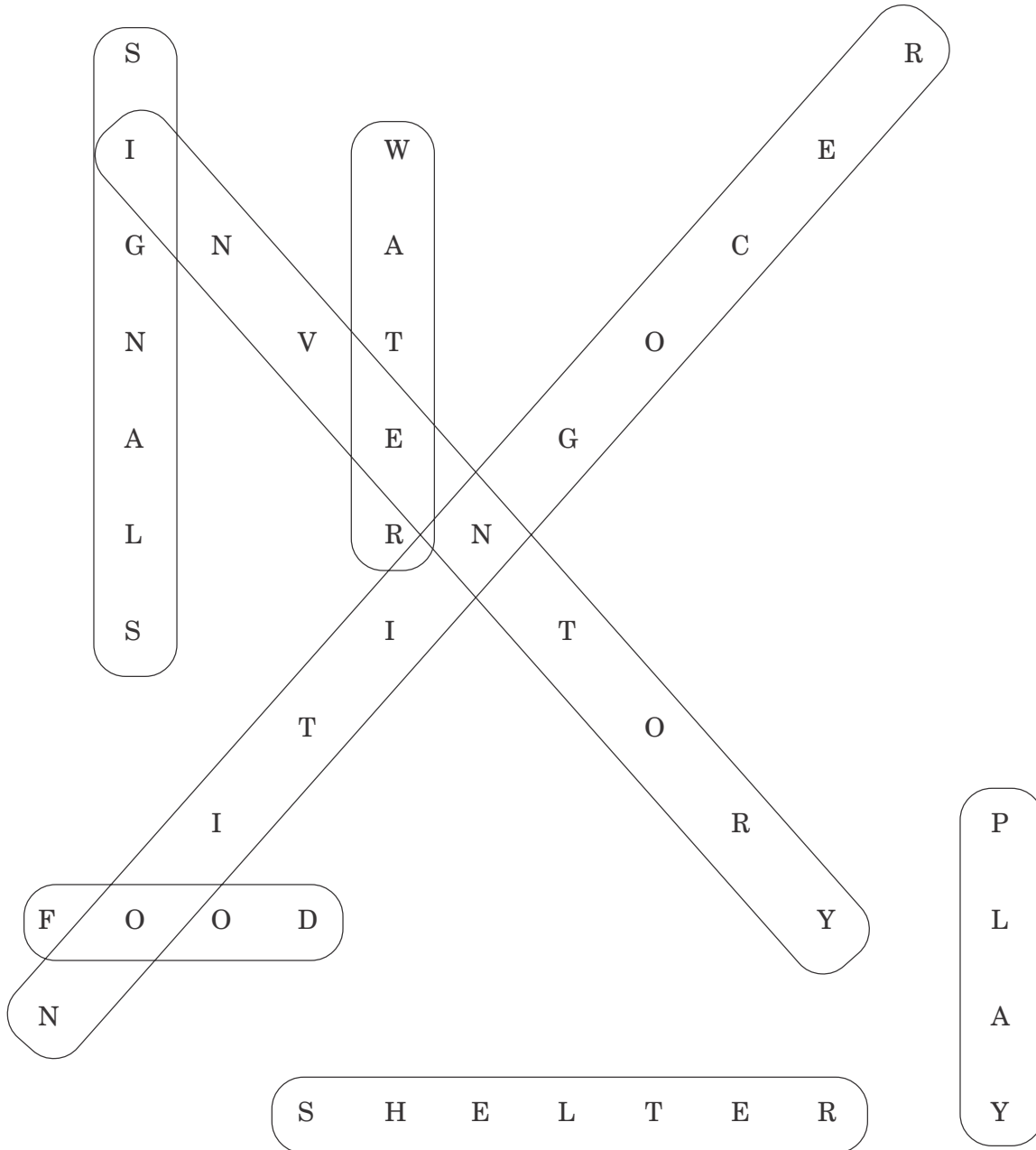
Find and circle each of the Seven Steps to Survival in the table below. Be sure you look in all directions.

Recognition, Inventory, Shelter, Signals, Water, Food, Play

A	J	S	C	B	O	B	H	C	E	I	D	R
G	S	H	E	G	R	Y	E	S	B	R	N	E
S	I	I	T	W	E	G	Z	H	E	A	I	J
E	G	N	Y	A	C	F	A	C	G	S	T	C
O	N	E	V	T	G	O	O	R	Y	I	I	O
W	A	Z	J	E	F	G	N	A	O	G	O	I
A	L	I	A	R	N	E	S	I	G	N	A	N
G	S	V	L	I	F	T	F	U	A	Q	U	R
S	K	E	T	F	B	D	O	K	F	O	D	L
V	N	I	O	M	J	F	O	R	C	N	P	Z
F	O	O	D	A	S	I	G	N	Y	A	L	G
N	W	N	I	N	H	J	N	A	L	S	A	M
G	Z	A	S	H	E	L	T	E	R	E	Y	O
J	F	H	L	X	L	A	H	K	V	J	S	O
P	S	J	G	W	T	J	E	T	I	T	R	S

Seven Steps Word Search

Recognition, Inventory, Shelter, Signals, Water, Food, Play



Empty Your Pockets

Time: 30 minutes

Overview

Practice “Inventory” by identifying uses for items found in pockets.

Objective

After completing this activity, students should be able to explain how items in their pockets could help them in a survival situation.

Materials

- Overhead #25 **Seven Steps to Survival** (optional)
- “The Chinaman’s Wristwatch” story from *On Their Own* by Mervyn Horder 

Procedure

1. Explain to students that they will be practicing Inventory from the Seven Steps to Survival.
2. Introduce the activity by completing Activity #2, **Seven Steps to Survival** or by reviewing Overhead #25.
3. Have students empty their pockets onto their desks. (Consider that some students may be carrying personal items in their pockets that they do not wish to share.)
4. Make two headings on the board: “Equipment” and “Uses.”
5. Have students list items from their pockets plus belts, hats, shoelaces, or other personal items, and identify uses for each. Record this on the board.
6. Read “The Chinaman’s Wristwatch” aloud. Discuss other important components of Inventory.
7. Conclude with a discussion emphasizing that most people who find themselves in an emergency have only the clothes on their backs and items in their pockets, and that people’s most valuable tool lies between their ears.

This activity addresses Alaska Content Standards:

Language Arts A-3 Demonstrate speaking skills

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury

prevention, A-6 Making informed decisions, B-1 Risk and consequences, C-5 Effects of attitude and behavior, D-1 Responsible decisions, D-2 Safe and healthy environments

EPIRB Mania!

Time: 90 minutes

Overview

Use role playing to simulate the route of an Electronic Position Indicating Radio Beacon (EPIRB) signal.

Objectives

After completing this activity, students should be able to:

1. Explain the communications links between an EPIRB and the search and rescue team.
2. Describe the roles of aircraft, boats, satellites, LUT, MCC, and RCC in the EPIRB search and rescue system.

Materials

- Overheads #27, **Emergency Position Indicating Radio Beacons (EPIRBs)** and #28 **How EPIRBs Work**
- Set of **EPIRB Mania cards** (make from Template #1)

- 1 each of the following EPIRB demonstrators, Category 1-406; Category 3-406; PLB; ELT **or** make an index card with the name and photo or picture of each type
- Toy boat or “lost person”
- Satellite (a ball covered with aluminum foil with wires stuck in it)
- Satellite dish (round metal bowl) to represent a Local User Terminal (LUT)
- Antenna or small building model to represent the Mission Control Center (MCC)
- U.S. Coast Guard hat (or similar object) to represent the Rescue Coordination Center (RCC)
- Toy helicopter
- Toy aircraft
- Strobe or flashing light
- 6 flashlights

Variation

Have students make the satellite, satellite dish, etc.

Procedure

1. Explain to students that they will be simulating how EPIRB signals are sent and processed to launch a search and rescue effort.
2. Use Overheads #27 and #28 to generally explain what EPIRBs are, their usefulness, and how they work.
3. Divide the class into groups of 7. Assign students in each group to one of the following roles.
 - Category 1-406 mHz EPIRB
 - Satellite
 - Local User Terminal (LUT)
 - Mission Control Center (MCC)
 - Rescue Control Center (RCC)
 - Search and Rescue Responder
 - Aircraft
4. If you have 10 or fewer students, the other three roles are: Class 3-406 EPIRB, PLB, and ELT.
5. If you have more than 10 students each group would have the same seven roles as above, except instead of a Category 1-406 mHz EPIRB, one group would have a Category 3-406 EPIRB, another a PLB, and another the ELT.
6. Distribute equipment as follows:
 - Category 1-406 mHz EPIRB—toy boat or “lost person,” EPIRB demonstrator or photo (or PLB or ELT), information card, and a strobe or flashing light to represent an activated EPIRB
 - Satellite—satellite, information card, and flashlight
 - Local User Terminal (LUT)—satellite dish, information card, and flashlight

- Mission Control Center (MCC)—antenna or building, information card, and flashlight
 - Rescue Control Center (RCC)—U.S. Coast Guard hat, information card, and flashlight
 - Search and Rescue Responder—toy helicopter, information card, and flashlight
 - Aircraft—toy aircraft, information card, and flashlight
7. Allow a few minutes for students to read their information cards and familiarize themselves with their roles in the relay system. You may want to leave Overhead #28 on while students are figuring out how the system works.
 8. Review the procedure with the students:
 - The toy boat or “lost person” shows his/her signaling device, explains what type it is, turns it on, turns on the flashing light, and aims it at the next link in the chain (satellite).
 - The next student in the signal chain turns on his/her flashlight if he can receive the signal or pass it on. After explaining what device it is and what it does, he passes the signal on by shining the flashlight on the next link in the chain.
 - Leave all the flashlights on until the rescue helicopter reaches the emergency scene.
 9. Dim the classroom lights and have students demonstrate, one group at a time, how the EPIRB signal is relayed.
 10. Once the first rescue is complete, pass the flashing light to the next group of students. Repeat with each of the distress signals.
 11. The exercise is complete when all the signaling devices have been tried, and communication loops completed with the rescue helicopter arriving at the emergency.
 12. Note that in the near future all 121.5 and 243 MHz EPIRBs will be phased out of use in favor of 406 MHz.
 13. Debrief and discuss any questions or problems.

Variations

1. Use string instead of flashlights to connect the links in the chain. This creates a more tangible illustration of the path the signal must travel before rescuers arrive on the scene. Use a different colored string to represent the 121.5 MHz signal traveling to an aircraft.
2. One person could be the signal, moving from link to link in the chain.

This activity addresses Alaska Content Standards:

Language Arts B-1 Meaning from text, B-2 Investigations in oral, visual, and written text

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed choices, B-2 Effective communication, D-1 Responsible decisions, D-2 Safe and healthy environments

Technology E-1 Evaluating limits of technology, E-2 Responsible use of technology, E-4 Ethical and legal behaviors, E-7 Technology in daily living, E-8 Emerging technologies

EPIRB Mania Cards

<p>Local User Terminal—LUT</p> <ul style="list-style-type: none"> • Also called ground receiving station • Receives 406 mHz signal from satellite • Decodes signal • Calculation location within 1-3 miles accuracy • Transmits information to Mission Control Center (MCC) 	<p>Mission Control Center—MCC</p> <ul style="list-style-type: none"> • Receives information from LUT • Looks up boat owner’s information using signal’s identifier code (if owner sent in information) • May call owner to confirm if signal is an emergency or false alarm • Transmits information to RCC
<p>Satellite</p> <ul style="list-style-type: none"> • Receives 406 mHz EPIRB signal • Stores signal in memory if necessary, until within range of LUT • Transmits EPIRB signal to LUT 	<p>Rescue Coordination Center—RCC</p> <ul style="list-style-type: none"> • Receives information on boat’s location and owner from MCC • Determines the best means of response • Notifies local search and rescue responders • May also receive 121.5 mHz EPIRB signal reports from an aircraft

<p>Search and Rescue Responder</p> <ul style="list-style-type: none"> • Responsible for conducting search and rescue • In U.S. Coast Guard, U.S. Air Force and other organizations • Receives information from RCC • Flies to within 3 miles of a 406 signal, then starts homing on 121.5 mHz and looking for strobe lights 	<p>Category 3-406 EPIRB</p> <ul style="list-style-type: none"> • Transmits a 406 mHz signal to satellite and a 121.5 mHz homing signal • Hand-held size • Must be turned on manually • Non-floating • Each beacon’s signal has its own identifier code; if the owner has sent in the registration card, MCC will have owner’s name, address, phone number, and boat name and description • Transmitted location is accurate to within 1-3 miles
<p>Aircraft</p> <ul style="list-style-type: none"> • May pick up a 121.5 or 243 mHz signal (only trans-oceanic flights are required to monitor) • Passes information to RCC 	<p>PLB—Personal Locator Beacon</p> <ul style="list-style-type: none"> • Designed for land users • Transmits a 406 mHz signal to satellite and a 121.5 mHz homing signal • Is pocket-sized • Must be turned on manually • Non-floating • Transmitted location is accurate to within 1-3 miles • Each beacon’s signal has its own identifier code; if the owner has sent in the registration card, MCC can easily find the owner’s name, address, and phone number and contact owner
<p>Category 1-406 EPIRB</p> <ul style="list-style-type: none"> • Transmits a 406 mHz signal to satellite and a 121.5 mHz homing signal • Self-activating • Floats free • Each beacon’s signal has its own identifier code; if the owner sent in the registration card, MCC will have owner’s name, address, phone number, and boat name and description • Transmitted location is accurate to within 1-3 miles 	<p>ELT—Electronic Locator Transmitter</p> <ul style="list-style-type: none"> • Transmits an electronic signal on 121.5, and 243 or 406 mHz • Required in most aircraft • Battery operated transmitters are usually set to “arm in aircraft” • Will activate and continuously emit signal for at least 48 hours when subject to crash forces • Can be set off accidentally with rough handling or a hard aircraft landing

Mayday! Mayday! Mayday!

Time: 20-30 minutes

Overview

Students practice Mayday distress calls using dummy microphones.

Objectives

After completing this activity students should be able to:

1. List the five elements of an effective Mayday.
2. Demonstrate a simulated Mayday.

Materials

- Overhead #30 **Mayday! Mayday! Mayday!**
- 1 per student, Student Handouts #1 **Mayday Scenarios**, #2 **Mayday! Mayday! Mayday!**, and #3 **One Day While Fishing**
- 1 per pair of students, microphone from dead radio (can be collected from electronic repair shops, garage sales, or thrift shops)

Procedure

1. Explain to students that they will learn how to give an effective Mayday.
2. Make two columns on the board. Label one column “Most Essential Information” the other “Other Information If Time Allows.”
3. Explain that a Mayday is a universal radio distress call, often used on boats—like calling 911 when you’re in town, and that it should only be used when there is an immediate threat to life or limb. Note that you can be fined and jailed for broadcasting a false Mayday.
4. Explain that Maydays can be made on:
 - VHF emergency channel (channel 16)
 - Single side band emergency frequency (2182 MHz or 4125 MHz in the western U.S.)
 - Cellular phone emergency access to the U.S. Coast Guard (*CG)
5. Point out the advantages and disadvantages of each method.
6. Read one of the Mayday scenarios or an account of a local emergency. Before telling any true stories, consider whether any of your students have any connections to the incident, and avoid stories that would be too personal.
7. Ask students what information the person in the story did and **should** have transmitted to potential rescuers. Record ideas in the proper column.
8. Following the brainstorming, add any of the five “Most Essential Information” items missed using Overhead #30.
9. Introduce Pan Pan and Sécurité calls so students can determine which type of emergency broadcast to use with their scenarios.
10. Distribute Student Handouts #1 and #2. Use one of the scenarios from Student Handout #1 and a “dummy” microphone to demonstrate sending a Mayday call. Explain that keying the microphone (pushing the transmit button) means you are transmitting, and that the radio **cannot receive when transmitting**. When you are through speaking, you **must** release the button to hear a response from any potential rescuers.
11. Divide the class into pairs and give each pair a “dummy” microphone. Explain that they will take turns being the “caller” and the “receiver” of a Mayday. The first time they transmit a Mayday it may take a minute to give the “Most Essential Information” but they should try to get the transmission down to 15-20 seconds, including any nice-to-know information. The “receiver’s” job is to listen for clear “Most Essential

Information” by the “caller” and watch for proper microphone operation. Have students practice and switch roles until they have practiced at least twice. Receivers have 1 minute to offer any feedback. Encourage students to broadcast their Maydays as though their emergencies were real.

12. Wrap up the lesson by reviewing each scenario. Discussion points:
 - Was life or limb at risk? If not, a Pan Pan or an advisory call to the U.S. Coast Guard or other local rescue resource is appropriate.
 - Explain to students that it is a good idea to call the U.S. Coast Guard or other rescue resource on a non-emergency basis to advise them of any situation that might become an emergency. They will monitor your status until you have reached safety. If the situation deteriorates, they can respond effectively.
13. Distribute Student Handout #3 for homework.

Variation

Use two short range UHF Family Radio Service (FRS) radios for the activity with another instructor in another room role-playing the U.S. Coast Guard or other responder. Make sure students begin their Mayday with “This is a drill” repeated three times. **Do not** conduct drills using other types of radios.

Extensions

1. Before class, make an audiotape of a simulated Mayday call from one of the scenarios complete with sound effects in the background. Play the tape in class. Ask students to listen for the five “Most Essential Information” items.
2. Have students tape themselves giving a Mayday.
3. Add a Mayday Relay scenario.
4. Collect newspaper articles of marine emergencies and accidents. Have students write or discuss what information the skippers of the boats in distress may have included in their Maydays.

This activity addresses Alaska Content Standards:

Language Arts A-4 Writing and speaking with purpose, A-7 Using electronic communications

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, B-1 Meaning from written, oral, and visual text, B-2 Effective communication

Technology E-1 Evaluating limits of technology, E-2 Responsible use of technology, E-4 Ethical and legal behaviors, E-7 Technology in daily living, E-8 Emerging technologies

Mayday Scenarios

In each of the following scenarios you have a VHF radio and GPS with you.

