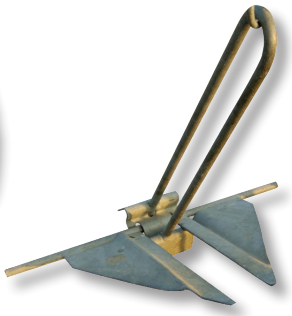
MERIT BADGE SERIES



MOTORBOATING

Scouting America

STEM-Based

SCOUTING AMERICA
MERIT BADGE SERIES

MOTORBOATING

"Enhancing our youths' competitive edge through merit badges"

Scouting America

Requirements

Always check www.scouting.org for the latest requirements.

1. Do the following:
   a. Discuss with your counselor the following hazards you might encounter while motorboating: flammable fuel; carbon monoxide; propellers; collisions; falls overboard; capsize; running aground. Explain what you should do to anticipate, prevent, mitigate and respond to these hazards.
   b. Explain first aid for injuries or illnesses that could occur while motorboating, including hypothermia, heat reactions, dehydration, motion sickness, bug bites, and blisters.
   c. Identify the conditions that must exist before performing CPR on a person, and explain how such conditions are recognized. Demonstrate proper technique for performing CPR using a training device approved by your counselor.

2. Do the following:
   a. Before doing requirement 5, successfully complete the Scouting America swimmer test.
   b. Name the different types of personal flotation devices (PFDs), and explain when each type should be used. Show how to choose and properly fit a PFD.

3. Do the following:
   a. Explain inboard, outboard, and inboard/outboard motors, and the uses and advantages of each.
   b. Explain the safety procedures and precautions involving handling fuel and engine servicing, and equipment storage and placement.
   c. Explain how to winterize a boat motor and tell why this procedure is necessary.
   d. Explain the safety procedures and precautions involving swimmers and skiers in the water, passenger positions underway, and boat wakes.

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4. Show you know safety guidelines for motorboating by doing the following:
   a. Review how each item of the Safety Afloat policy applies, including checking the weather prior to and during time on the water, confirming all required equipment is present and functional, and following a float plan.
   b. Explain the rules or laws that apply to recreational boating in your area or state. Have a permit to operate a motorboat, if required by the laws of your state. Discuss how you would find information regarding the boating laws in different states.
   c. Discuss how hazards of weather and heavy water conditions can affect safety and performance in motorboating.
   d. Discuss with your counselor the nautical rules of the road and describe the national and your state's aids to navigation.
   e. Explain and show the correct use of equipment required by both state and federal regulations to be carried aboard a motorboat.
   f. Explain federal and state rules for a ventilation system, and tell why these rules are required.
   g. Explain the use of lights (sight signals) and sound signals on motorboats.
   h. Discuss the common types of anchors used in motorboating and under what conditions each would be preferred. Explain proper anchoring techniques.

5. With your counselor or other adults on board, demonstrate proper boat-handling procedures and skills by doing the following:
   a. Board and assist others in boarding. Confirm that all passengers on board are wearing properly fitted life jackets.
   b. Fuel the boat and complete a safety check.
   c. If equipped, attach a kill switch and safely start the motor. Get underway from dockside or from a beach launch.
   d. Run a course for at least a mile, showing procedures for overtaking and passing slower craft, yielding right-of-way, passing oncoming traffic, making turns, reversing direction, and using navigation aids.
   e. Stop and secure the boat in position on the open water using anchors. Raise and stow the anchor and get underway.
   f. Land or dock the boat, disembark, and assist others in doing the same.
   g. Moor, dock, or beach the boat and secure all gear.

Note to Counselors

Merit badge counselors are responsible for following the requirements, procedures, and techniques presented in this pamphlet and ensuring that each Scout earning the merit badge is able to demonstrate knowledge and skills at a level consistent with the requirements. In addition, counselors must ensure that all applicable Scouting America safety policies, including Safe Swim Defense and Safety Afloat, are followed during training, practice, and review.

Counselors for Motorboating merit badge must be registered members of Scouting America, have current training in Safety Afloat, and be approved by the local council Advancement Committee. Councils with an Aquatics Committee should use that committee to coordinate with the Advancement Committee for approval of qualified counselors.

All counselors should have formal training in the knowledge and skills indicated by the requirements, experience in teaching such skills to youth and experience in identifying and managing risks associated with the activities involved. For the Motorboating merit badge, appropriate credentials include: current or previous certification by an organization (such as the National Safe Boating Council, the U.S. Power Squadrons, the U.S. Coast Guard Auxiliary or the U.S. Powerboating component of U.S. Sailing) that meets the voluntary National On-Water Standards for Powerboating or the NASBLA National Boating Education Standards for Powerboating. The council Advancement Committee may approve counselors with similar experience and training in knowledge, skill, safety, and instruction.

Motorboating is an introductory, experiential merit badge. While it is aligned with the National On-Water Standards, it is not intended to be a certification. Scouts who desire additional training or certification should explore the offerings of the organizations listed in the preceding paragraph and in the pamphlet.

The decision for selection of equipment for Motorboating merit badge lies with the counselor. While there are some requirements that are intended to be met using a gas-powered motor, it is possible to use an electric motor for the on-water requirements if it has sufficient power to maintain adequate headway against current and wind. Motorboating merit badge may not be earned utilizing personal watercraft (PWCs).

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Boating Safely

Learning to be a safe boater is a lot like learning to be a safe driver. First, you will need to learn the nautical "rules of the road" and obey them. You also will need to familiarize yourself with federal, state, and local laws that affect recreational boating. These laws regulate such things as the minimum age for operator licensing; numbering of boats and operators; required safety equipment, lights, and sound signals; speed limits; maximum horsepower of the motor; hours of operation; and areas where powerboats may be prohibited.

Scouting also has rules, standards, and precautions for boating activities. In some respects, Scouting America standards require measures and procedures that are stricter than federal, state, and local laws.

In cases where a Scouting America boating standard differs from the government regulation, apply the one that will ensure the highest level of safety.

When faced with a "traffic jam" or bottleneck on a waterway, you will need to exercise the same patience, courtesy, and common sense you would use in a similar situation on a highway or city street.

Recreational motorboating is very popular, but make sure you understand and follow all the safety rules.

Find out which rules and regulations apply before you launch a boat. For federal laws, get the most current information from the nearest U.S. Coast Guard office. For state laws, check with the state agencies having jurisdiction over boating activities in your state. For local regulations and general safety guidance, consult boat and motor dealers or marine operators and Scouting America publications such as the *Guide to Safe Scouting* and this *Motorboating* merit badge pamphlet. The U.S. Coast Guard boating safety website (www.uscgboating.org) also has links to boating safety laws and resources. Check with your merit badge counselor if you need help.

Personal watercraft are powered craft up to 10 feet long. They are designed to be operated by sitting, standing, or kneeling *on* the craft—sort of the aquatic version of a motorbike. The *Guide to Safe Scouting* specifically forbids the use of motorized personal watercraft in Scouting aquatics and in or near Scouting America program areas. It naturally follows that these craft cannot be used to complete Motorboating merit badge requirements—or for any other purpose on Scout outings or programs.

All powered craft must be currently registered and display identifying information.

The *Guide to Safe Scouting* requires that all participants in Scouting aquatics activities:

- Know and practice the Safety Afloat guidelines.
- Are able to render first aid for the types of injuries and illnesses that could happen while motorboating.
- Are familiar with appropriate life jackets and how to fit them.
- Understand fire prevention measures and know how to operate onboard fire extinguishers.
- Are familiar with the waterways they will be using.
- Respect and practice the nautical rules of the road.

Prevention goes hand in hand with mitigation, which means "to lessen in force or intensity" and "to make less severe." By taking precautions to manage risk and first aid, you can be prepared to anticipate, help prevent, mitigate, and respond to just about any motorboating hazard.

Safety Afloat

The Safety Afloat guidelines were developed to promote boating safety and to set standards for safe Scouting activity afloat. Be sure to keep these guidelines in mind during all boating activities.

1. Qualified Supervision

All activity afloat must be supervised by a mature and conscientious adult age 21 or older who

- Understands and accepts responsibility for the well-being and safety of the people in his or her care
- Is experienced in the water and the particular watercraft to be used
- Is confident in his or her ability to respond in the event of an emergency
- Is trained in and committed to complying with Safety Afloat standards

Every Scout boater should study and understand the points of the Safety Afloat plan. The complete text can be found in the *Guide to Safe Scouting.*

There should be one qualified adult supervisor for each 10 people, with a minimum of two adults for any group. At least one supervisor must be age 21 or older, and the remaining supervisors must be age 18 or older. At least one of these adults must be certified in cardiopulmonary resuscitation (CPR).

2. Personal Health Review

All participants must show evidence of fitness by presenting a complete health history from a physician, parent, or legal guardian. Adult supervisors will adjust the activity to anticipate any potential risks associated with individual health conditions such as diabetes, severe allergies, epilepsy, asthma, or heart conditions. If a participant has any significant health conditions, the adult leader should require proof of an examination by a physician.

Scouting's Swimmer Test

To qualify as a "swimmer," you must pass the following swimmer test. Jump feetfirst into water over your head in depth. Level off and swim 75 yards in a strong manner using one or more of the following strokes: sidestroke, breaststroke, trudgen, or crawl. Then swim 25 yards using an easy resting backstroke. The 100 yards must be completed without any stops and must include at least one sharp turn. After completing the swim, rest by floating. You will need to renew this qualification test each year.

Every skill and maneuver discussed in this pamphlet must be done while wearing a life jacket.

3. Swimming Ability

Operation of any boat on a float trip is limited to youth and adults who have completed the Scouting swimmer classification test. For activity afloat, those not classified as a swimmer are limited to multiperson craft during outings or float trips on calm water with little likelihood of capsizing or falling overboard. They may operate a fixed-seat rowboat or pedal boat accompanied by a buddy who is a swimmer. They may ride in a canoe or other paddle craft with an adult swimmer skilled in that craft as a buddy. They may ride as part of a group on a motorboat or sailboat operated by a skilled adult.

4. Life Jackets

Properly fitted U.S. Coast Guard–approved life jackets must be worn by all persons engaged in boating activity (rowing, canoeing, sailing, boardsailing, motorboating, waterskiing, rafting, tubing, and kayaking). Type III life jackets are recommended for general recreational use.

Whenever you go boating, make sure you have a buddy with you. If your boat goes afloat, the same rule applies—go with a buddy boat.

5. Buddy System

All activity afloat must follow the principles of the buddy system. Every individual must have a buddy, and every craft should have a buddy boat when on the water. The buddy system assures that for every person involved in an aquatics activity, at least one other person is always aware of his or her situation and prepared to lend assistance immediately when needed.

6. Skill Proficiency

All participants in activity afloat must be trained and experienced in watercraft handling skills, safety, and emergency procedures. Anyone operating a powerboat must be able to meet requirements for the Motorboating merit badge or equivalent.

7. Planning

Float Plan. Know exactly where the group will put in and pull out, and what course it will follow. Determine all stopover points in advance, and review the plan beforehand with others who have made the trip recently. Be sure to use accurate and current maps of the waterways to be traveled, and estimate travel time generously to allow for unexpected weather conditions and to avoid traveling under time pressures. It is strongly recommended that a currently trained BSA Lifeguard assist groups in the planning and conducting of all activity afloat.

Local Rules. Determine which state and local laws or regulations apply for your trip. Get written permission from the owners or managers to use or cross private property.

Preferably, an adult member of the group should run the course before the trip takes place.

Notification. Give a copy of your float plan to a few responsible adults who will be staying behind, such as the participants' parent, guardian, or a troop committee member. Appropriate authorities such as the Coast Guard, state police, or park personnel also should be notified of the activity when their jurisdiction is involved. Upon your return, check in with everyone who has a copy of the float plan.

Weather. Be familiar with the seasonal weather pattern for the area. Check the weather forecast just before setting out, and keep an alert eye on the weather. Bring all craft ashore if rough weather threatens.

Contingencies. Anticipate possible emergencies or other circumstances that could force a change in the original plan, and decide on alternate plans—just in case.

Carry an approved fire extinguisher, and know how to use and maintain it.

8. Equipment

All equipment must be suited to the craft, to the water conditions, and to the individual; must be in good repair; and must satisfy all state and U.S. Coast Guard requirements. To the extent possible, carry spare equipment and appropriate repair materials. Be sure that rescue equipment is available for immediate use.

In some cases, Sea Scout standards may be substituted for the Safety Afloat guidelines. The Sea Scout standards may be used when Venturers or Sea Scouts operate cruising vessels (including powerboats longer than 20 feet) or participate in any high-adventure program or other activity under the direct control of the National Council. These activities all require adult supervision.