1. It is late in the day and you are out on your skiff with a friend. The two of you are between Petersburg and Wrangell, Alaska, when your skiff hits a rock and your friend is thrown from the skiff. Your engine is OK. You get your friend in the skiff again safely. He/she is very wet. You don't have any extra clothing and neither does your friend. It is several hours back to town and you're not sure your friend can hold on until you reach home. You are at $57^{\circ}5'N$ and $132^{\circ}35'W$. Do you call a Mayday? What do you say?
2. You are berry picking upriver with your family. Grandpa has fallen and does not feel well—his head aches and he has a sharp pain in his chest. You are 11 miles from your home in Bethel, Alaska, where excellent health care is available. Your location is $60^{\circ}N$ and $154^{\circ}31'W$. Do you call a Mayday? What do you say?
3. You are driving your boat from Kotzebue, Alaska to fish camp up the Noatak River with two friends. The weather is deteriorating quickly in front and behind you. You're not sure if you can make it to the camp site. You have plenty of fuel but icing may occur if the conditions continue to worsen. Your location is $67^{\circ}45'N$ and $162^{\circ}30'W$. Do you call a Mayday? What do you say?
4. You are canoeing down the Yukon River from Fort Yukon to Rampart, Alaska, with several friends. On the third day of the trip you are bitten several times on the face and hands by bees. You are having trouble breathing. The swelling has caused a lot of pain and seems to be getting worse. Your GPS says your location is $66^{\circ}38'N$ and $148^{\circ}05'W$. Do you call a Mayday? What do you say?
5. You are on the Yukon River in your boat going upstream from Nulato to Galena, Alaska. The current was stronger than you thought, and you have encountered severe headwinds and deteriorating weather conditions. You will not be able to make it to Galena with the gas you have left nor return under power to Nulato. Your present location is $65^{\circ}20'N$ and $157^{\circ}30'W$. You see a small beach where you can land. You have no survival gear. Do you call a Mayday? What do you say?
6. Your girlfriend, and two other couples are with you returning to Kodiak, Alaska, from a day boat trip in two skiffs. It is late in the day and what started as a pleasant ride home has turned threatening. The wind has kicked up, snow is falling, visibility has been reduced, and the way home is becoming harder to find. The other smaller skiff is not able to keep up and does not do as well in the heavy weather. Your skiff is running out of gas because of a leak. You are $57^{\circ}50'N$ and $152^{\circ}25'W$. Do you call a Mayday? What do you say?
7. You have gone boating along the shore southeast of Craig, Alaska, with your brother, Nick, and his friend, Forrest. It is still early in the day and you beached your skiff to go beachcombing. Your brother just tried to jump a log and appears to have broken his leg and wrist. He also has a large bump on the right side of his head from the fall. He is conscious but in a lot of pain. You don't see any external bleeding. You and Forrest have both taken a first aid class. The weather is good. You are $55^{\circ}35'N$ and $133^{\circ}05'W$. Do you call a Mayday? What do you say?

8. Early in the morning your hunting partner left camp and headed upriver in his boat to the spot where he had seen moose sign the evening before. He said he would be back by lunch. It is now 4:30 PM and getting dark. You have heard no shots, and he has not called on his radio. You know the area well and it contains many river strainers, widowmakers, and sharp turns. Base camp is located at 65° N and 146° 5' W. Another group of hunters is 2 miles downriver and you have talked with them on the radio several times. Do you call a Mayday? What do you say?
9. Returning late at night from a weekend at a recreational cabin in Kachemak Bay, Alaska, your boat has swamped and is about to capsize. You and three friends are all wearing PFDs, no one is severely injured, but you are soaking wet. The air is extremely cold, you're not sure where you are on the bay, and you haven't seen another boat for hours. Do you call a Mayday? What do you say?
10. Your family is sailing off the coast of Maine near Vinalhaven. A storm blows up, your mast breaks, and you lose your tiller so you cannot steer. The seas have built to 30'. You have an EPIRB, a liferaft, and enough immersion suits for everyone onboard. You are at 44° N, 69° 10' W. Do you call a Mayday? What do you say?
11. You are enjoying an afternoon cruising in your speedboat in Florida Bay when suddenly you see a boat following an erratic course heading for you. You veer to starboard to avoid it, but it collides with your stern. Your engine dies and water is pouring in from the stern. Everyone is wearing a PFD, but you do not have a liferaft. The people in the other boat are not visible and their boat is rapidly sinking. Your position is 25° 10' N, 80° 50' W. Do you call a Mayday? What do you say?
12. You are canoeing with a friend in late summer about 1/2 mile off the south shore of Lake Superior when a freighter passes and its wake capsizes your canoe. Both of you are wearing PFDs and are able to right the canoe and re-enter, but your bailer has disappeared. You have your paddles, and your waterproof radio is in your pocket. Your nearest help is a fire department rescue team 5 miles away. Your location is 47° 5' N, 88° 15' W. Do you call a Mayday? What do you say?

Mayday! Mayday! Mayday!

To make a Mayday call from your radio:

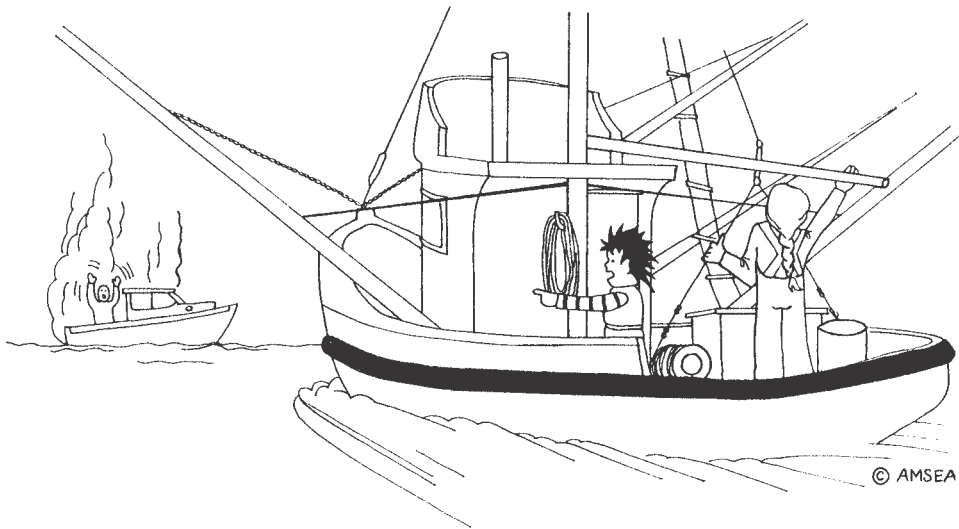
1. Be sure your radio is on.
2. Tune your radio to an emergency channel.
3. Key the microphone when speaking.
4. Speak with a clear voice at normal volume.
5. Include the five “Most Essential Information” items.
 - “Mayday, Mayday, Mayday!”—emergency signals come in threes
 - Boat name and description—helps potential rescuers know who and what to look for; include boat’s size, style, and color
 - Location—use latitude and longitude if possible, use place names found on charts, be as exact as possible, avoid vague descriptions like “I’m 10 minutes from town,” (the person receiving your distress call may be in a different community), always know where you are
 - Nature of the emergency—helps rescuers prepare for the situation
 - Number of persons onboard—helps rescuers know when all are found
6. Key off the microphone when the message is finished.
7. Give the receiver of the message 30-60 seconds to respond before repeating the Mayday.

Never give a false Mayday. It is illegal and penalties are severe.

Name: _____ Date: _____

One Day While Fishing

You are fishing with your family in your boat _____ (call it what you want) near _____. (Pick the spot so you can get a position from a chart.) Smoke starts pouring out of a boat named _____ near you. A man on the smoky boat yells to you to come pick him up. Your dad goes to the wheel and steers over to the boat on fire. Your mother is busy pulling the fishing gear. Your dad hands you the VHF radio. You turn to channel 16 and say . . .



One Day While Fishing

You are fishing with your family in your boat _____ (call it what you want) near _____. (Pick the spot so you can get a position from a chart.) Smoke starts pouring out of a boat named _____ near you. A man on the smoky boat yells to you to come pick him up. Your dad goes to the wheel and steers over to the boat on fire. Your mother is busy pulling the fishing gear. Your dad hands you the VHF radio. You turn to channel 16 and say . . .

Answers will vary but should include:

Mayday! Mayday! Mayday!

This is the _____ (name of caller's boat)

There is a fire onboard the _____ (name of boat on fire)

Description of boat on fire _____

We are _____ (location)

There appears to be just one person onboard the burning boat. We are picking him up.

Advertising with Flare

Time: 90-180 minutes (over 2-3 days)

Overview

Practice safe operation of flares, then write a PSA about flares.


Objectives

After completing this activity, students should be able to:

1. Demonstrate the operation of a flare using a dummy flare.
2. List three safety procedures for firing flares.

3. Write a 30-second television public service announcement.

Materials

- Overhead #31 **Pyrotechnics (Flares)**
- Several used or “dummy” flares (check with your local fire department or borrow from AMSEA)
- *Visual Distress Signals* video (14 minutes)

- VCR, camera, and video tapes

Procedure

Part 1

1. Explain to students that they will be practicing firing a flare using a “dummy” flare. Explain that **flares should be treated like a loaded firearm! Never** bring live flares into the classroom or allow students to handle live flares.
2. Introduce hand-held, meteor, and parachute flares. Describe the safety precautions to be considered when using flares.
3. Show the *Visual Distress Signals* video. Summarize using Overhead #31.
4. Divide the class into groups. Give each group a “dummy” flare and have students read its directions.
5. Have each group prepare a presentation about their type of flare, including a demonstration and safety procedures for firing it.
6. Have students do presentations.

Part 2

1. Explain to students that they will be writing a script and creating a 30-second television advertisement to sell their flare to an appropriate audience. The advertisement must:
 - Be exactly 30 seconds long.
 - Be original and creative.
 - Offer a demonstration of the proper procedure for using the flare.
 - Include at least three safety tips for flare use.
 - Use factual and descriptive information to sell the flare.
2. Allow students time to prepare and video tape their ads.
3. Award prizes for creativity and for the ad voted best by students.

This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing and speaking, A-3 Demonstrating speaking, A-4 Writing and speaking for purpose skills, A-6 Visual communication, A-7 Using electronic communications, C-1 Developing a project, C-2 Project organization, C-3 Decision making, C-4 Project quality, C-5 Individual and group responsibilities

Skills for a Healthy Life A-1 Personal well-being, A-3 Injury prevention, A-6 Making informed choices, D-2 Safe and healthy environments

Technology A-2 Communicating through technology

Operating Signal Mirrors

Time: 15 minutes

Overview

Practice using a signal mirror in the classroom.

Objective

After completing this activity, students should be able to use a mirror as a signaling device.

Materials

- Overhead #32 **How to Use a Signal Mirror**
- 1 per pair of students, signal mirror
- 2 illustrations of a rescue helicopter, 1 large, the other small (or 2 toy helicopters)
- List of the advantages of using signal mirrors written in large letters
- Illustration of rescuer of your choice (aircraft or boat) or toy aircraft or boat
- Overhead projector

Procedure

Before Class

1. Place large helicopter target on front wall, Advantages of Using Signal Mirrors target on side wall, small helicopter (50 miles away) on other side wall, and an illustration of your choice on the back wall.
2. Practice shining the overhead projector (your sun) so it won't blind students, and practice using the signal mirror to hit all four targets.

During Class

1. Explain to students that they will be learning to use a signal mirror.
2. Explain the advantages of using a mirror as a signaling device.
3. Use Overhead #32 to review the steps for using a signal mirror, then demonstrate how to do it.
4. Divide class into pairs and distribute mirrors.

5. Remove the overhead and point the projector light toward the students.
6. Lead students through the steps for using the mirrors, aiming first at the large helicopter on the front wall.
7. Then have students aim their signal at the "List of Advantages to Mirrors" target on the side wall. Read the advantages together.
8. Remind students how far away aircraft can see a signal light on a clear day. Direct them to aim their light at the small rescue helicopter (50 miles away) hanging on the other side of the room.
9. Point out the target (potential rescuer) on the back wall.
10. Discuss how signal mirrors can be useful in a survival situation, and other items that could be substituted for a mirror in a survival situation.

This activity addresses Alaska Content Standards:

Skills for a Healthy Life A-1 Personal well-being, A-3 Injury prevention

Abandon Ship

Time: Part 1: 30 minutes, Part 2: 30 minutes plus 10 minutes for each group

Overview

Reinforce the importance of drills, and PFD use and storage using a video, discussion, and abandon ship drills.

Objectives

After completing this activity, students should be able to:

1. Explain the benefits of wearing PFDs.
2. Explain the value of practicing emergency procedures.
3. Describe one consideration for the stowage of immersion suits/PFDs.

Materials

- *Casualties at Sea* video, *Cape Beaver* and *Margaret Jane* segment (5 minutes) **AMSEA** or Student Handout #1 **U.S. Coast Guard Safety Alert 06-00**
- *When Seconds Count* video (16 minutes) **AMSEA**
- PFDs of various sizes for everyone in the class **AMSEA**
- Immersion suits for about a quarter or a third of the class **AMSEA**
- 2 per student, plastic grocery bags stored in each suit
- “Boat” area with enough chairs for all participants or keep students in their seats at their desks for the “boat”
- “Abandon Ship” muster station area
- Liferaft **AMSEA**
- Liferaft inflator **AMSEA**
- Clock with a second hand

Procedure

Part 1. PFDs

Before Class

1. Students should know how to don PFDs and immersion suits. This is covered in depth in *Cold Water Safety and Survival*, Volume 2.
2. Set up the room. Position the boat area, muster station, and liferaft areas so students walk a short distance between each area. The liferaft can be inflated in another area of the room or hallway or you can designate an area in the room as the “liferaft.” Post signs identifying the locations and place PFDs under each chair in the boat area.

During Class

1. Explain to students that they will be watching video footage of a boat sinking. Don’t tell them you will be doing abandon ship drills; the surprise element is important in this activity.
2. Point out the stations to students.

3. Watch the *Cape Beaver* and *Margaret Jane* segment of *Casualties at Sea* video. Time how long it takes for the *Margaret Jane* to sink and discuss some of the problems the people onboard may have faced while trying to survive. Option: Read Story #1 and discuss Lessons Learned points 2 and 4.
4. Have students return to do some work at their desks. Make sure some students are working in the boat area.
5. (Time this sequence) Unexpectedly call out, “Abandon ship! Put on your PFDs and report to me!”
6. Have students don their PFDs. Don yours and move to the muster station. As soon as all are assembled, snapped, buckled, and zipped, move as a group to the liferaft. Let them know when a minute is up. Say, “The boat is down.”
7. Repeat the drill with students again working at their desks, then repeat the drill

with all wearing PFDs while working at their desks.

8. Write the times for each drill on the board. Discuss how much easier and faster the procedure was after students had practiced it just once before. Emphasize the value of wearing a PFD before disaster strikes. Discuss different situations:
 - On some vessels like ferries, large enclosed boats, or live-aboards it may not be reasonable to wear a PFD at all times. In these situations, a readily accessible storage location is necessary. If the classroom were a large boat, where could the PFDs be stored to make the abandon ship process easier and quicker?
 - What criteria are important for determining a PFD storage location?
 - When should you wear a PFD aboard such boats?
 - What should you do with the PFD when you aren't wearing it?

Part 2. Immersion Suits

Before Class

1. Place immersion suits in one place in the room. Make sure bags are marked in some way to distinguish sizes. Do not make them too accessible.
2. Inflate a liferaft some distance away, preferably in a hall or outside, or designate a "lifeboat" area.

During Class

1. Explain to students that they will be practicing abandoning ship later during class.

2. Assign students to groups. Explain that, when directed by you, everyone in a group is to get an immersion suit, don it, move to the liferaft, and enter it. Review the steps to properly don an immersion suit.
3. Assign students to immersion suits that fit. Time one group while they are getting their suits on. Note the amount of donning space needed.
4. Have students work at their desks, then randomly call out the name of a group. Tell them to abandon ship immediately. (Option: You also don a suit as the captain.) Other students observe and time them.
5. Discuss any difficulties encountered. Did all students have a suit that fit? What could you do to avoid getting a suit that didn't fit you?
6. Once all are back to work at their desks, have another group abandon ship. Time them. Did they learn from the first group?
7. Continue to practice until all groups have abandoned ship. Discuss lessons learned from each group.
8. Brainstorm and write on the board criteria for storage locations. What are the pros and cons of storing your immersion suit by your bunk?
9. Watch the video, *When Seconds Count*. Review the steps in donning an immersion suit, point out the scene when the skipper yells, "Abandon ship!" and compare your list for storage ideas with the criteria discussed in the video.

Note: Be careful with immersion suits. You may need to wax zippers between groups. Occasionally you may have a student who feels claustrophobic in an immersion suit.

This activity addresses Alaska Content Standards:

Language Arts B-1 Meaning from oral and visual text

Science D-1, 3 Practical applications of scientific knowledge

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed decisions, B-1 Risk and consequences, B-5 Evaluating information, D-1 Responsible decisions, D-2 Safe and healthy environments

Fishing Vessel Sinks, 3 Crew Saved, South of Ketchikan, Alaska

Safety Alert 06-00

17th U.S. Coast Guard District, U.S. Coast Guard, P.O. Box 25517, Juneau, Alaska 99802

Background: The Seventeenth U.S. Coast Guard District Safety Alert program provides timely safety-related information of “Lessons Learned” from marine casualties in support of the U.S. Coast Guard’s “Ready for Sea” safety program.

Incident: In the early evening of May 28, 2000 a 29-foot gillnetter, recreationally fishing 2 miles south of Ketchikan off Dall Point, took on water and sank in three-to-5-foot seas and 20 knot winds. The operator was alerted to the flooding when seawater flowed freely over the transom. The vessel listed to port as the operator made a Mayday call on VHF Channel 80 and capsized within minutes. The Mayday was promptly relayed by a third party in Metlakatla to the U.S. Coast Guard Communications Center in Juneau. U.S. Coast Guard Station Ketchikan personnel overheard the radio call and immediately got underway in a 41-foot utility boat (UTB). The UTB crew spotted and rescued the three people from the sunken boat, who were in the water clinging to a galley stove fuel tank amid other debris. Although personal flotation devices (PFDs), visual distress signals and a ring life buoy were on the vessel, no one was able to grab them prior to abandoning the vessel. The three family members were transported to Ketchikan, treated by medical personnel and released.

Lessons Learned: There are “Ready for Sea” safety factors that are relevant to this incident and several lessons learned.

1. Mariners should assess the weather before departing the dock and while underway. The

sea and wind conditions most likely hastened the capsizing of the vessel.