9. Discipline

All participants should know, understand, and respect the rules and procedures for safe activity afloat. The group should review the applicable rules just before setting off. Safety rules—plus common sense and good judgment—keep the fun from being spoiled by accidents or injury.

First Aid

Following the Safety Afloat guidelines will eliminate many serious risks in outings afloat. However, some minor injuries still might occur. Take appropriate precautions to be prepared.

Dehydration

Water is essential for nearly every bodily function, including digestion, respiration, brain activity, producing heat, and staying cool. When more water is lost than the body is taking in, a person risks becoming dehydrated. The first sign of dehydration usually is dark urine. Other signs can include weariness, headache, body aches, and confusion. Heat exhaustion, heatstroke, and hypothermia may all be caused in part by dehydration.

Prevent dehydration by drinking plenty of fluids and eating enough throughout the day to keep your body well-balanced. This is easy to do on hot summer days when you are thirsty; it is just as important in cold weather when you may not feel thirsty. Drink enough so that your urine stays clear. If you become weary or develop a headache or body aches, or if you become confused, rest in the shade and sip water until the symptoms go away.

Cold Water–Related Illnesses

There are two primary dangers from falling into cold water. In the first few minutes, a person can experience cold-water shock, even in water as warm as 69 to 77 degrees. The second danger is hypothermia, which is a gradual lowering of the body's core temperature caused by spending minutes to hours in water cooler than 80 degrees.

Cold-water shock occurs when a boater falls into very cold water, especially below 60 degrees. The colder the water, the more severe the effects. The body's responses to cold water are completely out of the person's control. The first response will

be the reflex to take a deep, gasping breath, which is dangerous if the person is underwater. Wearing a life jacket could save the boater's life in this case. Next the boater will start taking many quick, short breaths, as many as three to four times the normal rate, as if panting for air. This can make the person light-headed and dizzy, and unable to hold his or her breath. In fact, cold-water shock reduces the time you can hold your breath to 25 percent to 50 percent of normal. The person will also likely lose any sense of up and down, and his or her heart rate and blood pressure will go up. All of these effects can occur in about 60 seconds. During cold-water immersion, it is important that you concentrate on self-rescue initially. If that is not possible, minimize your exposure to the water by using the HELP position (see sidebar) and wait for help.

If alone in cold water and more than a short distance from safety, you can reduce heat loss by avoiding movement, using clothing and the life jacket for insulation, keeping your head above water, and maintaining a tuck position. This is called the heat escape lessening posture (HELP).

The only treatment for cold-water shock is to get the boater out of the water. He or she will likely need to be treated for hypothermia. Take care when boating in cold waters. The best prevention for cold-water shock and related injuries is to dress appropriately for the weather and stay dry.

Hypothermia occurs when the body's core temperature falls below the normal range. Exposure to cold, or even cool, water can lower your core temperature dangerously. Early signs of heat loss include bluish lips and shivering. Further cooling will upset the ability to think clearly and to do simple tasks. Further chilling will lead to unconsciousness and, eventually, death. Treatment for hypothermia involves carefully removing the person from the water, removing wet clothing, and drying him or her. Warm the person by putting warm, dry clothes on him or her and wrapping in blankets. Be sure to cover the head, as most heat loss occurs from the head. Warm the person's trunk first, not the hands and feet as this can cause shock. If using hot-water bottles or chemical hot packs, wrap them in cloth; don't apply them directly to the skin. Place the heating sources on the chest, neck, and groin. Avoid rough handling or jerking of the person, especially if the person is lethargic or unconscious. This may cause the heart to develop life-threatening irregular rhythms. If conscious, give the person a warm drink. Avoid caffeine or alcohol. Once the body temperature begins to rise, keep the person dry and wrapped in a warm blanket with the head and neck covered. Avoid rapid rewarming, as it can induce fatal heart rhythms.

Heat-Related Illnesses

Heat and dehydration can lead to **heat exhaustion,** which happens when a person's body cannot cool itself sufficiently. Early symptoms of heat exhaustion include heavy sweating, reddening of the skin, headache, faintness, fatigue, and difficulty concentrating. Advanced symptoms can include pale, clammy skin; nausea; muscle cramps; dizziness and fainting; and possibly loss of consciousness.

If a member of your group is suffering from heat exhaustion, get the person in the shade and lying down with the feet raised. Encourage drinking small amounts of fluids; cool water is best. Fan the person and apply cool, wet cloths to the skin. Activities can resume when the person feels better, although it can take a day or more for full recovery. If the condition worsens, get medical help.

Victims of heat exhaustion should be cooled down as quickly as possible. Heat exhaustion can lead to heatstroke, which is very serious.

When a person's core temperature rises to life-threatening levels (above 105 degrees), a condition called **heatstroke** occurs. Sweating, which is the body's natural cooling mechanism, may stop entirely as the body dehydrates (dries out) and begins to shut down. The body temperature soon rises to dangerous levels, the pulse is extremely rapid, and the person will be disoriented or lose consciousness. Symptoms may include hot, sweaty, red skin; confusion; disorientation; and a rapid pulse.

Get medical help immediately. If not treated promptly, the victim could die. To treat a heatstroke victim while waiting for a doctor, work quickly to lower body temperature. The victim must be cooled immediately. Move to a shady location and loosen tight clothing. If you have ice packs, wrap them in a thin barrier (such as a thin towel) and place them under the armpits and against the neck and groin. Sponge the person with cool water; apply cool, wet towels to the skin; and fan the person. If the person is able to drink, offer small amounts of cool water. Monitor the victim closely to guard against a relapse.

Apply a waterproof sunscreen liberally and often when you are outdoors.

Sunburn is a fairly common and potentially serious result of overexposure to the sun. Long-term exposure can result in an increased risk of skin cancer. It is best to prevent sunburn by covering up, wearing a hat and sunglasses, and using a waterproof sunscreen with an SPF (sun protection factor) of at least 15. When it is practical, wear a broad-brimmed hat, pants, and a long-sleeved shirt for protection. Avoid unnecessary direct exposure to the sun, and limit strenuous physical activity and exposure time. Treat sunburn by getting the person into the shade and applying cool, wet cloths to the skin.

Motion Sickness

Motion sickness, known as seasickness when it occurs on a boat, can happen to anyone, although some people are more prone to it than others. The rougher the water conditions, the more likely it is to occur. Motion sickness causes victims to feel sick to their stomachs and can lead to vomiting. It helps if a seasick victim remains in fresh air and stares at the horizon. The worst place to be is below the deck in an enclosed cabin.