2. Training in emergency situations is critical. Conducting drills at the dock and while underway prepare crewmembers for emergency situations. In this situation, one person could have made the Mayday call, while another grabbed the PFDs and the third grabbed the ring life buoy. Be prepared!
3. Properly functioning bilge alarms and pumps provide an early warning and time to conduct damage control and prevent the vessel’s sinking. Routinely test alarms and pumps.
4. PFDs save lives and should be worn when working on deck and otherwise stowed in a readily accessible location. Carry immersion suits for each person on board, in addition to a PFD. Immersion suits offer protection against the cold water. Also, the bright orange colors and reflective tape on PFDs and immersion suits aid rescuers in locating survivors.
5. The U.S. Coast Guard and most vessels monitor VHF Channel 16. VHF radios should be left on channel 16 so, in the event of an emergency, a Mayday call will reach Search and Rescue units without delay. A portable VHF radio, visual distress signals, and flashlight are effective means of alerting nearby vessels and search parties of your location. These items should be readily accessible.
6. The vessel did not have a current U.S. Coast Guard dockside exam. Exams are free and often identify safety deficiencies that can lead to loss of a vessel and/or the crew.

Williwaw!

Time: 90-120 minutes

Overview

Analyze a story to apply the Seven Steps to Survival and review weather.

Objectives

After completing this activity, students should be able to:

1. Describe two signs of potentially dangerous weather.

2. Apply knowledge of the Seven Steps to Survival to a boat emergency story.

Materials

- *Williwaw!* by Tom Bodett
- 1 per student, Student Handout #1 ***Williwaw!* Questions**

Procedure

1. Explain to students that they will be studying a boat emergency story.
2. Summarize the plot of *Williwaw!* through Chapter 12: September and Ivan Crane's father is away fishing. (Their mother has died.) They promised their father they would not leave their cabin, located in an isolated bay several miles by skiff from town. Ivan breaks their VHF radio, which is their only means of communication. The kids go to town to get the radio fixed, but the job takes longer than expected and involves a couple of trips. They make new friends while in town and are invited to a party.
3. Read aloud Chapter 13 to the end of the book. The reading is best completed in two or three sections: Chapters 13 and 14, Chapter 15, and Chapters 16-18.
4. After each reading, complete related sections of Student Handout #1 in small groups, then share and discuss group responses as a class.

Extension

Have students write an account of a boat trip or outing they took that could have ended in disaster. Why didn't it? Which of the Seven Steps to Survival came into play? What decisions were critical? What attitudes did people have?

This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing, A-2 Writing conventions, A-4 Writing with purpose, B-1 Meaning from written, oral, and visual text, B-2 Investigations in written material, D-1 Developing a logical position, D-1-A Personal knowledge and prior knowledge, D-1-D Analyzing information, D-4 Explain and defend a position

Geography A-5 Interpreting geographical patterns, B-1 Geographic characteristics of place, B-6 Making informed decisions about place, C-3 Regional environments, E-6 Physical hazards

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed decisions, B-1 Risk and consequences, C-5 Effects of attitude and behavior

Name: _____ Date: _____

Williwaw! Questions

Chapters 13 and 14

1. There is a discussion of red skies in the morning. What are the two warnings contained in the saying and what causes those conditions?
2. What is confusing about seeing the red sky in the morning?
3. What two pieces of advice does the “sea captain” Harry give September and Ivan?
4. What type of weather warning alerted September to the change in weather?
5. What two things interfered with their leaving for home early in the morning?
6. Would you have made the same decision the kids made about attending the party? Explain.
7. Why did September and Ivan linger at the party? List facts in favor of staying and facts against.

Chapter 15

1. What were their reasons for heading home in bad weather? What were the reasons for waiting?
2. What decision would you have made in the situation described in #1? Why?

3. Why does September think, “Halfway across Bag Bay was the worst place to be”?
4. Why would it be important to keep an extra tank of gas on a skiff at all times?
5. When they realized they couldn’t make it home or back to town, what did September and Ivan do?

Chapters 16-18

1. What two things did September and Ivan do that probably saved their lives?
2. List four strategies they used to keep from swamping or capsizing.
3. List the equipment they had with them. Make a list of practical items they should have had with them.

Gear they had

Gear they should have had

4. List decisions that contributed to or caused this dangerous situation.
5. Apply the Seven Steps to Survival to September’s and Ivan’s emergency. Identify a part of the story for each of the seven steps: Recognition, Inventory, Shelter, Signals, Water, Food, and Play.

Williwaw! Questions

Chapters 13 and 14

1. There is a discussion of red skies in the morning. What are the two warnings that the saying contains and what causes those conditions?
Answer on pages 136-137. "Sailors take warning" and "sailors' hearts warming." They mean that a weather front is coming your way.
2. What is confusing about seeing the red sky in the morning?
Answer on page 137. It's September and therefore unpredictable.
3. What two pieces of advice does the "sea captain" Harry give September and Ivan?
Answer on page 137. Go get the radios and head home. Forget the party. Mother Nature can fool you.
4. What type of weather warning alerted September to the change in weather?
Answer on page 152. Black fast-moving clouds and sea color change.
5. What two things interfered with their leaving for home early in the morning?
Answer on pages 140-141. The radio still wasn't fixed. Their friends entice them to attend the party briefly.
6. Would you have made the same decision the kids made about attending the party? Explain.
7. Why did September and Ivan linger at the party? List facts in favor of staying and facts against.

Answer on pages 137, 138, 146, 147, 148, and 149.

Ivan wanted to try to break a record on the video game and they got an invitation to eat lunch and socialize with other kids.

Facts for leaving:

Harry had warned them to go home because Mother Nature might fool them.

The clouds were moving into Bag Bay.

They were supposed to leave as soon as the radio was fixed.

They weren't even supposed to be in town.

Facts for staying:

They got lunch.

They got to meet new kids and enjoy socializing.

Ivan got to play video games and maybe break the record on one of them.

Chapter 15

1. What were their reasons for heading home in bad weather? What were the reasons for waiting?
Answers found on pages 155, 156.
Reasons for leaving:
Their dad was already ahead of them on the way home.

They weren't even supposed to be in town so their dad would be very unhappy.

Their dad will think they sank on the way home.

Reason for waiting:

The weather looked ominous.

2. What decision would you have made in the situation described in #1? Why?

Answers will vary.

3. Why does September think, "Halfway across Bag Bay was the worst place to be"?

Answer found on page 159. She wanted to be all the way across.

4. Why would it be important to keep an extra tank of gas on a skiff at all times?

Not mentioned in the story, but implied by the prospect of running out of fuel when in a tight situation. Also running out of fuel because of problems in general.

5. When they realized they couldn't make it home or back to town, what did September and Ivan do?

Answer found on page 165. They set off a flare.

Chapters 16-18

1. What two things did September and Ivan do that probably saved their lives?

Answer found on pages 171, 179, 187, 188, and in chapter 15, page 156. They wore PFDs and left a message with the harbormaster to call their dad.

2. List four strategies they used to keep from swamping or capsizing.

Answers found on pages 159, 161, 162, 163, and 169.

1. September kept the skiff's speed the same as that of the swells.

2. September ran up the back of a wave and then cut back on the throttle to hold them on the back sides of waves. She kept repeating this maneuver with each wave. September angled and timed all their maneuvers.

3. When the big roller came September turned the boat into the wave.

4. Built a sea anchor from a bucket and the tow line (dragged a bucket off the bow to keep the boat from turning into the wind) and used the oar as a rudder.

3. List the equipment they had with them. Make a list of practical items they should have had with them.

Gear they had

PFDs

Oars

Buoys

Bailing buckets and clam buckets

Boat pole

Lines, including towing line

Toolbox

Flare gun and flares

Backpacks

Gear they should have had

VHF radio

Another tank of gas

Rocket flares not requiring a gun

4. List decisions that contributed to or caused this dangerous situation.

They chose to stay at the party and eat lunch, and to leave the harbor when the weather was starting to deteriorate. They shouldn't have gone to town without their father's permission.

5. Apply the Seven Steps to Survival to September's and Ivan's emergency. Identify a part of the story for each of the seven steps: Recognition, Inventory, Shelter, Signals, Water, Food, and Play.

Recognition—First recognition is when September sees the weather changing and they are still at the party. This is followed by denial of the possible consequences when they head out for home. Next recognition is when the seas get worse. Next one is page 165 when they realize they won't make it either to town or home. They set off a flare.

Inventory—Had a well-stocked boat and knew how to use their gear.

Shelter—Were well-dressed for the weather and wearing PFDs. Used dummy to help keep themselves warmer, together.

Signals—used flares when knew they couldn't get there on their own. Asked harbormaster to let their dad know they were on their way home.

Water—not relevant

Food—not relevant

Play—September talks with Ivan about his video game when he is hypothermic.

Culmination Game by Stations

Time: 45-90 minutes

Overview

Review dressing, signals, knots, and float plans at activity stations.

Objectives

After completing this activity, students should be able to:

1. Demonstrate how to signal for help with a signal mirror.
2. Say a Mayday that includes the five critical points.
3. Describe three differences between EPIRBs and Maydays as signals.
4. State at least one reason why both EPIRBs and Maydays should be used to signal in an emergency.
5. Tie a bowline, half-hitch, and sheet bend.
6. Write a float plan.

Materials

- Grand prize, others as desired
- 1 per group, Student Handouts #1 **Student Directions** and #2 **Culmination Game Score Card**

“Signals” Station

- 1 per group, signal mirror
- Overhead projector

- 2 targets (pictures of helicopter, aircraft, or boat)
- 1 per group, “dummy” VHF microphone
- 1 or more **Mayday Scenarios** (take from Activity #5, Student Handout #1 **Mayday Scenarios**)
- 1 per group, demonstrator EPIRB or picture of an EPIRB
- **Instructions for “Signals” station** (make from Template #1)
- 2 adult helpers

“Knots” Station

- 1 per student in group, 5 foot piece of rope
- 1 per student in group, 5 foot piece of rope, thickness different from first piece
- Station cards for bowline, half-hitch, and sheet bend (make from Small Boat Skills unit: Activity #2 templates)
- **Instructions for “Knots” station** (make from Template #2)
- Adult helper

“Float Plan” Station

- 1 per student in group, Student Handout #3 **Float Plan Story**
- **Instructions for “Float Plan” station** (make from Template #3)
- Adult helper

Procedure

Before Class

1. Set up the stations.

Signals—Set overhead projector near walls away from bright light. Place signal mirror on the overhead projector, and hang targets on two walls. In a separate area place the dead microphone, Mayday scenarios, and pencils. Put the demonstrator EPIRB in a third area.

Knots—Set out lengths of rope and station cards.

Float Plans—Set Student Handout #3, paper, and pencil in a quieter place than other stations.

2. Assign adult helpers to each station and provide orientation.
 - Use Student Handout #1 to explain the game scoring process to them. Adult

helpers will assign the score at their stations. Emphasize that up to 5 extra points can be earned per station for cooperation and working as a team.

- Distribute appropriate instructions for station cards to adult helpers and review each station with them.

During Class

1. Explain to students that they will be playing a game to summarize what they have learned about small boat safety and survival.
2. Divide the class into three teams as equal in size as possible.
3. Review the stations with the class.

Signals—Everyone must signal a rescuer with a signal mirror and give a proper Mayday. The group as a whole must explain how an EPIRB compares with a Mayday and why both are good signals.

Knots—Everyone must tie their own bowline, half-hitch, and sheet bend.

Float Plans—Teams read a story and write a float plan for the scenario.

4. Distribute and explain Student Handouts #1 and #2.

5. Start a team at each station. If a team finishes early they must wait, working for that extra 5 points.
6. Rotate teams through stations until every group has completed all stations. Have groups keep their Culmination Game Score Card with them.

Extensions

1. Add a “Dressing for a Boat Trip” station with a collection of large clothes for a boat trip, some appropriate and some not; include a cotton baseball cap in “not appropriate” and wool or fleece pants in “appropriate,” and a small number of PFDs of various sizes. The team must dress one member correctly, demonstrating knowledge of three layers, which fabrics insulate best when wet, and the importance of wearing a PFD. Clothing is covered in detail in *Cold Water Safety and Survival*, Volume 2, Hypothermia unit.
2. Add more complex skills or questions to each station. For example, add Mayday Relays and the path an EPIRB takes to the “Signals” station. Add more complex knots and ask when each type of knot would be used to the “Knot” station.
3. Time students as they do the skills and have them compete based on accuracy and time.

This activity addresses Alaska Content Standards:

Language Arts A-1 Effective writing, A-3 Demonstrate speaking skills, D-1-A Personal experience and prior knowledge, D-4 Explain and defend a position

Mathematics A-3 Arithmetic and computation

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury prevention, A-6 Making informed choices, B-1 Risk and consequence, B-2 Effective communication, D-2 Safe and healthy environments

Instructions for “Signals” Station

This station has 3 parts and uses 2 adult helpers. At the start, split the team into 2 groups and direct one-half to signal mirrors, the other to Maydays. One helper monitors signal mirrors while the other monitors Maydays. When students complete each skill, they switch so all can complete both skills. Then the team and both helpers focus on EPIRBs.

Signal Mirrors

1. Turn on the overhead projector as the “sun.” Point out the targets.
2. Direct students one at a time to use the mirror to signal the rescuer. They must direct a reflection onto the target.

Mayday

1. Give each student one of the **Mayday Scenarios**.
2. Using information from the scenario, have students use the microphone one at a time to give a Mayday.
3. Essential parts of a mayday:
 - Mayday, Mayday, Mayday!
 - Boat name and description
 - Location, preferably in latitude and longitude
 - Number of people on board
 - The nature of the problem

EPIRB

1. Have the team compare EPIRBs and Maydays as signals. Ask students to list at least three ways they differ and three ways they are the same. They should discuss the answers themselves before presenting them. Answers may include:

Differences

EPIRB	Mayday on VHF Radio
Broadcast an electronic signal	Broadcast a voice signal
406 EPIRBs send owner and boat ID in signal	Person must provide all information verbally
Waterproof	Some, but not all radios, are waterproof
Include internal power source, self-sufficient	Portable radios have internal power source, mounted radios require external power that may be affected by flooding/fire
All models either mounted on float-free systems	Mounted (not float-free) or portable models or are portable
Many are self-activating	Need person to operate

Differences (continued)

EPIRB	Mayday on VHF Radio
Operate continuously for up to 48 hours after activated	Battery life of portable radios more limited than EPIRBs
Sends signal to satellite which is stored and sent to Local User Terminal when in sight, then routed to MCC, RCC, and SAR group	Sends signal to receiver on land or boat, receiver must be within range
Accuracy within 1-3 miles, continually corrected, homing beacon used to pinpoint final location of person in distress	Accuracy depends on accuracy of information given by person in distress and how current the information is
Most have strobe light	No lights
Broadcasts a signal on 406 and 121.5 MHz	Broadcasts a signal on whatever frequency is set on the radio

Similarities

- Both are effective emergency signals when used properly.
- Both provide rescuers with valuable information.
- Both use electronic radio signals to transmit information.
- Both can provide accurate location and boat description information.

2. Ask students why using both in an emergency is a good idea. Answers may include:

Maydays

- Give the rescuer information not available from EPIRBs: people on board, nature of emergency, safety equipment on board, greater accuracy than 1-3 mile radius is possible if operator gives accurate, timely information.
- Immediately alert other operators in the area to the emergency, which may result in immediate assistance.

EPIRBs

- Provide accurate position that is constantly updated, reducing search time.
- 406 EPIRB gives information so rescuers can identify the vessel in distress.
- If float-free, self-activating, and mounted correctly, it will go off even if no one is able to activate it.

3. Assess the signals and record the score on the team's score card. Assign bonus points **only** if earned! See **Culmination Game Score Card** for scoring criteria.

Instructions for “Knots” Station

1. Distribute lengths of rope to each student, and tell them they will be tying a bowline, half-hitch, and sheet bend. They can refer to the station cards if they need to.
2. Ask students to tie the first knot at the same time. Inspect the knots.
3. Repeat until all knots have been tied correctly.
4. Evaluate the knots and record the score on the team’s score card. Assign bonus points only if earned! See **Culmination Game Score Card** for scoring criteria.

Instructions for “Float Plan” Station

1. Have students read Student Handout #3 and write a float plan as a team for the situation described in the story.
2. The float plan must contain:
 - Who is going.
 - Where they are going.
 - When they are expected to arrive at the destination and when they will be back.
 - What equipment they are taking along and what they plan to do.
 - A physical description of their boat.
3. Ask the students to describe the characteristics of the best person to give the float plan. Answer: a responsible person who will miss the boaters if overdue.
4. Assess the float plan and record the score on the team’s score card. Assign bonus points only if earned! See **Culmination Game Score Card** for scoring criteria.

Student Directions

“Signals” Station

1. Your group will be split in two for the first part of this station. Half will go to the adult helper with signal mirrors, the other half to the adult helper with the Mayday microphone.
2. One at a time, each person at “Signal Mirrors” will use the mirror and “sun” to signal a rescuer.
3. One at a time, each person at the “Mayday Microphone” will call a Mayday using a Mayday scenario.
4. You will switch so everyone on your team can complete both skills.
5. Your team will then compare Maydays and EPIRBs. You will be asked the following questions. Discuss the answers among yourselves before presenting them to the adult at the station.
 - List at least three ways EPIRBs and Maydays differ.
 - List at least three ways they are the same.
 - Why is using both in an emergency a good idea?

“Knots” Station

1. Each student on the team gets 2 lengths of rope. You will be tying a bowline, half-hitch, and sheet bend. You may refer to the station cards.
2. Everyone will tie the first knot at the same time and wait until the adult helper inspects your knots before untying them.
3. You will repeat until all three knots have been tied.

“Float Plan” Station

1. Read the story.
2. As a team, write a float plan for the situation described in the story.
3. Make sure you include all of the essential elements, and use your imagination for the details that aren’t included in the scenario.
4. Describe the characteristics of the best person to give the float plan.

Name: _____ Date: _____

Culmination Game Score Card

1. Record the number of students in your group in the blanks in the column labeled “How to Score.”
2. Use scoring criteria to calculate your “possible” score. Don’t forget to add the 5 extra points. Total your possible score and record it in the box marked “Total” under the “Possible Score” column.
3. Complete the activity at each station and have the adult at the station record your score.
4. When the group at the next station is finished, move to the next station.
5. Continue until you have completed all the stations.
6. Total your score. The team closest to its “possible” score wins.

Scoring Criteria

Signals—One point for each person who successfully signals the target with a mirror.

One point for each person who gives a complete Mayday and uses the microphone correctly.

One point for each correct answer when comparing EPIRBs and Maydays.

Maximum points = $(2 \times \text{the number of students in the group}) + 3$.

Knots—One point for every person who ties a bowline.

One point for every person who ties a half-hitch.

One point for every person who ties a sheet bend.

Maximum points = $3 \times \text{the number of students in the group}$.

Float Plans—One point for each category included in the float plan.

One point for naming a responsible person to give it to.

Maximum points = 6 points.

Bonus points—Up to **5 extra points** may be earned at each station for cooperation and working as a team.

Station	How to Score	Possible Score	Actual Score
Signals	$(2 \times \text{_____}) + 3 =$		
Knots	$3 \times \text{_____} =$		
Float Plan		6	
Bonus		15	
Total			

Float Plan Story

Overdue Kayakers Safe But Search Was Costly

Safety Alert 05-01

17th U.S. Coast Guard District, U.S. Coast Guard, P.O. Box 25517, Juneau, Alaska 99802

Two kayakers left Ketchikan for a four day kayaking trip to Rudyerd Bay in Behm Canal (Rudyerd Bay is 50 to 60 miles from Ketchikan). They were due to return on Monday, April 23rd. On Tuesday, friends contacted the Coast Guard, who searched for the missing boaters along the shorelines and cabins throughout the area. The kayakers were located safe in a cabin at Point Alava, which was in the area of their travel. The pair delayed their transit in a cabin due to rough weather. The kayakers had lifejackets, a tent, sleeping bags, food and a cellular phone. The Coast Guard spent approximately \$89,000 in this search effort, including 10 hours of helicopter time and nine hours of searching by small boat.

[Ed. Note: The kayakers, one experienced, and one not experienced, said they would take one of several alternative routes coming back to Ketchikan but ended up using yet another alternative route not mentioned in their float plan. The helicopter actually flew right over the cabin they were in and hovered but they did not even come out of the cabin, and their kayaks were not visible in the woods.]

Emergency Scenario

Time: 60 minutes

Overview

Review skills from all three units of this volume using a simulated boat emergency.

Objectives

After completing this activity, students should be able to:

1. Select proper equipment for a boat trip.
2. Demonstrate an effective Mayday and Mayday relay.
3. Plot a course to a known location.

4. Select appropriate emergency signals and demonstrate their use.

Materials

- **Boat cards** (make from Template #1)
- 3 dummy microphones
- Chart of a nearby area
- Parallel ruler
- Dividers
- Weather or VHF radio

Procedure

Before Class

1. Fill in the blanks in Template #1 to create your **Boat cards**.
2. Mark the location of the three boats on the chart.
3. Decide on the emergency for the scenario.

During Class

1. Explain to students that they will be going on a simulated boat trip.
2. Divide the class into three groups: Boats A, B, and C and hand out Boat cards. **Don't** tell students what kind of emergency will occur or which boat will experience it. Explain to all that Boats A and B are both recreational boats out on a day trip; they have their VHF radios on. Boat C is a kayak with one or two people having a picnic on an island during a day trip. They are listening to their VHF radio to pick up weather or a call from friends.
3. Have students create realistic roles and personalities for the people in their boat, and tell them that whatever happens, they should act in their defined personalities.
4. Have the class listen to the weather report on the radio.
5. Instruct each boat to prepare for a day trip, listing what they will do and what they need

to take with them to get ready (include float plan, and clothing and equipment appropriate for the weather and that meets legal requirements).

6. Send Boat A to one room and Boat B to another room so that they cannot hear each other.
7. Send Boat C to a location where they can hear both boats.
8. Using the scenario you created before class, quietly inform Boat A that they are having an emergency.
9. Have Boat A broadcast a Mayday, which Boat C should relay. Make sure Boat B hears and answers the relay. Have Boat C relay information between the other two boats.
10. Inform Boat B that it is the rescue boat and students need to plot a course to Boat A's position. They must calculate how long it will take to arrive on scene (figuring they are traveling at 12 knots) and describe their rescue actions.
11. Have Boat C try to contact the U.S. Coast Guard.
12. Have Boat A simulate activating emergency signals and address the emergency using any equipment included on their equipment list.
13. Time the response.

14. Debrief, asking the following questions:

- Was the Mayday complete? If not, what was missing?
- How did the Mayday Relay go?
- What equipment did the boat with the emergency and rescue boats **not** have that would have helped in the emergency?
- While traveling at 12 knots, how long did the rescue boat take to get to the boat having the emergency? Did it take the shortest route? Compare the response time with the needs of boat in the emergency.
- Were all of the boats properly and legally equipped?

- Was a float plan filed? If so, with whom? Was it complete?
- What was the latitude/longitude of the boat having the emergency?
- How was communication between the boats? How could it have been improved?
- For the weather conditions and time of day, were the proper emergency signals used?
- Were emotional issues handled appropriately (if part of scenario)?
- What could all boats have done to make the rescue more effective?

15. Adjust the scenario and switch roles. Repeat as time allows.

This activity addresses Alaska Content Standards:

Mathematics A-3 Arithmetic and computation

Geography A-1 Use maps and globes, F-6 Geographic knowledge for interdisciplinary learning and competencies

Skills for a Healthy Life A-1 Personal well-being, A-2 Healthy behaviors, A-3 Injury

prevention, A-6 Making informed choices, B-1 Risk and consequence, B-2 Effective communication, D-2 Safe and healthy environments

Technology A-2 Use technology for communications

Name: _____ Date: _____

Boat Cards

Boat A—Recreational Boat

Style of boat _____ Top speed _____

people _____

On a day trip to: _____

Purpose of trip: _____

Location: _____

Boat B—Recreational Boat

Style of boat _____ Top speed _____

people _____

On a day trip to: _____

Purpose of trip: _____

Location: _____

Boat C—Kayakers

Kayak Top speed 5 knots

people _____

On a day trip to: _____

Purpose of trip: _____

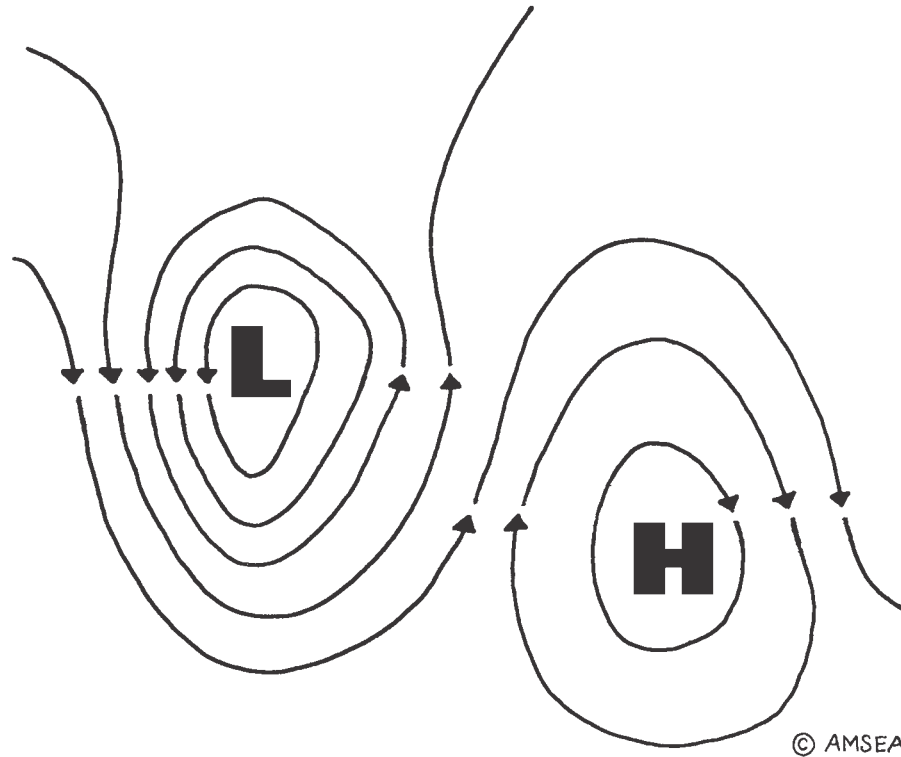
Location of beach: _____



Overhead Masters

Air Flow in the Northern Hemisphere

- Counterclockwise in a low pressure system
- Clockwise in a high pressure system

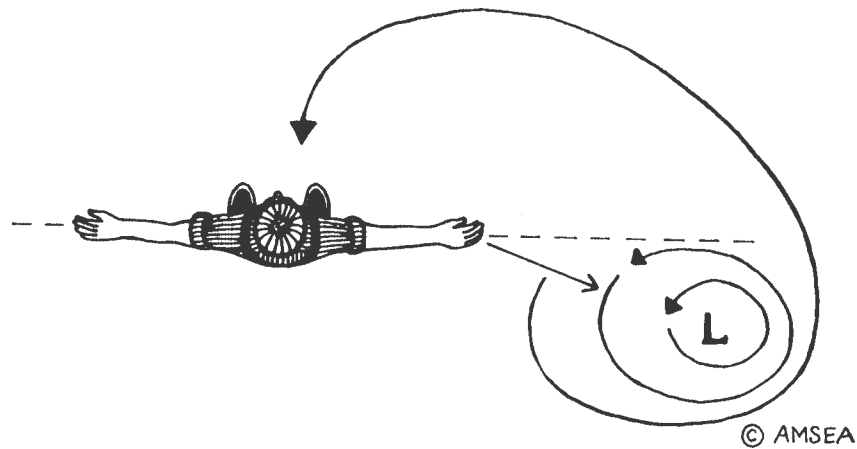


Buys-Ballot's Law

Locate the center of a storm by using Buys-Ballot's Law

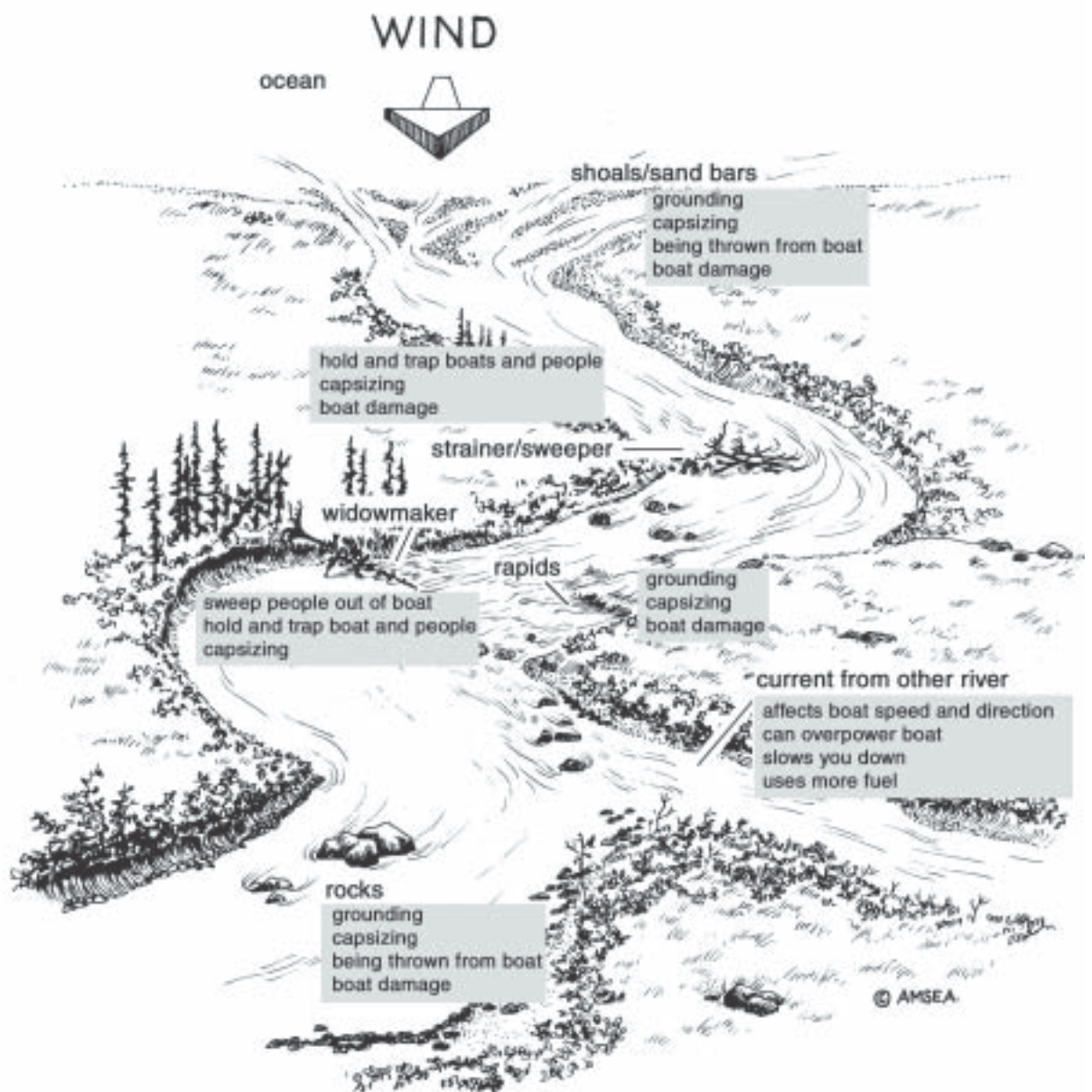
This law was formulated in 1857 by the Dutch meteorologist Buys-Ballot, and is also known as the Baric Wind Law

- Face the true wind
- Extend your right arm to the side
- The storm's center will be to your right and somewhat behind you



River System Cautions

- Get local knowledge
- Use appropriate speed
- Look ahead and plan your route
- Take action in sufficient time
- Expect the unexpected
- Stay sober



Float Plan

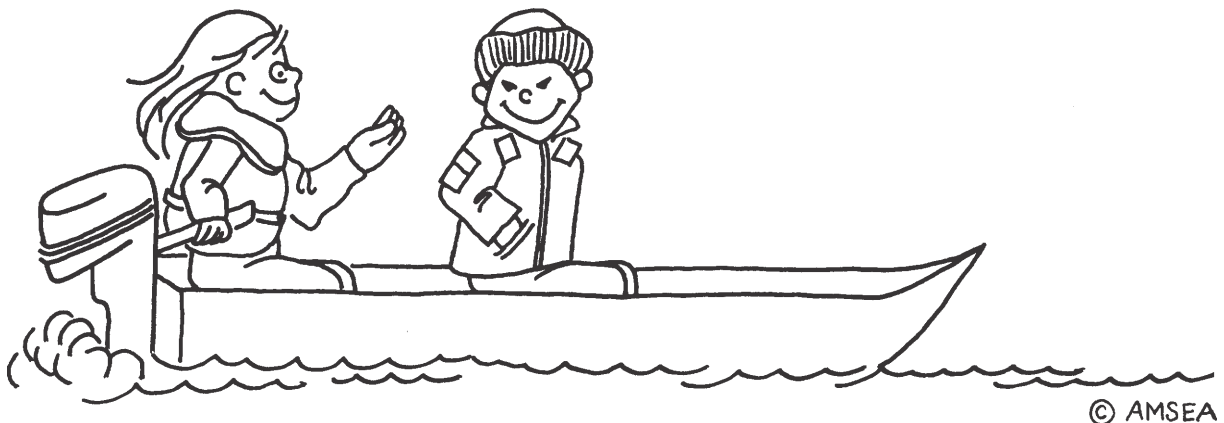
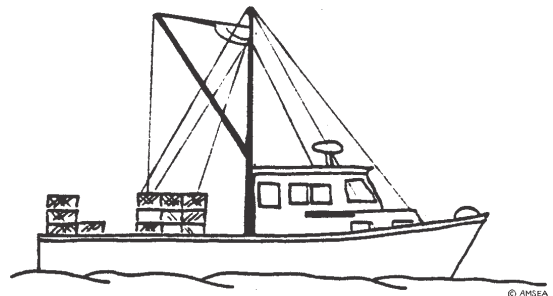
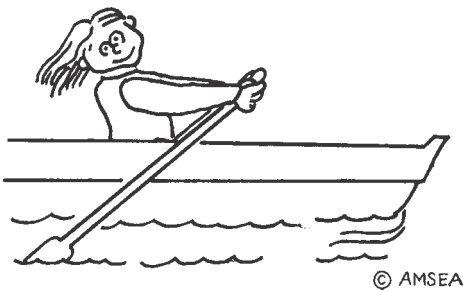
- Should be part of preparing for every boat trip
- Leave with a reliable person who will miss you
- Update when plans change
- Cancel when you return
- Include

Who is going—names and phone numbers for all onboard

Where you are going, including route and destination

When you expect to be at destination and return

What you are traveling in, what equipment you have, what you plan to do



Why Alcohol and Boating Don't Mix

At least 50% of boating fatalities involve alcohol

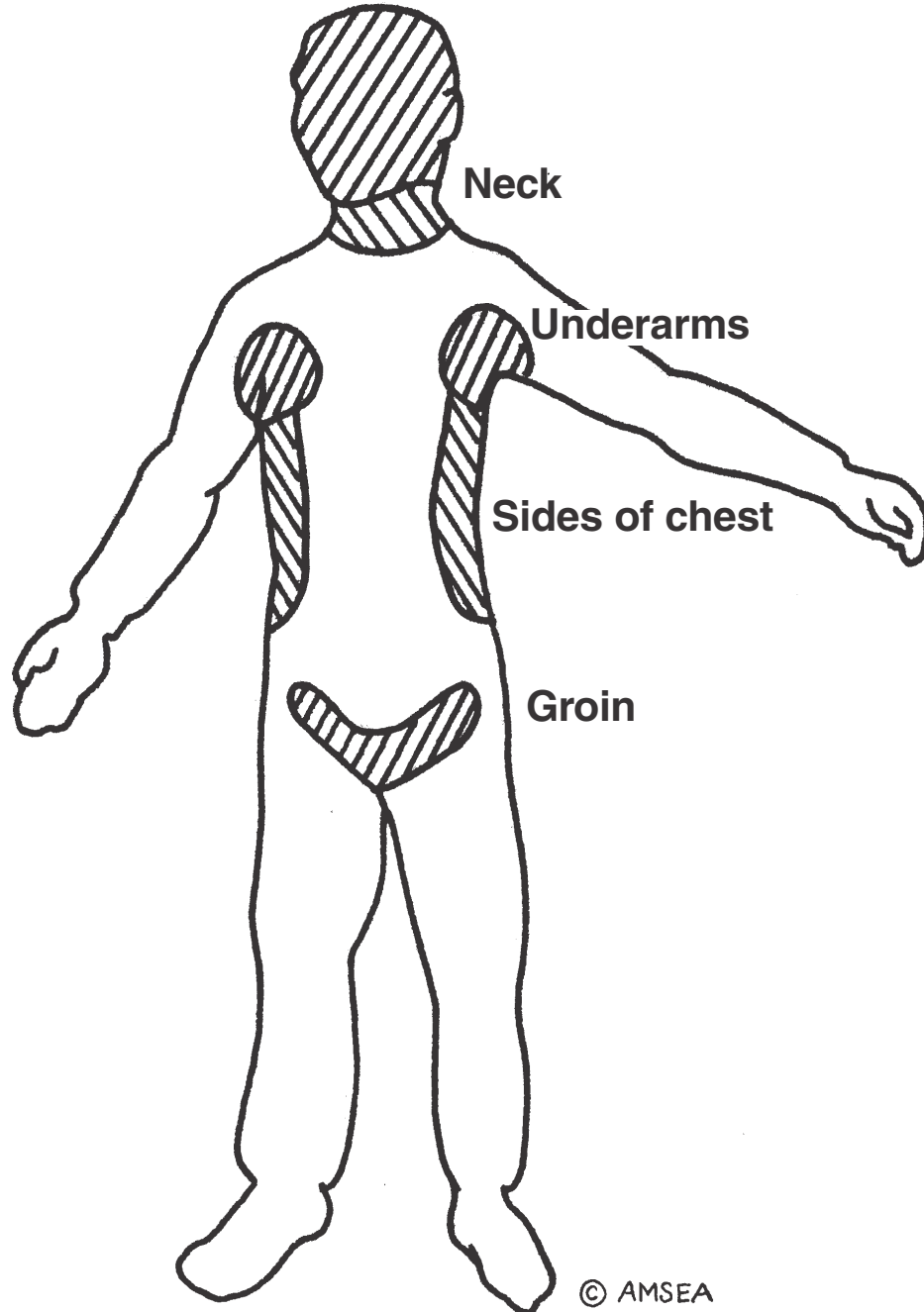
- 1. Alcohol causes loss of judgment, which leads to**
 - Increased risk taking
 - Poor decision making
 - Poor reasoning
 - Faulty information processing
- 2. Alcohol causes loss of balance**
- 3. Alcohol increases risk of hypothermia and speeds up hypothermic process**
- 4. Alcohol amplifies effects of boater's hypnosis**
- 5. Alcohol slows reaction time**
- 6. Alcohol reduces night vision, peripheral vision, ability to focus, and depth perception**
- 7. Alcohol increases risk of sudden drowning syndrome**
- 8. It's against the law to operate a vessel while intoxicated**