Motion sickness can make a person feel miserable, but it normally is not life-threatening. Comfort the victim as much as possible until you can get to shore or smoother waters. The nausea goes away quickly after the motion stops.

Frightened or anxious victims might breathe too heavily, too quickly, or too deeply, which can result in hyperventilation, an abnormal loss of carbon dioxide from the bloodstream. Victims might feel dizzy, disoriented, and as if they are being suffocated. Treat someone who is hyperventilating by speaking calmly and encouraging slow breathing. Make sure the person rests in a comfortable position and has plenty of open, fresh air. Keep bystanders well away.

In rare cases, insect stings or bites can cause anaphylactic shock, a condition that restricts breathing and requires immediate treatment. People who know they might suffer from anaphylactic shock often carry an EpiPen® for injecting a measured dose of epinephrine in case they are stung.

EpiPen®

Other First-Aid Concerns

Insect stings and bites are not common in motorboating. However, knowing your aquatic environment and the launching and loading areas, and avoiding possible contact is the best strategy for avoiding stings and bites. For typical insect stings and bites, carefully scrape away the stinger with the edge of a knife blade. Trying to squeeze it out will force more venom into the skin from the sac attached to the stinger. Apply an ice pack to help reduce pain and swelling. For severe and prolonged pain, or for any severe reaction, dizziness, or respiratory distress, get medical help.

Tick bites are a common problem in the outdoors. If a tick has attached itself, grasp it with tweezers close to the skin and gently tug until it comes loose. Do not squeeze, twist, or jerk the tick, as that might leave its mouthparts in the skin. Wash the wound with soap and water, and apply antibiotic ointment. After disposing of the tick, thoroughly wash your hands. If a tick has been embedded for longer than a day or if it is difficult to remove from the skin, see a physician.

Blisters form when the skin is irritated, usually by friction or heat, and can be a nuisance on a motorboater's hands. They may also form when you are out wakeboarding or waterskiing. A hot spot signals the beginning of a blister. If you develop a hot spot, immediately stop what you are doing and protect the tender area by covering it with a piece of moleskin or molefoam. If a blister forms, build up several layers of moleskin or molefoam. It might be worthwhile to try a commercial product like Second Skin® or Blist-O-Ban® in place of moleskin.

Type I

Personal Flotation Devices (PFDs)

Properly fitted U.S. Coast Guard–approved life jackets must be worn by all participants while on open water (rowing, canoeing, sailing, boardsailing, motorboating, water-skiing, wakeboarding, rafting, tubing, kayaking). **Only U.S. Coast Guard–approved equipment is acceptable for use in Scouting aquatics.** Ski belts are not acceptable. Scouts and adult leaders should learn which type of life jacket is appropriate for each specific circumstance and how to wear them and check for proper fit.

Type II

Type I, Offshore Life Jacket. Type I devices are designed to turn most unconscious victims faceup. The device gives a lot of flotation in the chest, shoulders, and upper back areas. The Type I life jacket is not designed for recreational boating but for passengers on cruising vessels, such as ferries on large bodies of water.

Type II, Near-Shore Buoyant Vest. These life jackets are designed to turn an unconscious person in the water faceup in calm, inland waters. Shaped like a horse collar, the Type II life jacket design places all the flotation in the front and around the neck. While it is not as bulky as the Type I, the Type II can be uncomfortable for longer boating trips. Type II life jackets are adequate for short periods of recreational boating and instruction, and are recommended for closer, inshore cruising on boats of all sizes.

Type III

Type III, Flotation Aid. These devices have the same buoyancy as Type II life jackets and are designed to keep a conscious person in a vertical or slightly backward position; they may not prevent an unconscious person from floating facedown. The Type III device has less turning ability than the Type II. The Type III may be used while riding in a boat of any size.

Type IV, Throwable Device. Type IV devices are ring buoys and seat cushions with straps. They are designed to be tossed to a nearby person in the water and should never be used in place of a wearable life jacket.

Type IV

Before you put on a life jacket, check that there is a U.S. Coast Guard approval number on it.

Sizing and Maintaining a Life Jacket

To be effective, a life jacket must be fitted and worn properly. Make sure that all side straps are adjusted to fit snugly, all ties are appropriately tied, all zippers are zipped, and all buckles are fastened. To check the fit, perform the shoulder strap test with a partner. Stand behind your partner and firmly pull up both shoulder straps. If you can pull the shoulder straps up to ear level, readjust the life jacket or try a different style or size. While floating in calm, shallow water, test the fit of your life jacket by relaxing your body and tilting your head back. A properly fitted and sized life jacket will keep your chin well above water. If it does not, readjust your life jacket or try one with a higher buoyancy rating (found on the label).

Proper care and storage of life jackets is essential. Allow your life jacket to drip-dry, and store it in a well-ventilated place away from direct sunlight, which causes the fabric to fade and the flotation material to weaken. Never use a life jacket as a kneeling pad or seat cushion, and never cut or alter a life jacket. This includes gluing or sewing patches on the fabric that covers the flotation material. Finally, do not repair tears or holes in the material. If the fabric is ripped or if buckles are missing, replace the life jacket.

Fire Protection

In addition to life jackets and navigational signaling equipment, fire prevention measures and onboard fire extinguishers are required by law for all powered craft. Fire extinguishers must be of a marine type and U.S. Coast Guard–approved. Look on the label for "Marine Type U.S.C.G. B:C Size I [or Size II]."

Every fire extinguisher has a letter rating (A, B, C, or D) that refers to the type of fire it will extinguish. For example, B extinguishers are intended to be used on fires caused by flammable liquids such as gasoline and oil. Each extinguisher also has a numerical rating that refers to the size of fire it can be expected to put out. A B-I extinguisher will extinguish a fire (caused by a flammable liquid) that is no more than 1-foot square in size; a B-II will put out a fire that is 2-feet square.

The onboard fire extinguisher should be easily accessible to the boat operator.

Dry chemical extinguishers are the most popular type of onboard fire extinguisher. They are compact, lightweight, and inexpensive, and they do an excellent job when used correctly. To operate, most of these extinguishers require you to pull the pin, aim the nozzle at the base of the fire, and squeeze the lever. However, always follow the manufacturer's instructions, which should be clearly posted on the unit itself.