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Five High Heat Loss Areas

Head—50% of your body's heat is lost through your head



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Heat Gain—Heat Loss

HEAT LOSS

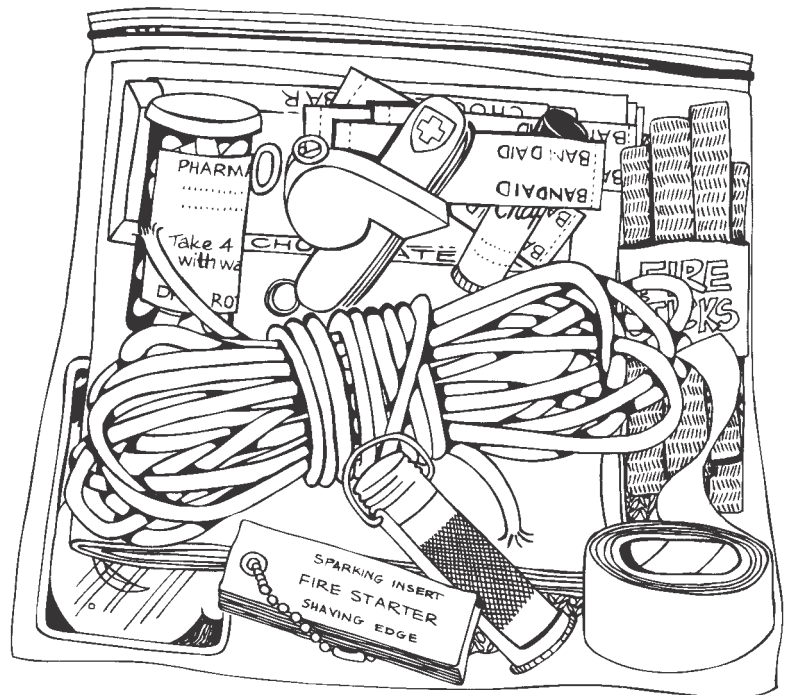
HEAT GAIN



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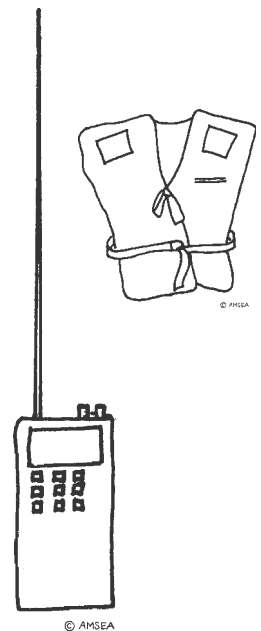
Personal Survival Kit

- Should always be carried on your person
- Must be light and small enough to fit in your pocket
- Items should be multipurpose
- Should contain items from 4 categories
 - Shelter building aids—twine, dental floss, large garbage bags, space blanket, bug head net, etc.
 - Signal aids—mirrors, whistle, foil, surveyors flagging tape, flares, chemical lights, strobe light, etc.
 - Personal health needs—medication, eye care, water purification tablets, bouillon, energy bars, bug repellent, tampons, etc.
 - Fire starter
- Container should be waterproof and sturdy

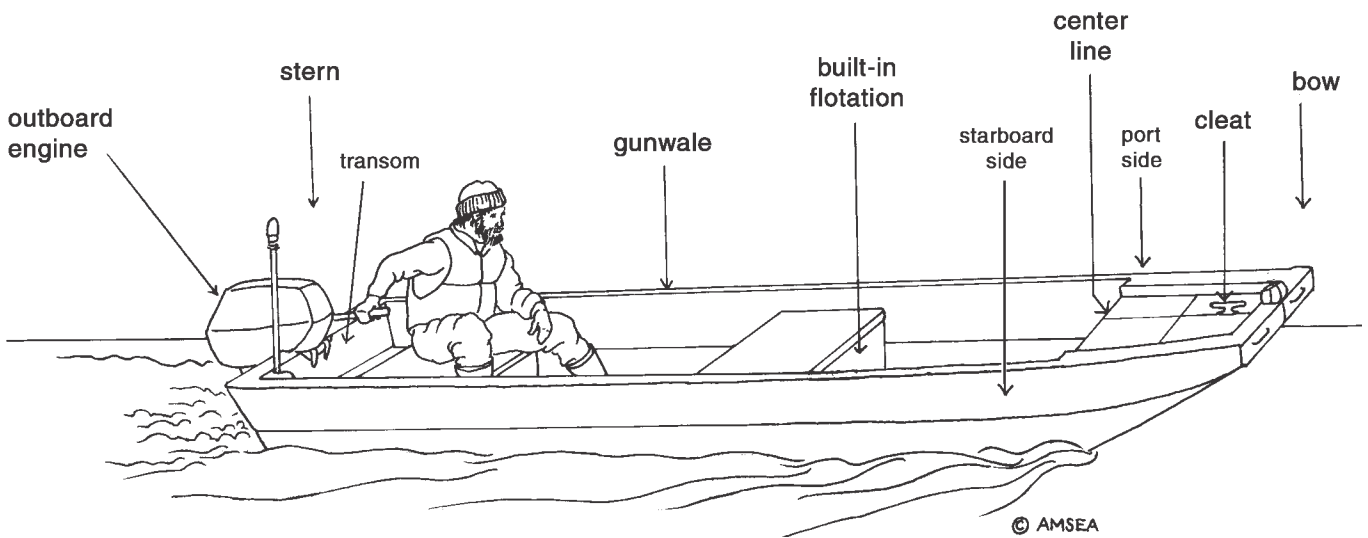
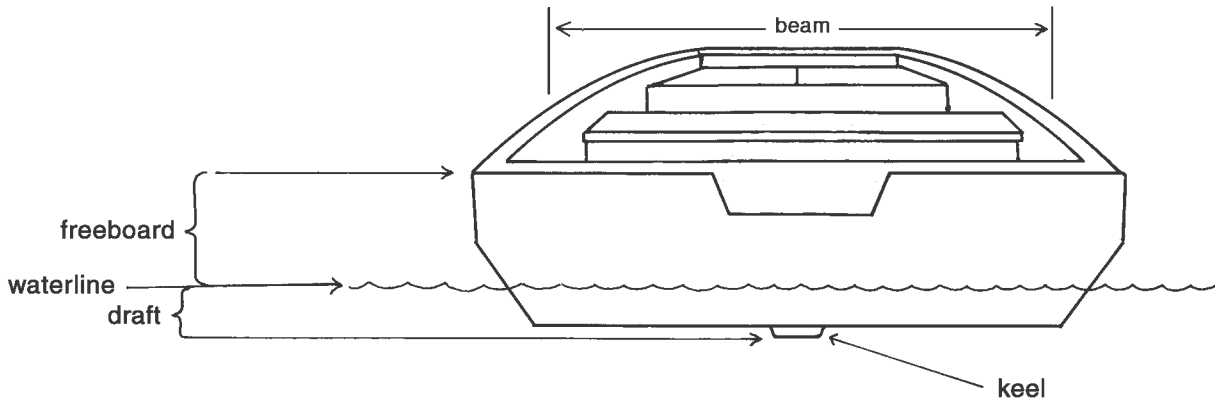


Boat Safety Orientation

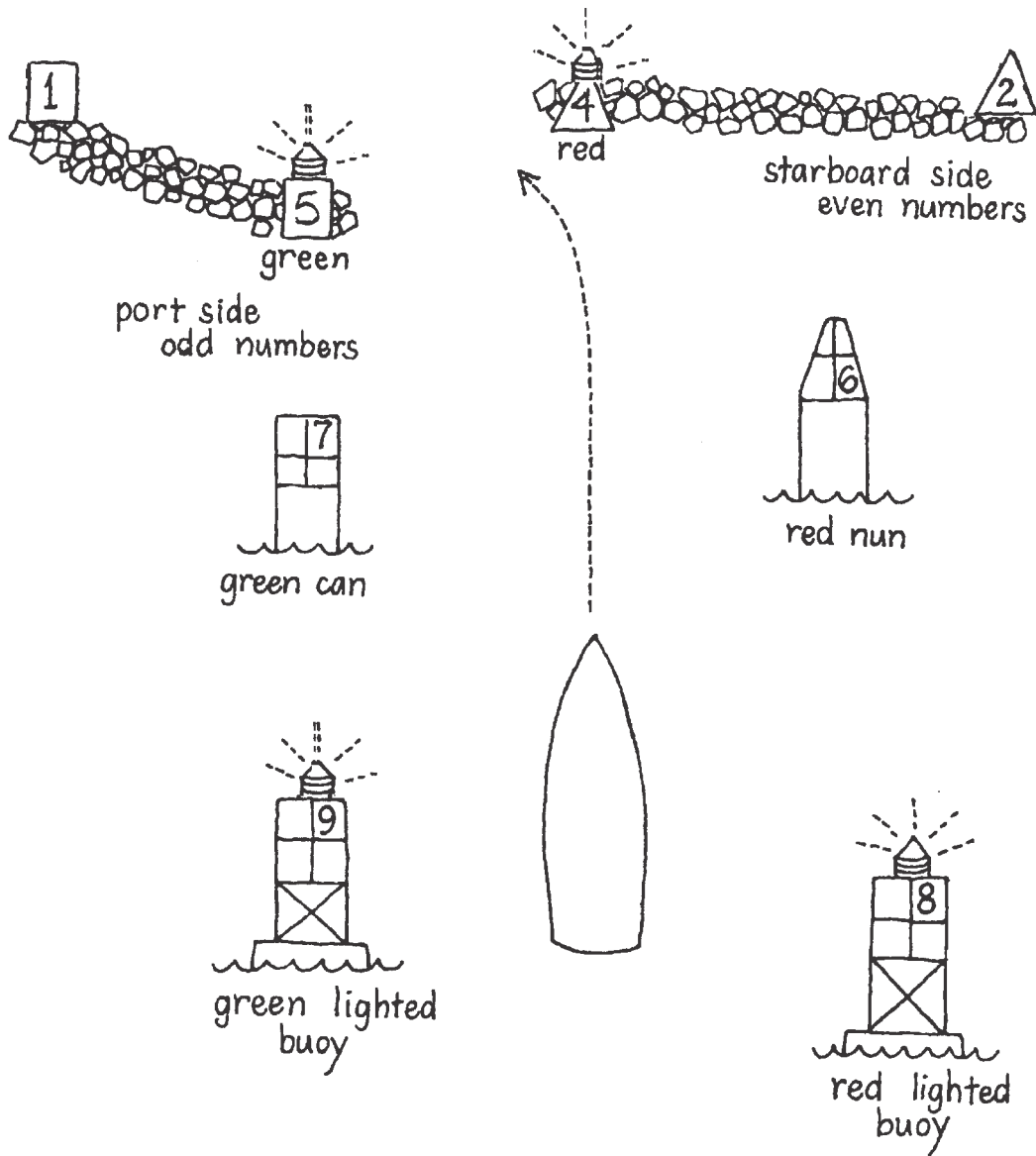
- Engine—off/on, steering, common problems, fuel switches
- Hazards—slippery areas, lines, overhead hazards
- Anchoring procedure
- Line handling
- Loading and balance concerns
- Drug and alcohol policy—abstinence is the best policy
- Waste management
- PFDs—location, size, donning, use, and care
- Fire extinguisher(s)—location, types of fires, how to use, what not to do
- Radio—location, use, emergency channel, care
- EPIRB (if available)—location, use, what not to do
- Flares—location, use, what not to do, safety
- First aid kit—location
- Alarms—what they mean, what to do
- Comfort kit/Abandon ship kit—location
- Emergencies—what to do in case of entrapment, capsizing, man overboard, swamping, rough weather/water, etc.



Naming the Parts of a Boat

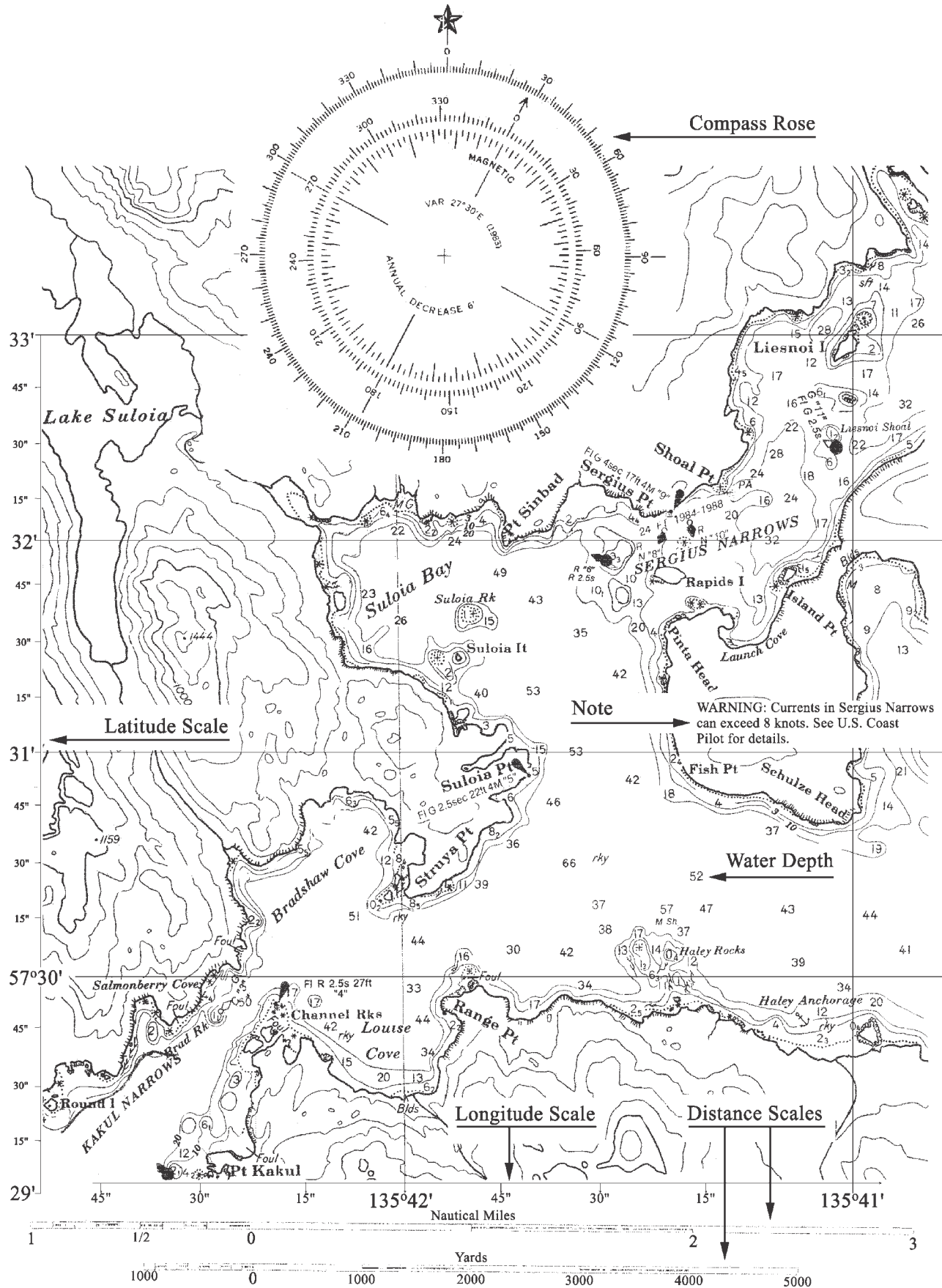


Aids to Navigation (ATON)