Halon extinguishers use a colorless and odorless gas that interferes with the chemical reaction involved in a fire. Some are portable, while others may be installed in the engine compartment with a heat sensor for automatic discharge as well as a pull box at the helm station. The only disadvantages to halon extinguishers are their high cost and the fact that they must be periodically inspected by a licensed service person.

Carbon dioxide extinguishers smother the fire by displacing the oxygen that supports the flame. While these extinguishers are effective, they are heavy and they require regular inspection. These units often are installed as a fire control system in the engine compartment.

Once used, most extinguishers cannot be recharged and should be discarded. Check the pressure gauge or pressure button at least monthly. If the extinguisher is not fully charged, properly dispose of it and buy a new one.

The *Fire Safety* merit badge pamphlet has more information on the proper use and care of fire extinguishers.

REQUIRED EQUIPMENT SUMMARY	LENGTH OF VESSEL			
	Less than 16 feet	16 feet to less than 26 feet	26 feet to less than 40 feet	40 feet to not more than 65 feet
Certificate and Number	Required if propelled by machinery. Some states require one for all watercraft.			
Backfire Flame Arrester	Required on each carburetor of all gasoline engines except outboards.			
Ventilation	Required for every closed engine or fuel tank compartment.			
Life Jackets	U.S. Coast Guard–approved Type I, II, or III life jacket required at all times for each person onboard.			
Portable Fire Extinguishers*	One B-I type, except outboards with open fuel tanks.		Two B-I types or one B-II type	Three B-I types, or one B-I type and two B-II types.
Pollution Prevention	Required on all vessels.		Required on all vessels and placard must be posted.	
Sound-producing Device	Not required.	Efficient sound signal required.		Whistle and bell required.
Navigation Lights	Required if operating between sunset and sunrise.			
Visual Distress Signals**	Required between sunset and sunrise.		Both day and night signals required in coastal waters and Great Lakes.	

*If an approved fixed system is installed, one fewer B-I is required.

**Strongly recommended but not required on inland waters.

Charts—marine versions of road maps—of federal waterways that show buoys, water depths, shoals, and so forth are available from the U.S. Army Corps of Engineers and the U.S. Coast and Geodetic Survey.

Know the Water

Find out as much as possible about the river, lake, reservoir, or bay before you launch your boat. If charts or other maps are available, study them carefully and note the location of any possible hazards such as rocks, shallow areas, reefs, or bars. Find out if and how these underwater hazards are marked. Once underway, travel slowly and carefully, keeping alert for unusual features.

On rivers, check the current and water release patterns by talking with others who know the water and by reviewing data on current flow and water level fluctuations (changes) from the U.S. Army Corps of Engineers or other comparable resources. In tidal water, get information on the time of high and low tides and the level of fluctuation, and locate channels where you may meet much larger boats. On reservoirs, find out ahead of time which areas may be restricted so that you can avoid them.

Nautical Terms

Some terms are specific to the boating world. Knowing them will help you understand position, direction, and location of your boat.

abaft. Toward the stern; at the rear of the boat.

abeam. Refers to the position of an object; at right angles to the center line of the boat. For instance, another boat, a pier, or a lighthouse is abeam when it is abreast (by the side) of your boat.

aft or after. In, near, or toward the stern or rear end of the boat.

astern. The direction aft, or behind, the boat. An object is astern when it is behind the boat. A boat is going astern when it is moving backward.

leeward. The direction away from the wind; opposite of windward.

windward. The direction from which the wind is blowing; opposite of leeward. The windward (weather) side of a boat is that toward the wind.

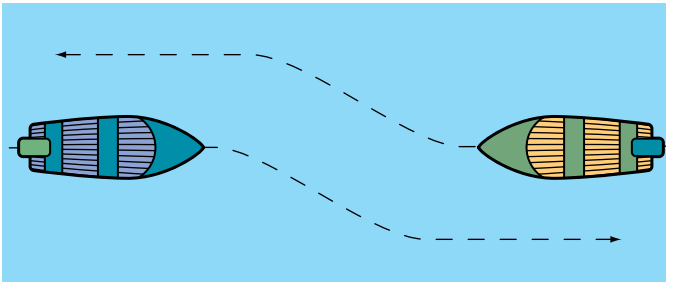
Nautical Rules of the Road

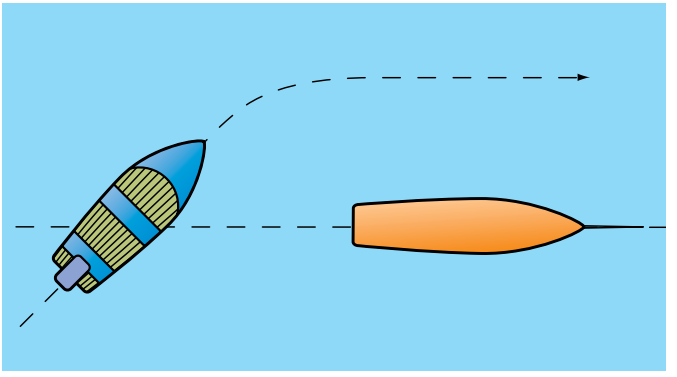
The nautical rules of the road were created to promote safety and help prevent collisions. It is important for all boaters to learn and follow the navigation rules when encountering other boats on the water.

There are two important nautical rules you should follow even when no other boats are in sight. First, have a dedicated lookout person aboard who keeps an eye on the water and clearly communicates any potential hazard to the driver. Second, be sure the driver maintains a speed that is safe and appropriate for the body of water, the participants, and the activity.

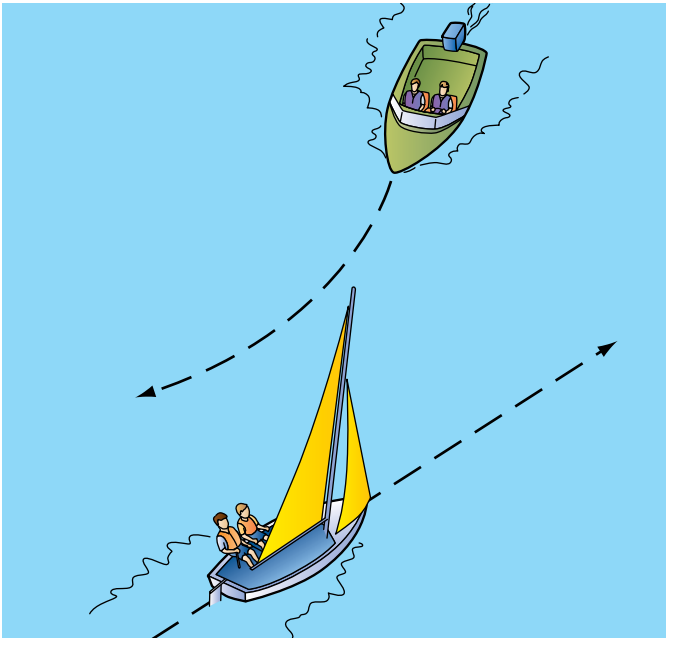
Meeting. When two vessels approach each other head-on, neither has the right-of-way. Each boat steers to the starboard (that is, bears right) so that the boats pass port (left) side to port side. The exception to this rule applies when boating in the Great Lakes and on channels with strong currents. In these cases, the vessel going downstream (being carried along by the current) has the right-of-way and the vessel going upstream must maneuver out of its way.

On the water, to "give way" means to yield the right-of-way.



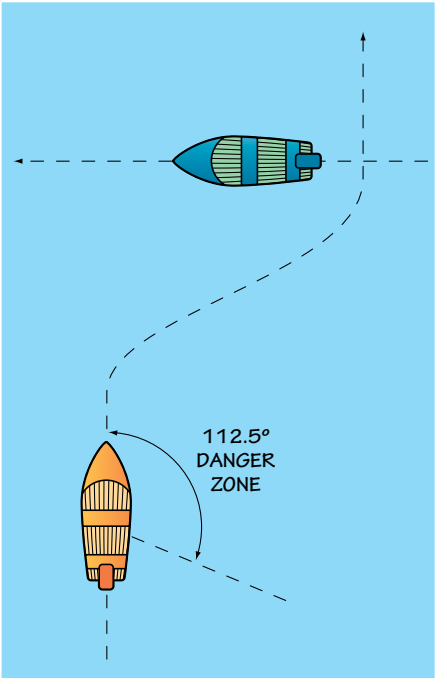


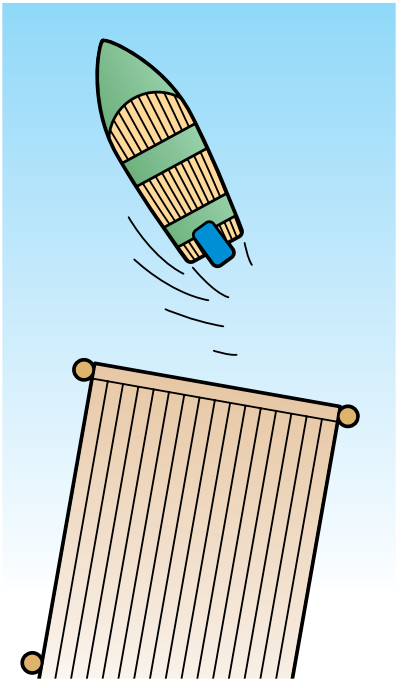
Overtaking. When one boat is overtaking, or passing, another, the one doing the overtaking must keep clear, while the boat being overtaken does not alter its course or speed.



Sailboats. Sailboats always have the right-of-way over powerboats, except in the unlikely event of a boat under sail overtaking one under power. Courtesy also dictates that racing sailboats be given a wide berth.

Crossing. A motorboat preparing to cross another motorboat that is in its "danger zone" (see illustration) must yield the right-of-way by altering its course to go around its stern (the rear of the boat), by slowing down, or, if necessary, by stopping or reversing. Thus, if a boat approaches your port side (coming from your left), you have the right-of-way and should maintain course and speed.

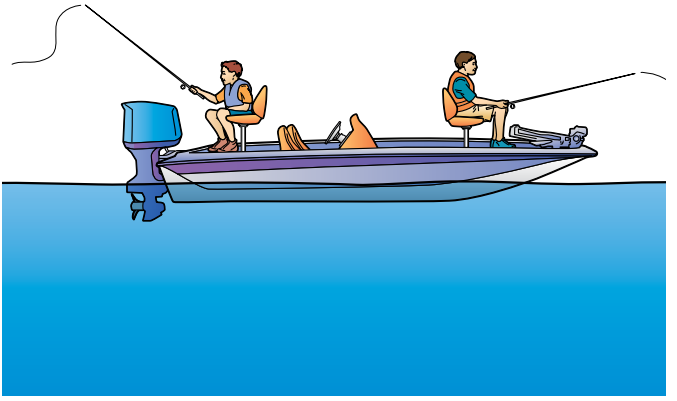




Leaving Slips, Wharves, and Piers. Boats coming out of slips into open water or leaving berths at piers and wharves should proceed with caution and at low speed. They have no rights-of-way until they are entirely clear in open water.

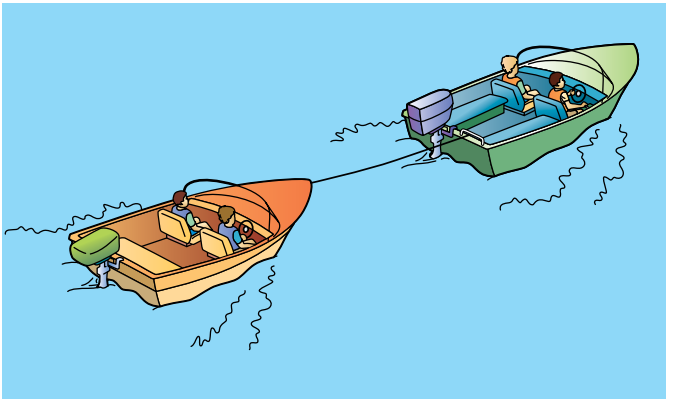
Towing. Tugs with barges in tow, whether alongside or pushing ahead, should be given the right-of-way.

Yielding to Fishing Boats. Whether they are anchored or underway with nets, lines, or trawls out, fishing boats have the right-of-way. Boats engaged in trolling do not have the right-of-way, but in any case, take care when passing a fishing party.



It is a time-honored tradition that mariners always go to the aid of those in distress.

Responding to Accidents or Vessels in Distress. In cases of collision, capsizing, fire, or other serious accidents, it is the boater's duty to render any help possible. A good boater is always willing to offer a tow to a boater who has suffered an engine breakdown or to loan gasoline to someone who has run out of fuel.