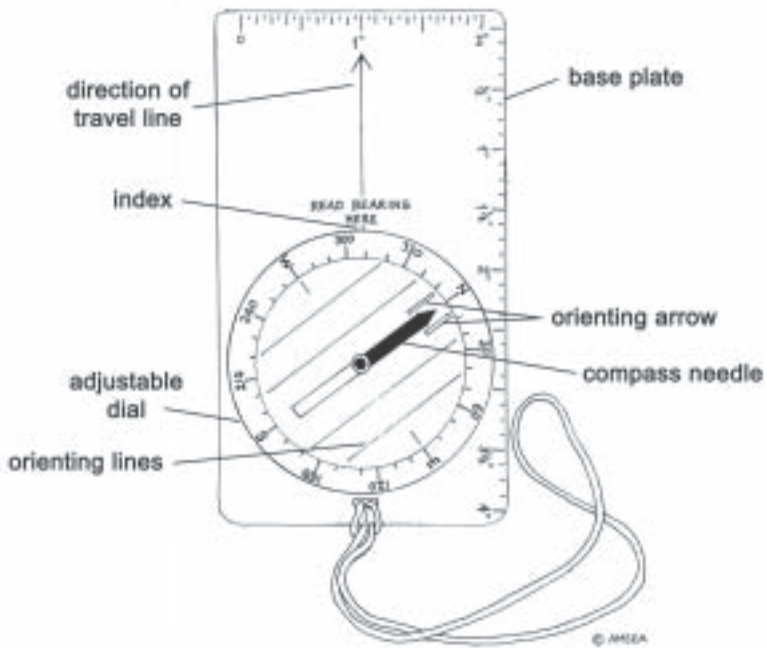


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Features of a Chart



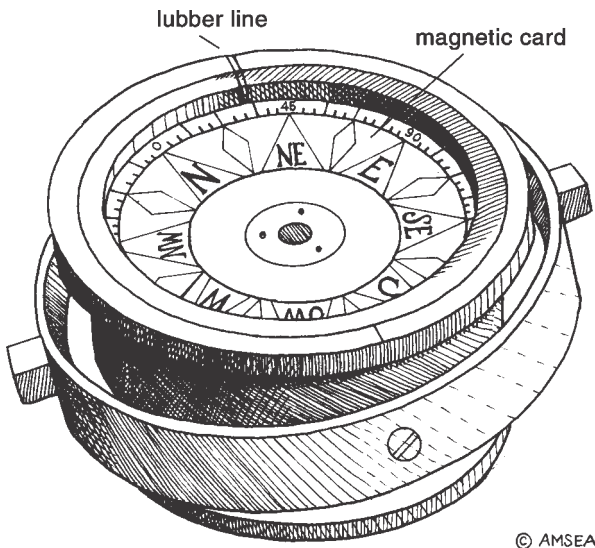
Compasses



Orienteering Compass



Hand-held Bearing Compass



Bearing Compass

Deviation Table

Extrapolate deviation for magnetic courses between deviation table listings

Magnetic Compass Deviation Table

Vessel: *F/V Isabel*

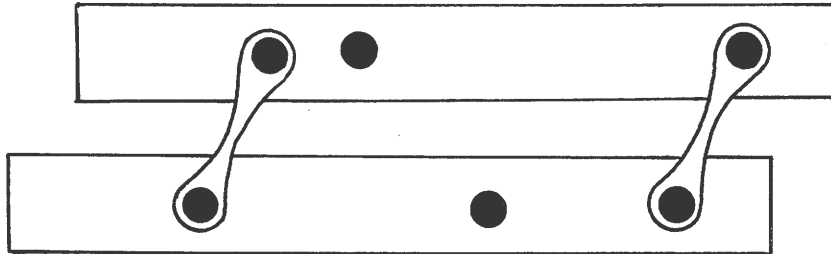
Compass Make: *Ritchie Voyager*

Port: *Unalaska*

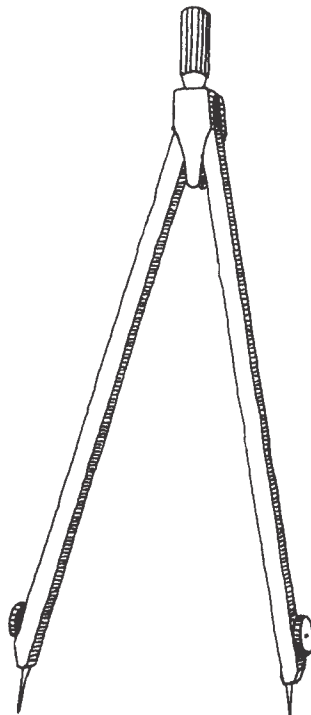
Date: *May 1, 2001*

MAGNETIC COURSE	DEVIATION	STEER BY COMPASS
N 000	3° E	357
NE 045	1° E	044
E 090	0	090
SE 135	2° E	133
S 180	4° W	184
SW 225	3° W	228
W 270	1° W	271
NW 315	2° W	317

Parallel Rulers and Dividers



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Using Parallel Rulers



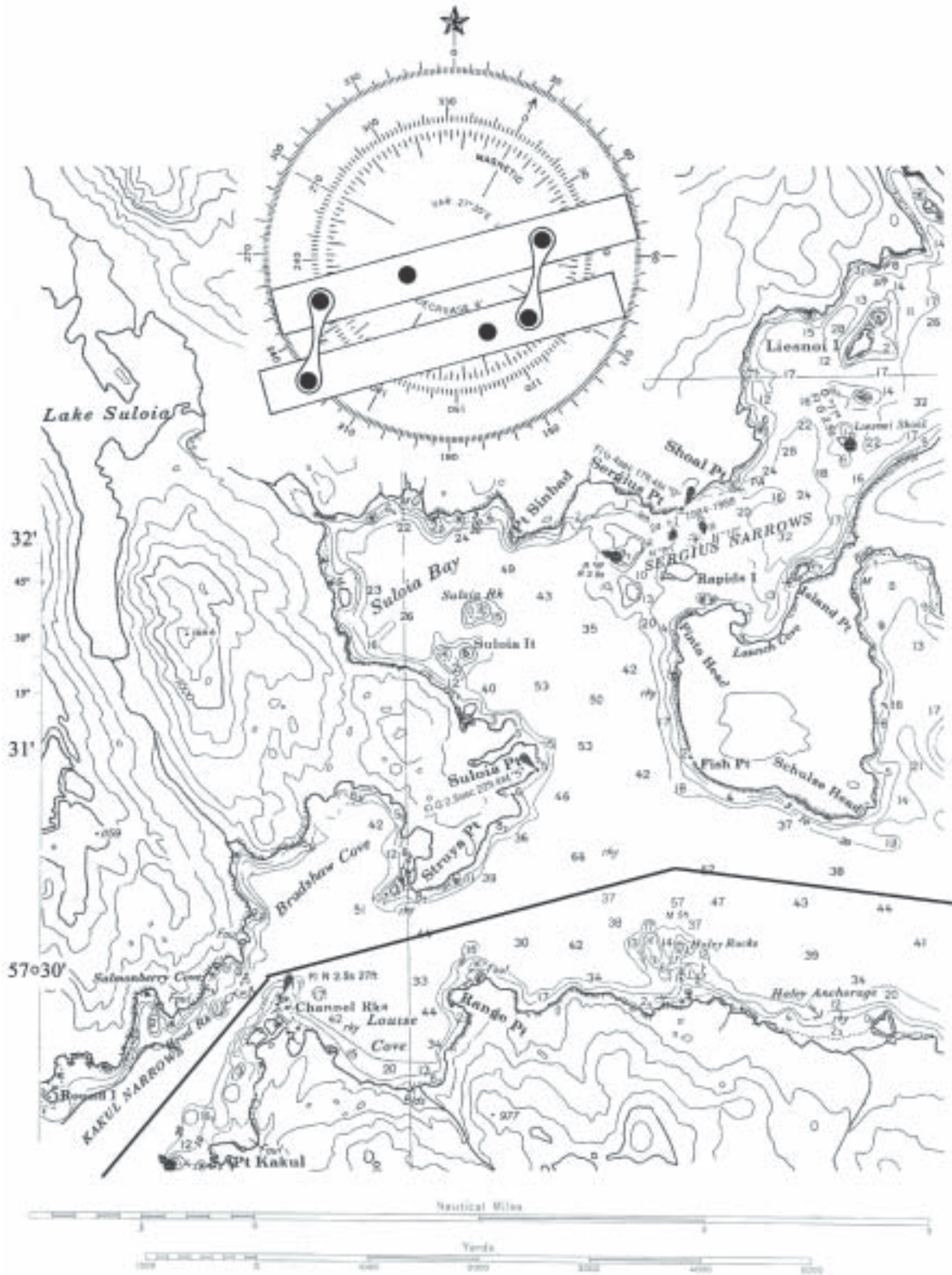
Using Parallel Rulers



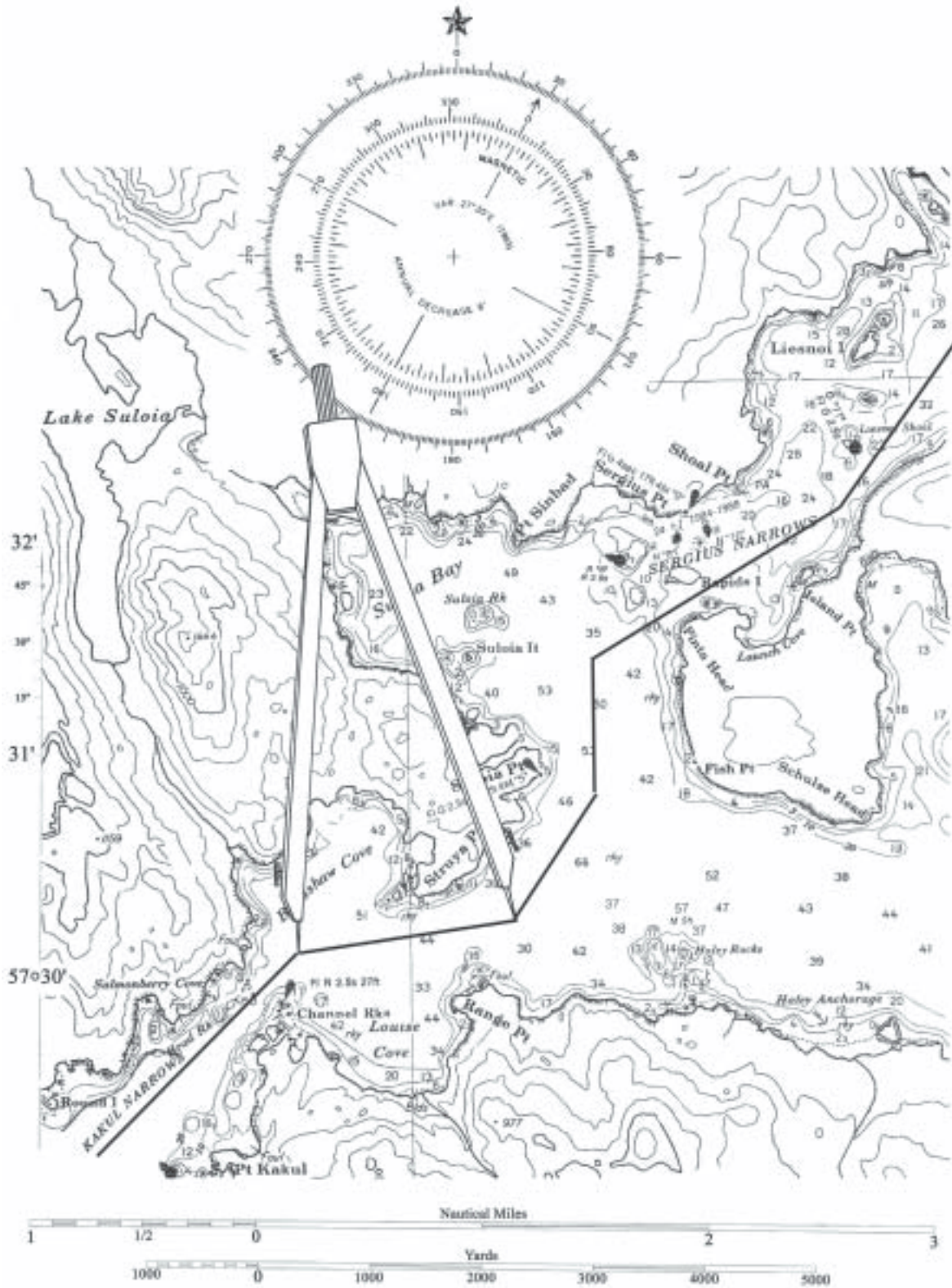
Using Parallel Rulers



Using Parallel Rulers



Using Dividers

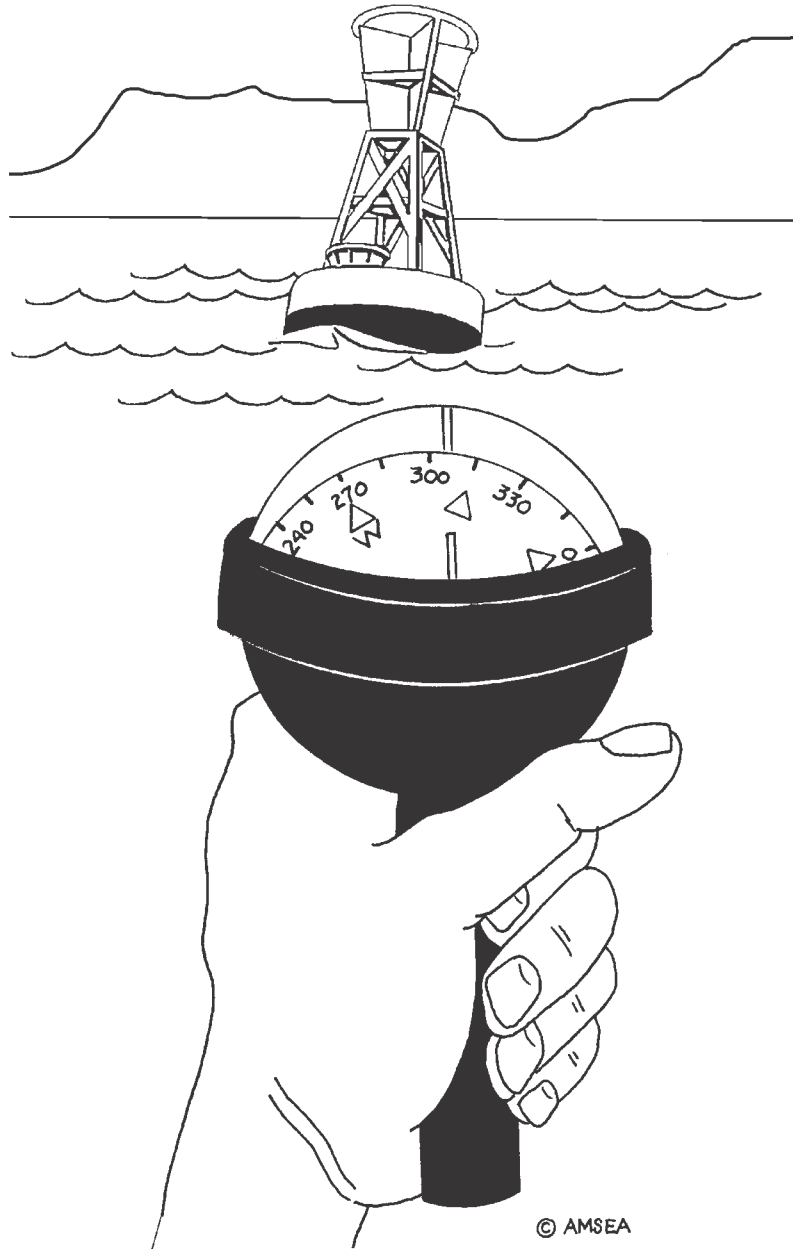


Using Dividers



Taking a Bearing to an ATON (Aid to Navigation)

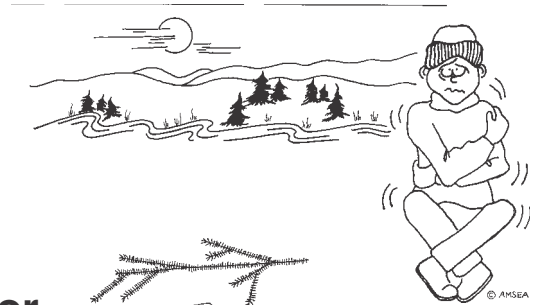
- Slow or stop boat and point lubber line toward ATON, object, or destination
- Read number directly behind lubber line



Seven Steps to Survival

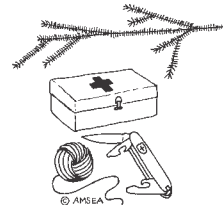
Recognition

- Recognize that you are or could possibly be in trouble and act!



Inventory

- Take into account things that work for you and things that work against you



Shelter

- Anything that insulates you and protects you from the environment
- Clothes are your primary shelter



Signals

- Should attract attention and convey the need for help!
- A good float plan given to the right person can be one of your best signals



Water

- Drink at least 2-4 quarts of water a day



Food

- Know wild, edible food before you go on an outdoor adventure



Play

- A positive mental attitude helps the will to survive



Recognition

Recognize that you are or could possibly be in trouble and act!