Exceptions to the Rule

It is important to know that there are different right-of-way rules for motorboats, sailboats, and muscle-powered craft (canoes, rowboats, kayaks, etc.). In general, motorboats have to keep clear of sailboats, and both sailboats and motorboats must keep clear of muscle-powered craft, although not always. Here are some exceptions.

- All boats must keep clear of disabled vessels except to render assistance.
- All boats must yield to vessels that do not maneuver easily, such as barges or commercial fishing boats engaged in fishing.
- In narrow channels, smaller boats must yield to ships and deep-draft vessels that can operate only in the channel.
- Any vessel overtaking another must keep clear of the overtaken vessel.
- A sailboat that is using an engine is considered a powerboat and must follow powerboat rules.

Boat defensively—that is, simply steer clear of other boats, even when you have the right-of-way. Other boaters may not understand the rules as well as you do, may not be alert, or may not be very skilled at boat handling.


17

Signs and Signals

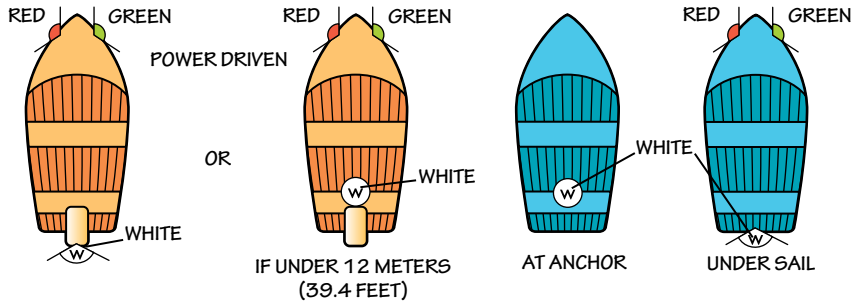
Learn the proper signs and signals to safely operate a boat.

Motorboat Lights

All boats are required by law to display lights from sunset to sunrise, or whenever visibility is low, such as when fog rolls in. These lights warn others of the presence of your boat, show if you are under power or sail, and may indicate what you are doing. By observing the properly displayed lights of another boat, you can note its course, speed, and approximate size, and tell if it is under power or sail.

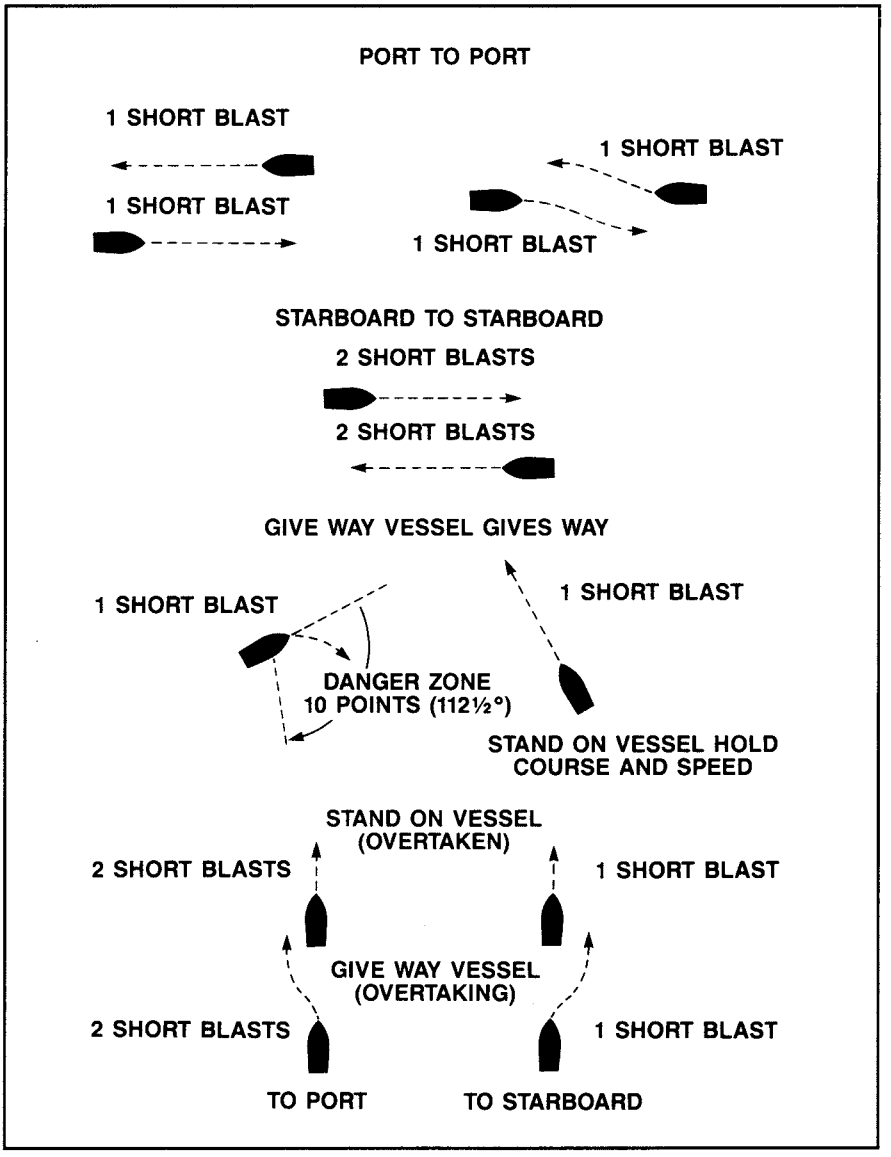
Generally, green lights designate the starboard (right) side of the boat, and red lights designate the port (left) side. The more common lighting patterns for recreational vessels are shown here.

Boats at anchor, except those less than 20 meters (65.6 feet) long when anchored in a designated anchorage area, must display anchor lights.



Navigation lights for vessels under 20 meters (65.6 feet) long

Note: Vessels over 50 meters (164 feet) will show a second, forward-facing white light, at the rear of the boat and higher than the forward light.



Standard sound signals

Sound Signals

In meeting, crossing, or overtaking, all power-driven vessels should give the proper whistle signals. Power-driven vessels, passing each other within half a mile, or small boats passing each other within 10 boat lengths, must sound whistle signals as shown in the illustration. In addition:

- Three short blasts are sounded whenever engines are going astern (in reverse) or if the vessel is moving backward with the engines stopped.
- Five or more short blasts are given in all cases of confusion or doubt. This is the only signal that may be given in fog before vessels sight each other. In this case it means simply "danger." When this signal is given, a vessel's engine should be slowed or stopped.
- Vessels leaving a pier or dock or nearing a river bend or similar blind spot must blow one prolonged blast of 4 to 6 seconds.