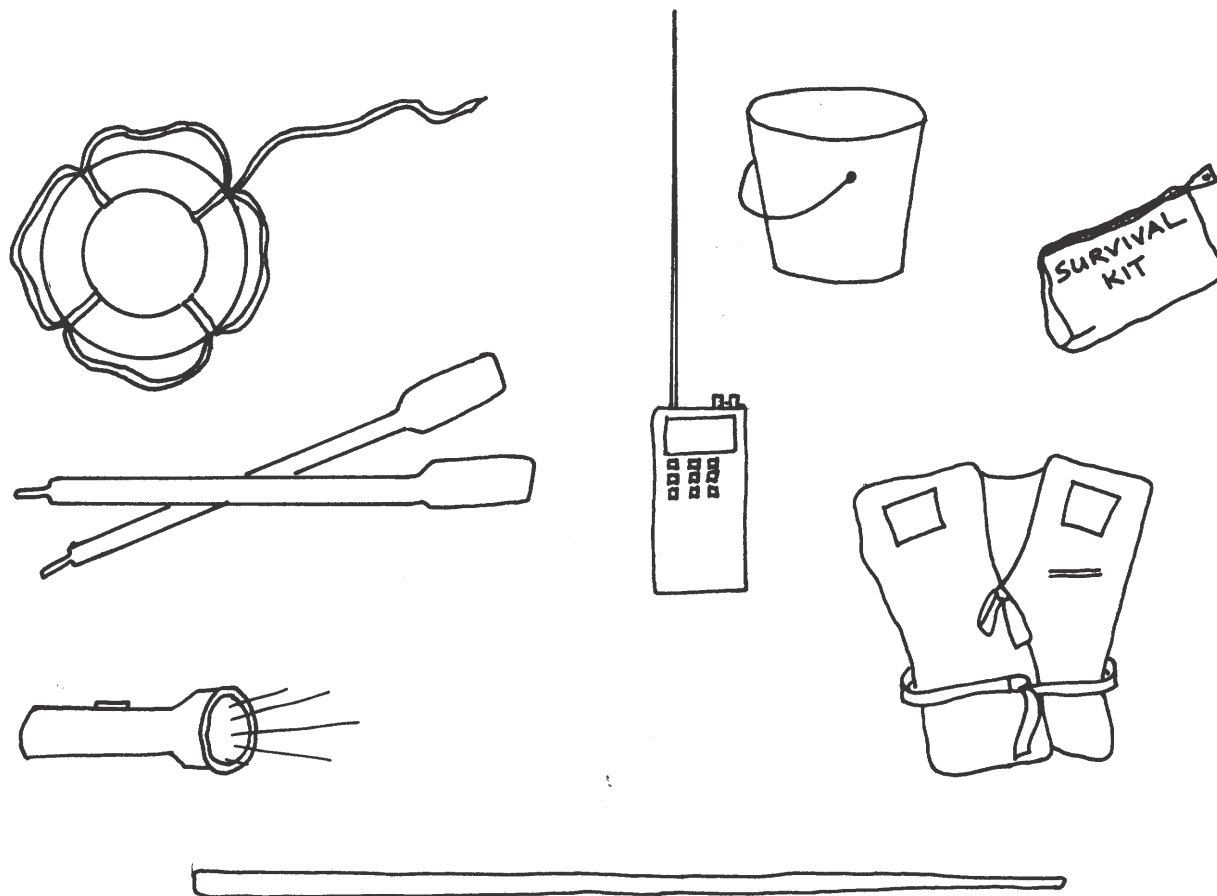


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Inventory

Take into account things that work for you and things that work against you

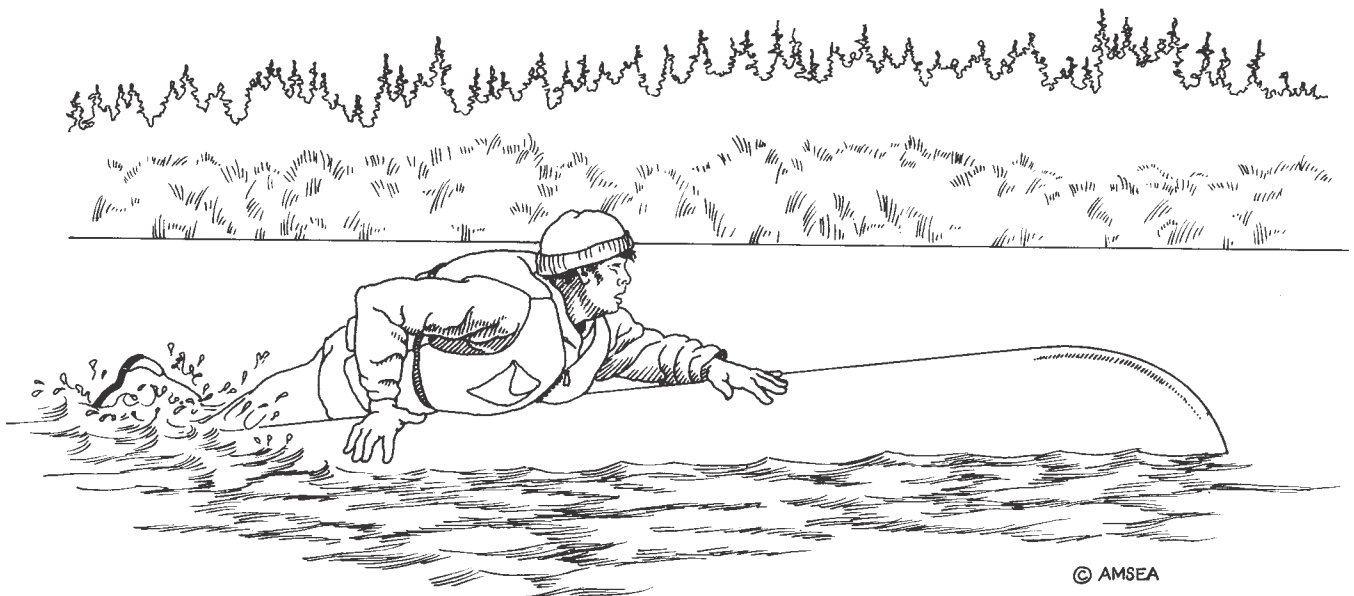
- People
- Equipment
- Environmental factors
- Location
- Ability to communicate with rescuers
- Inventory is ongoing
- Be creative!!
- Your most valuable survival tool lies between your ears!



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Shelter

- Anything that insulates you and protects you from the environment
- Clothes are your primary shelter
- Stay with the boat until it is more dangerous than being in the water
- PFDs are essential shelter



Signals

- Should attract attention and convey the need for help!
- A good float plan given to the right person may be your best signal
- Make signals **bigger, brighter, different**



Water

Drink at least 2-4 quarts of water a day

Only five safe sources of water in a survival situation:

1. Boiled for at least 1 minute
2. Prepackaged
3. Filtered
4. Chemical treatment
5. Rainwater—if caught and stored in uncontaminated container

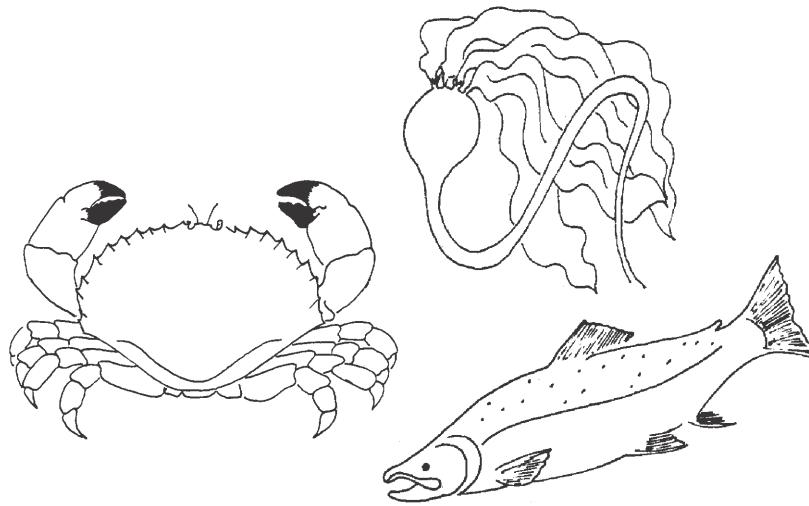


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Food

Know wild food sources before you go out

Generally, do not eat unless you have drinking water



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Play

A positive mental attitude helps the will to survive

Any attitude that creates and helps maintain a positive attitude can be considered play

Do something to improve your situation

when I get home, I'm going to...

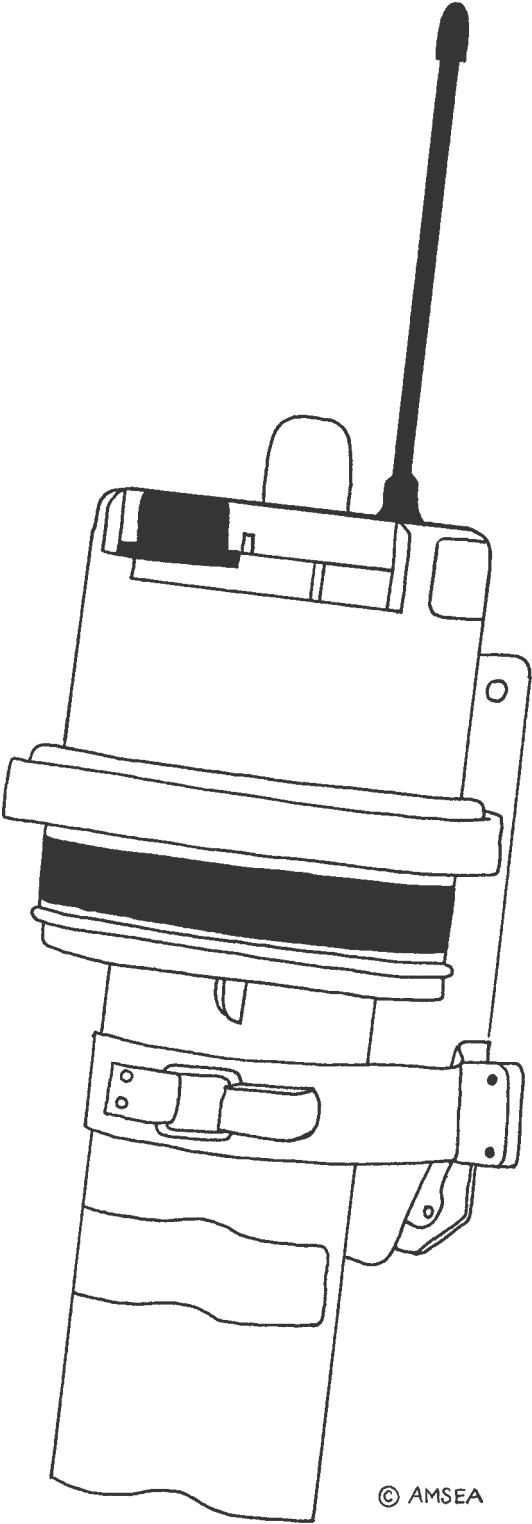


HAVE YOU HEARD THE ONE ABOUT...?



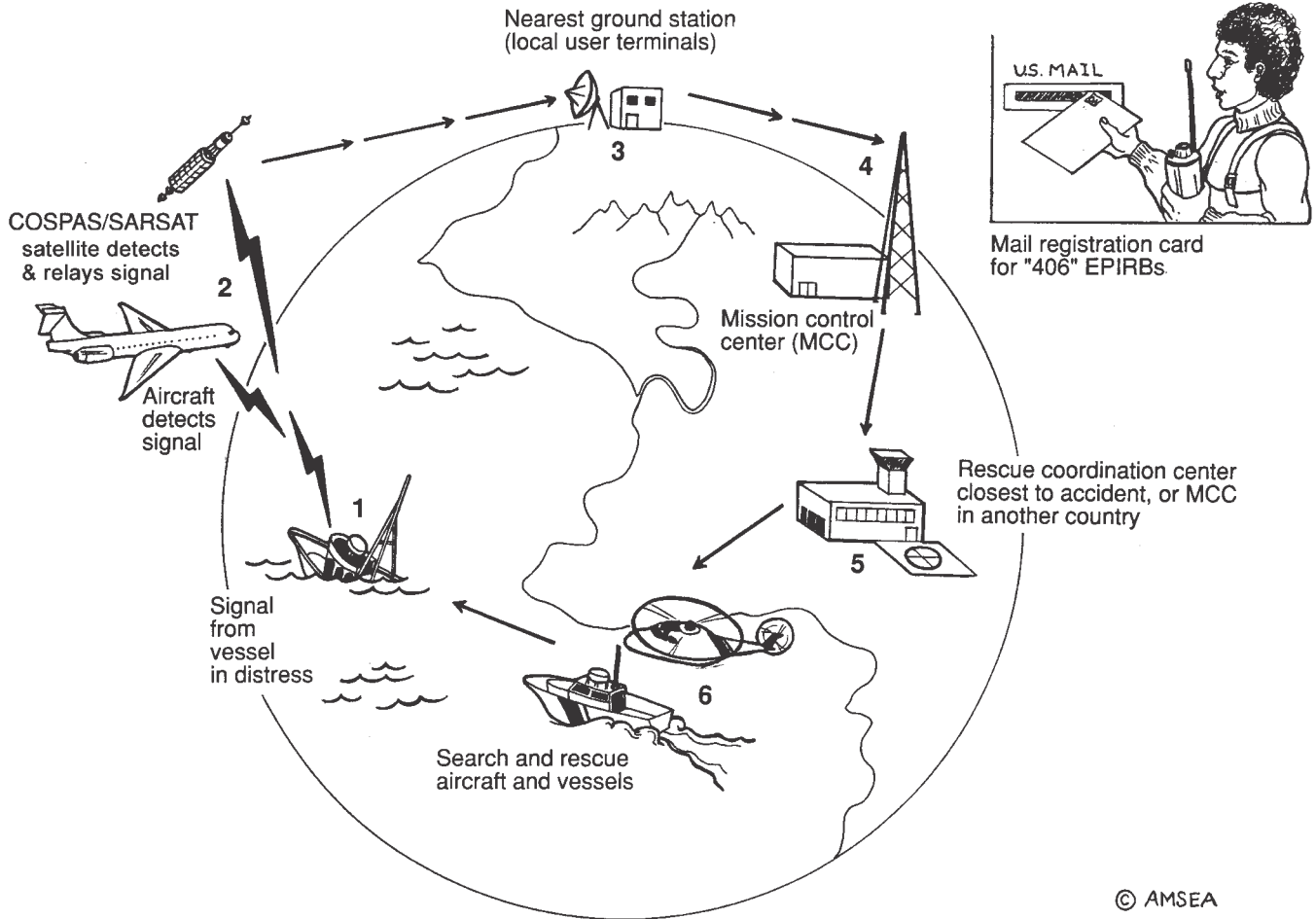
ha ha ha ha ha

Emergency Position Indicating Radio Beacons (EPIRBs)



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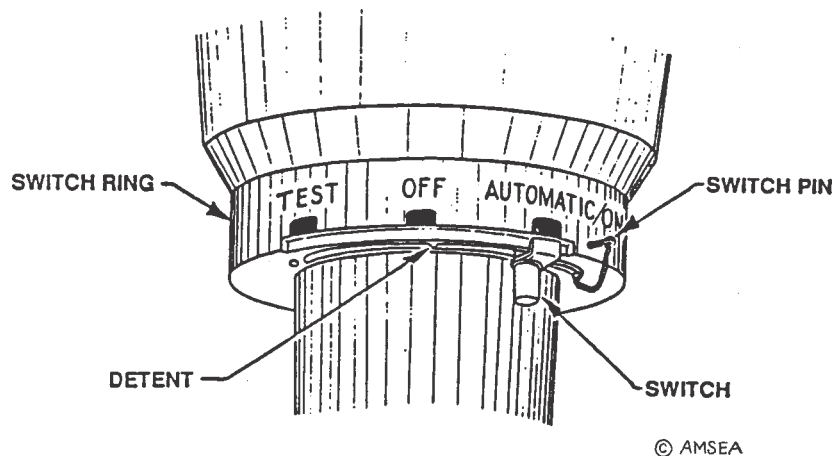
How EPIRBs Work



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Using EPIRBs

- **Mount fixed EPIRBs in float-free space, avoid overhangs**
- **Store portable EPIRBs in a readily accessible location**
- **Always leave Category 1, 406 MHz EPIRBs in armed position**
- **Include EPIRB in emergency drills**
- **Test once a month following manufacturer's instructions**
- **Always re-arm the EPIRB after testing**



- **Once turned on, leave on until rescued!**
- **Keep with you when leaving the boat**
- **Keep antenna vertical, out of the water**
- **Do not allow antenna to touch any solid object**

Mayday! Mayday! Mayday!

Be sure your radio is on and tuned to an emergency channel

Key the microphone when speaking

Include the five “Most Essential Information” items:

- 1. “Mayday, Mayday, Mayday!”**
- 2. Boat name and description**
- 3. Location**
- 4. Nature of the emergency**
- 5. Number of persons onboard**

Give the receiver of the message 30 to 60 seconds to respond before repeating the Mayday

Never give a false Mayday. It is illegal and penalties are severe.



Pyrotechnics (Flares)

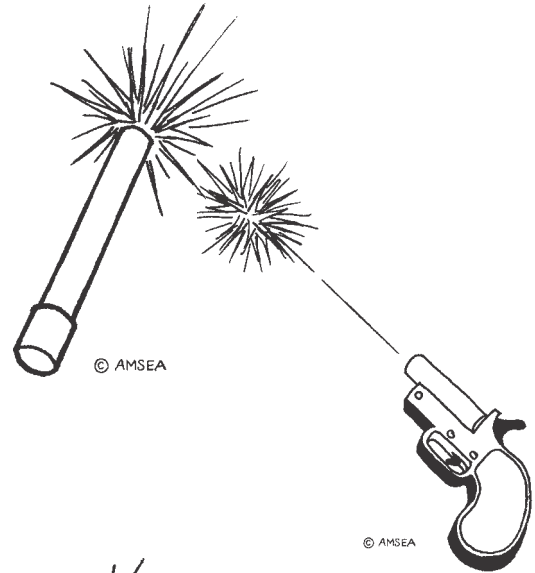
Children should not practice with flares

Hand-held flares

- Work best at night
- Burn time 40 seconds to 5 minutes

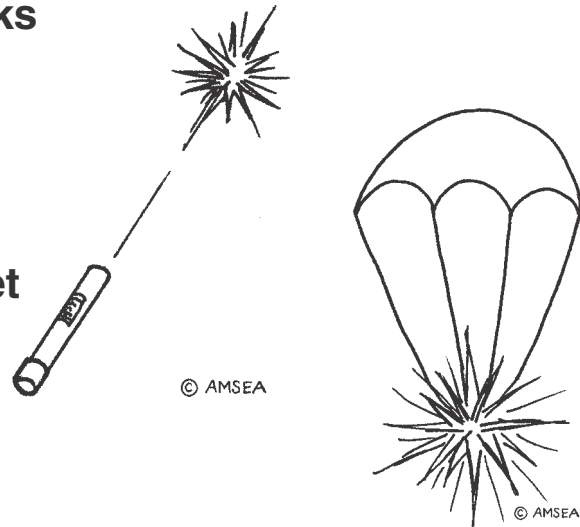
Flare guns

- Work best at night
- Burn time 5.5-30 seconds
- Generally launch 100-300 feet
- Can't use if plastic gun breaks



Meteor flares

- Work best at night
- Burn time 5 to 10 seconds
- Generally launch 100-300 feet

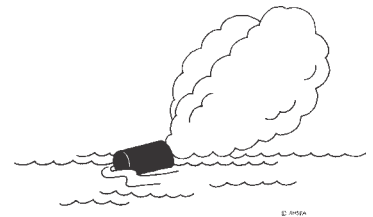


Parachute flares

- Work best at night
- Burn time 60 seconds
- Launch up to 1,000 feet high

Smoke canisters

- Work best during day with little wind
- Burn time 40 seconds to 4 minutes
- Floating type will not ignite fuel floating on water



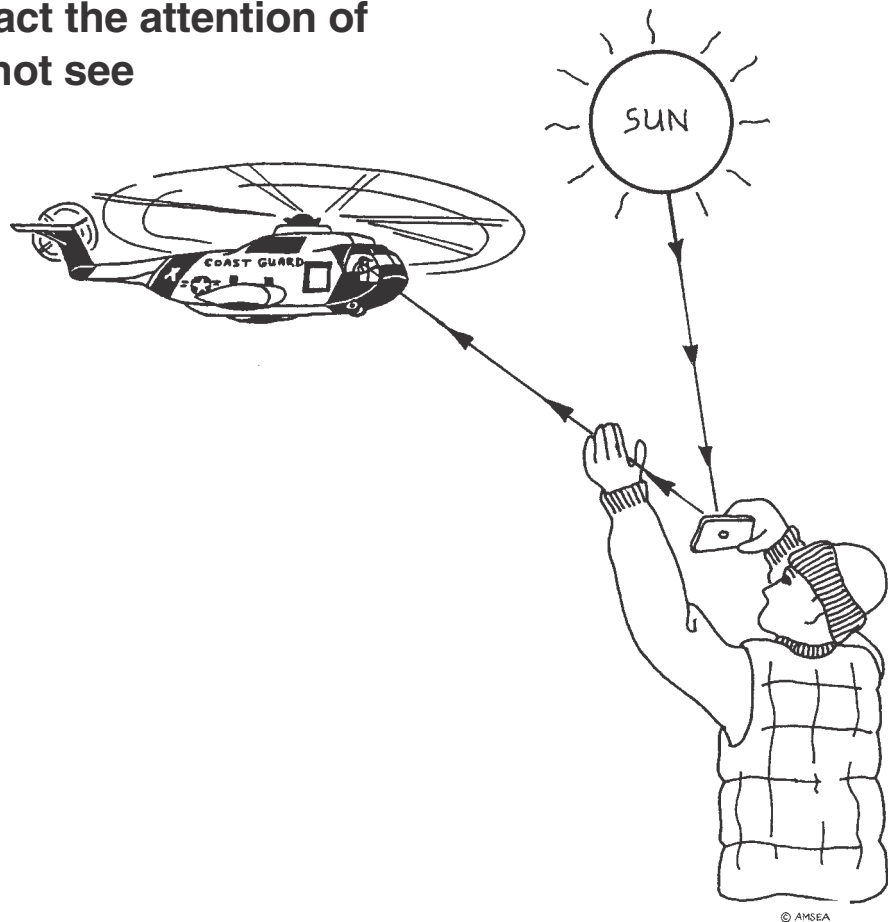
Dye

- Best used during daytime in calm water

Read directions to know how to properly use

Operating Signal Mirrors

- Position yourself with the mirror, sun, and potential rescuers in front of you
- Hold one hand up between you and rescuers to act as a sight
- Aim the mirror's reflected light onto the back of your hand
- Remove your hand and shine the light onto your target
- To better attract attention, wiggle mirror
- If the sun and rescuer are not both in front of you, lie on your back, catch the sun, and shine the light toward the rescuer
- Occasionally sweep the horizon with reflected light; you may attract the attention of someone you cannot see



Resources

General References

Small Boat Safety and Survival

- Alaska Boater's Handbook*. Anchorage, AK: Alaska Division of Parks and Outdoor Recreation, Office of Boating Safety, 2000. Excellent resource on Alaska recreational boating laws and safety. Prince William Sound supplemental handbook also available with local information. Other regional supplements to be developed. 47 pages.
- Beating the Odds on the North Pacific: A Guide to Fishing Safety*. Jensen, Susan, ed. Fairbanks, AK: University of Alaska Sea Grant, 1994. Award-winning book that covers preparation, weather, handling fishing gear, fatigue, personal flotation devices (PFDs), man overboard, sea survival, shore survival, first aid, fire fighting, rules of the road, basic navigation and stability, anchoring, grounding, float plans, radio use, orientation and drills. 244 pages.
- Chapman Piloting, Seamanship and Small Boat Handling*, 62nd edition. Maloney, Elbert. New York: Hearst Marine Books, 1994. Considered the most comprehensive resource on boating. 656 pages.
- Chart No. 1, USA, Nautical Chart Symbols Abbreviations and Terms*, 10th edition. Washington, DC: NOAA National Ocean Service and the Department of Defense, National Imagery and Mapping Agency, November 1997. Defines and illustrates the legend for charts. 99 pages.
- Cold Water Near-Drowning*. Fairbanks, AK: University of Alaska Sea Grant, 1990. A self-study workbook designed to accompany the *Cold Weather Safety and Survival* videotape series, *Cold Water Near-Drowning* video. Steps in treating the victim, including cardiopulmonary resuscitation (CPR), are described and illustrated. 19 pages.
- Designed for Life: Lifejackets through the Ages*. Brooks, C.J. Richmond, British Columbia: Mustang Engineered Technical Apparel Corp., 1995. History and photos of personal flotation devices. 203 pages.
- Federal Requirements and Safety Tips for Recreational Boats*. Washington, DC: U.S. Coast Guard, Government Printing Office, 1998. Discusses requirements for vessel registration, fire extinguishers, PFDs, signals, and navigation lights, and offers safety information. 47 pages.
- Frostbite and Other Cold Injuries*. Fairbanks, AK: University of Alaska Sea Grant, 1990. A self-study workbook designed to accompany the *Cold Weather Safety and Survival* videotape series, *Frostbite and Other Cold Injuries* video. Explains how to prevent, identify, and treat frostnip, frostbite, and immersion foot. 20 pages.
- A Guide to Small Boat Emergencies*. Waters, John M. Annapolis, MD: Naval Institute Press, 1993. Covers pleasure boats, search and rescue, preparation, disabled and adrift vessels, fire, grounding, flooding, collision, heavy weather, man overboard, medical problems, capsizing, reduced visibility, fatigue, rigging failure, navigation errors, drug interdiction boardings, emergency communications, abandoning ship, towing, helicopter rescue, and float plans. 333 pages.
- Hypothermia*. Fairbanks, AK: University of Alaska Sea Grant, 1992. A self-study workbook designed to accompany the *Cold Weather Safety and Survival* videotape series, *Hypothermia* video. Tells how to prevent, recognize, and treat hypothermia as well as how to wear flotation and thermal protection devices and the advantages and disadvantages of each. 20 pages.
- Instant Weather Forecasting*. Watts, Alan. Dobbs Ferry, NY: Sheridan House, Inc., 1996. A color photographic guide to weather forecasting from the clouds. 64 pages.
- Marine Safety Instructor Manual*, 8th edition. Sitka, AK: Alaska Marine Safety Education Association, 2001. In-depth curriculum covering preparation, cold water near-drowning, hypothermia, cold water survival, sea survival including drills and station bills, shore survival, and food and water in a survival situation. 450 pages.
- Marine Weather Hazards*. Canada: Minister of Supply and Services, Environment Canada, 1987. Covers weather hazards in detail along the British Columbia coast. 112 pages.
- Recreational Boating Safety: Safety Study*. Notation 6035. Washington, DC: National Transportation Safety Board, April 1993. 54 pages.
- Sea Kayaking: A Manual for Long Distance Touring*. Dowd, John. Vancouver: University of Washington Press, 1997. Thorough guide emphasizing expedition and blue water trips. Covers currents, tides, winds, anchors, beaching, rescue, kayak types, and more. 304 pages.

- Shore Survival*. Fairbanks, AK: University of Alaska Sea Grant, 1986. A self-study workbook designed to accompany the *Fisheries Safety and Survival* videotape series, *Shore Survival* video. Covers basic survival principles, including making decisions, building a shelter, making signals, what to eat and drink, and how to keep your spirits up. 39 pages.
- Sinking of the Passenger Vessel Cougar off the Coast of Oregon, September 15, 1988*. Washington DC: National Transportation Safety Board Marine Accident Report, PB90-916402, NTSB/MAR-90/02, NTSB, March 1990. 68 pages.
- Spawn, Spat, and Sprains: A Manual for Aquaculture Safety in Alaska*. Fairbanks, AK: University of Alaska Sea Grant, 1998. Covers ergonomics, work place hazards, small boat safety, injuries from fish, electrical hazards on the water, cold injuries, cold water survival, fire, bears, shore survival, and airplane safety. 84 pages.
- Survival Guide for the Mariner*. Meurn, Robert J. Centreville, MD: Cornell Maritime Press, 1997. Guide covering preparation, station bills, emergency equipment, man overboard, abandon ship, first aid, navigation, hypothermia, survival in a liferaft, survival on land, search and rescue, and helicopter rescues. 225 pages.
- Using Small Boats in Alaska Is a Way of Life—Don't Make It a Way to Disaster*. Sitka, AK: Alaska Marine Safety Education Association, 1990. Brochure that covers preparation, float plans, stability, equipment, and cold water near-drowning.
- Vessel Safety Manual*. Seattle, WA: North Pacific Fishing Vessel Owners' Association (NPFVOA), 1986. Safety awareness and education program geared toward commercial fishers in a loose-leaf notebook. 289 pages.
- Water Wise: Safety for the Recreational Boater*. Dzugan, Jerry and Susan Jensen. Fairbanks, AK: University of Alaska Sea Grant, 1999. Award-winning safety book for coastal and ocean recreational mariners nationwide. Covers preparation, alcohol, fatigue, seasickness, cold water survival, PFDs, signals, man overboard, survival craft, abandon ship, fire fighting, and safe seamanship. 196 pages.
- Survival Stories**
- High School and Adult Level**
- Adrift*. Callahan, Steven. New York: Ballantine, 1987. Steven Callahan's true story of 76 days surviving in the Atlantic in a liferaft. 344 pages.
- Almost Too Late*. Wortman, Elmo. New York: Random House, 1981. A true story of a family shipwrecked off southeastern Alaska for three weeks. Much of it serves as a study of what not to do, but provides good discussion for ways to improve a survival situation. 211 pages.
- Endurance*. Lansing, Alfred. New York: Carol and Graf, 1986. Amazing true survival story of Shackleton's Antarctic voyage that turned into a survival expedition and self-rescue against incredible odds. A good study on never giving up, and handling people in a survival situation. 282 pages.
- Fastnet Force 10*. Rousmaniere, John. New York: W.W. Norton and Co., 1980. Story of a storm off the coast of Great Britain during a yacht race. 287 pages.
- Five Against the Sea*. Arias, Ron. New York: Penguin Books USA, 1990. Story of five Costa Rican coastal fishermen who spent 142 days in the Pacific after a storm crippled their small boat. 302 pages.
- "Night of the Blue Bird." Sykora, Allen. In: *Reader's Digest*, January 1990. Story of a Sitka, Alaska man and his son who are rescued by the U.S. Coast Guard during a storm.
- Lost at Sea: An American Tragedy*. Dillon, Patrick. New York: The Dial Press, Bantam Doubleday Publishing Group, Inc., 1998. Account of one of the worst commercial fishing disasters recorded in the U.S. when the *Americus* and the *Altair* disappeared, leaving no survivors in a storm in the North Pacific off Dutch Harbor, Alaska. 264 pages.
- Nights of Ice*. Walker, Spike. New York: St. Martin's Press, 1987. Riveting account of king crab fishing in Alaska in the 1980s. 206 pages.
- On Their Own: Shipwrecks and Survivals*. Horder, Mervyn. London: Gerald Duckworth and Co., Ltd., 1988. Collection of shipwreck narratives drawn from all ages and climes emphasizing ingenuity and improvisation. 140 pages.
- Our Last Chance*. Butler, Bill, and Simonne Butler. Miami, FL: Exmart Press, 1991. Story of a couple surviving sixty-six days in a liferaft in the Pacific in which they become very religious. 313 pages.
- The Perfect Storm*. Junger, Sebastian. New York: W.W. Norton Co., 1997. The story of the "storm of the century" in the North Atlantic and several fishing boats caught out in it. 227 pages.
- The Raft*. Trumbull, Robert. Annapolis, MD: Naval Institute Press, 1992. True account of the survivors of a plane crash into the Pacific during World War II. 205 pages.

The Spirit of Rose-Noelle. Glennie, John, and Jane Phare. New York: Fawcett Crest, 1990. Story of a sailboat crew off the coast of New Zealand who survived 119 days in the half-flooded cabin of their overturned trimaran. 240 pages.

Staying Alive: 117 Days Adrift. Bailey, Maurice D. New York: McKay Co., 1974. A true story of a couple surviving at sea for 117 days. 192 pages.

Survive the Savage Sea. Robertson, Dougal. Dobbs Ferry, NY: Sheridan House, 1973. Story of a family whose sailboat is attacked and sunk by killer whales in the Pacific, and their journey in their dinghy. 216 pages.

Juvenile Level

Adrift! Politino, C. and J. Neudecker. Sidney, British Columbia: Porthole Press Ltd., 1986. A young person's book about a lost-in-a-dinghy experience. Activities included in the text are appropriate for all elementary grades. Excellent to read to young children. 61 pages.

Video Resources

All videos are available for loan to teachers from the Alaska Marine Safety Education Association library, (907) 747-3287.

General Marine Safety

Adventures in Boating. Washington State Parks and KCTS Channel 9, 1992. General boating safety aimed at youth, featuring Bill Nye the Science Guy. 30 minutes.

Alcohol and Boating? It's Your Choice. Alaska Marine Safety Education Association, 1994. Discusses risks of alcohol and boating. Aimed at pre-teens/teens. Comes with companion discussion and activity guide. 20 minutes.

Boating and Boozing. 20/20 News, 1988. A program on alcohol and boating safety. 15 minutes.

Cold Water Near-Drowning. University of Alaska Marine Advisory Program, 1983. Part of the *Cold Weather Safety and Survival* series. How to properly treat a cold water near-drowning victim; including demonstration of CPR on an adult. Companion self-study workbook is available (see general reference section). 20 minutes.

Cold, Wet and Alive. American Canoe Association, 1989. Follow a group of friends on a canoe trip down a river, watching the progression from cold reaction to severe hypothermia. Note: what is defined as severe hypothermia in Alaska is called moderate hypothermia in the video and treated accordingly. Good for discussion of recognition of emergency. 20 minutes.

Frostbite and Other Cold Injuries. University of Alaska Marine Advisory Program, 1988. Four types of cold injuries and their treatments are covered in this video. How to prevent cold injuries and how to avoid situations that could cause them are also explained. 16 minutes.

Hypothermia. University of Alaska Marine Advisory Program, 1986. Part of the *Cold Weather Safety and Survival* videotape series. Demonstrates the danger of hypothermia on a fishing boat, how to recognize hypothermia, what to do about it, and how to prevent it. Companion self-study workbook is available (see general reference section). 15 minutes.

It Could Have Been Prevented. University of Alaska Marine Advisory Program and Alaska Marine Safety Education Association, 1990. An award-winning video produced for people who spend time on rivers or coastal waters in Alaska. Covers planning, weather, float plans, and effects of alcohol. Filmed in Kotzebue, Alaska using local residents. 17 minutes.

Rescue: 76 Days in the North Atlantic. Film and LYD Denmark, 1982. Interview with Steve Callahan about liferaft survival. 27 minutes.

Sea Survival. University of Alaska Marine Advisory Program, 1983. Shows the seven steps to survival; how to use a liferaft; how to conserve body heat, energy, and water on a liferaft; and how to safely board a rescue helicopter. 21 minutes.

Shore Survival. University of Alaska Marine Advisory Program, 1983. The seven steps to survival are demonstrated in this video, as well as vital survival skills such as how to build an emergency shelter from materials at hand, how to create signals, and how to use resourcefulness and ingenuity to stay alive. 22 minutes.

Taken by Surprise: Thin Ice Safety. Alaska State Troopers, 1979. Covers basic ice safety; includes three true stories to emphasize safety points. 29 minutes.

Water: The Deceptive Power. American Red Cross, 1997. Covers warm water swimming safety, alcohol, water hazards, waves, and PFDs. Closed captioned. 30 minutes.

Fishing Vessel Safety

Air-Sea Rescue Procedures. University of Rhode Island and U.S. Coast Guard, 1988. Covers hoists, equipment deliveries, and raft and water rescues. 12 minutes.

Alaska Fishing and Storms at Sea. 20/20 News, 1986. Both segments discuss the risks of commercial fishing and how it draws college students from the Lower 48 to Alaska. 17 minutes and 12 minutes.

- Casualties at Sea: Cape Beaver/ Margaret Jane Collision, The Wave, Linda's Draw, Alaska Monarch Grounding, All Alaska Fire, Rudder Fire, Prime Time Fire.* Alaska Marine Safety Education Association. Compilation of raw footage of boating casualties. 32 minutes.
- Emergency Position Indicating Radio Beacons.* Sabella and Associates, 1989. Discusses types of EPIRBs, how they work, installation, maintenance, testing, and use. 15 minutes.
- Emergency Radio Procedures.* Sabella and Associates, 1990. Covers the search and rescue system, VHF and single sideband radios, designated distress frequencies, distress and safety calls, making a Mayday, if you hear a Mayday, and Coast Guard response. 19 minutes.
- Fishing Vessel Stability.* National Maritime Institute, 1987. Discusses stability factors using diagrams to demonstrate center of gravity, center of buoyancy, and stable equilibrium. 26 minutes.
- How to Use the 406 MHz EPIRB.* North Pacific Fishing Vessel Owners' Association, 1992. Covers how to arm, test, mount, and service first generation 406 MHz EPIRBs manufactured by ACR, Alden, Grasby, JRC, Kannad, Litton, and Lo-Kata. 44 minutes.
- Immersion Suits.* Sabella and Associates, 1989. Covers testing and donning your suit, leaving the vessel, using suits in the water, inspection, and stowage. 13 minutes.
- Inflatable Life Rafts.* Sabella and Associates, 1989. Covers the decision to abandon ship, plus liferaft installation, launching, boarding, and equipment. 16 minutes.
- Lifesling.* Lifesling Foundation. Demonstrates use of Lifesling man overboard recovery device on commercial and recreational vessels. 8 minutes.
- Marine Survival Equipment and Maintenance.* University of Alaska Marine Advisory Program, 1987. Covers fire extinguishers, EPIRBs, immersion suits, and liferafts. 11 minutes.
- Personal Flotation Devices.* Sabella and Associates, 1989. Covers clothing, flotation, types of PFDs, fit, how they work, and using PFDs in the water. 17 minutes.
- Race for Fish.* Alaska Longline Fishermen's Association, 1992. Video of still pictures plus a discussion of safety in commercial fisheries that have short openings. 28 minutes.
- Safety and Survival at Sea.* North Pacific Fishing Vessel Owners' Association, 1987. A four-part series covering Stability (22 minutes), Safety Equipment and Survival Procedures (46 minutes), Fire (26 minutes), and Medical Emergencies (42 minutes). Total time is 136 minutes.
- Strategy for Survival.* Seattle Fisherman's Memorial, 1992. Interviews with fishermen and families, and actual footage of commercial fishing boating casualties. 12 minutes.
- USCG P-1 Dewatering Pump.* Alaska Marine Safety Education Association and U.S. Coast Guard, 1994. Covers communication, vessel preparation, delivery, and use of pumps. 12 minutes.
- Visual Distress Signals.* Sabella and Associates, 1989. Covers how signals attract attention, radio signals, pyrotechnics, and lights. 14 minutes.
- When Seconds Count: Care and Use of Immersion Suits.* Alaska Marine Safety Education Association, 1998. Filmed in Alaska; covers storage, maintenance, features, donning instructions, and use of immersion suits. 16 minutes.

Contact Information for Resources

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