A "whistle" can be anything that can produce the signal blasts as described here. The specifications for whistles are defined in the U.S. Inland Navigation Rules.

Aids to Navigation

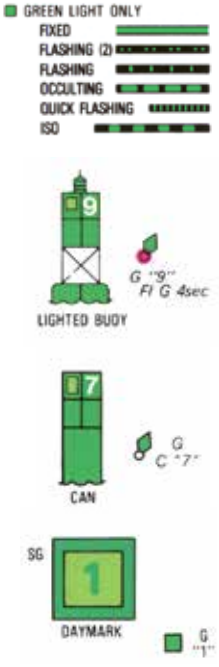
Much like street signs guide motorists on the road, the U.S. Coast Guard's standardized aids to navigation system indicates hazards, safe channels, and on-the-water traffic patterns. These navigational markers serve the commercial traffic on major coastal and inland waters. Until 2004, waterways under state or other jurisdiction used a simpler, uniform marker system. This system was primarily for use by recreational boaters.

U.S. AIDS TO NAVIGATION SYSTEM

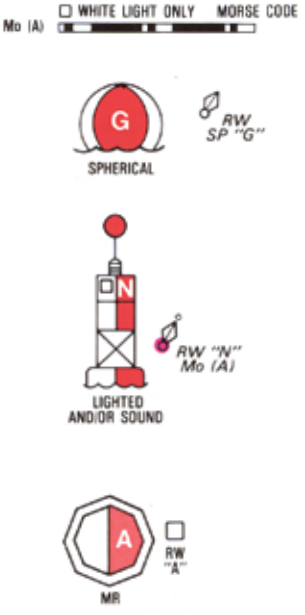
(on navigable waters except western rivers and intracoastal waterway)

LATERAL SYSTEM AS SEEN ENTERING FROM SEAWARD

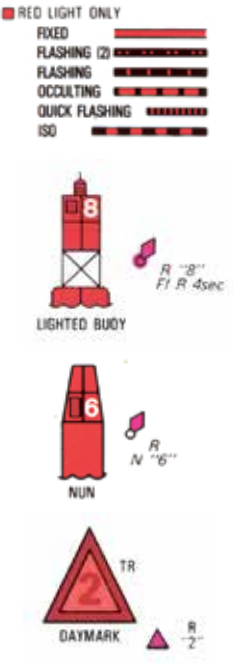
PORT SIDE (ODD-NUMBERED AIDS)



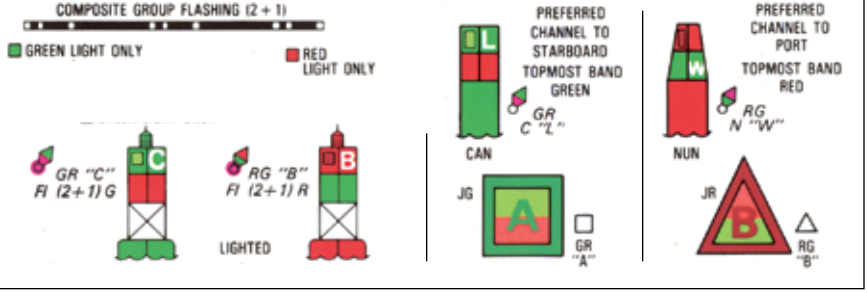
SAFE WATER (NO NUMBERS–MAY BE LETTERED)



STARBOARD SIDE (EVEN-NUMBERED AIDS)



PREFERRED CHANNEL (NO NUMBERS–MAY BE LETTERED)

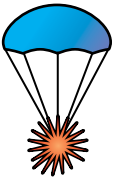


Standard Marine Distress Signals

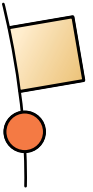

FLAMES IN A BUCKET


CODE FLAGS NOVEMBER AND CHARLIE

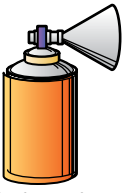

HANDHELD FLARE OR SMOKE

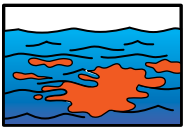

PARACHUTE WITH A RED FLARE


SHOTS FIRED IN THE AIR AT ONE-MINUTE INTERVALS


SQUARE FLAG AND BALL

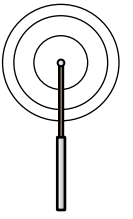
MAYDAY CALL BY RADIO

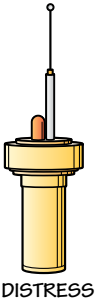

FOGHORN SOUNDED CONTINUOUSLY

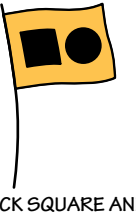

WATER DYE MARKER OF ANY COLOR


WAVING ARMS


RED METEOR FLARES


RADIO BEACON


RADIO DISTRESS ALERT


BLACK SQUARE AND BALL ON ORANGE FIELD


MORSE CODE SOS SIGNAL

Unofficial but still widely recognized distress symbols include flying an inverted U.S. flag or waving a red-orange flag of any size.

Boat Handling and Seamanship

A good boater takes the time to understand boat-handling basics and seamanship.

Motor Configurations

There are several motor configurations for motorboats. Each has its advantages and disadvantages, depending on the activity. Inboard, outboard, and inboard/outboard (I/O) motor configurations are all appropriate for Scouting activities.

Inboard configurations, where the engine is just beyond midship and fully accessible from the interior of the boat with the propeller mounted under the boat several feet forward of the stern line, are recommended for waterskiing and related activities where people are in the water. Because the propeller is well underneath the boat, there is less risk of propeller injury. This configuration also provides optimal use of the rear platform for easy access from the water into the boat and for fitting and adjusting equipment before entering the water.

The rear platform on an inboard is ideal for activities such as wakeboarding and water-skiing.

A vessel's speed is measured in knots, or nautical miles per hour.

Forward maneuverability also is usually better when pulling skiers or boarders with the inboard engines and a center-mounted tow pole. Maneuverability at low speed, however, especially in reverse and on dock approaches, can be difficult. Inboards are not recommended for beginner instruction and practice on docking and close maneuvers.

The I/O configuration with an inboard motor is popular for recreational boating. It does, however, have a rear exposed (outboard) propeller. Maneuverability is good at all speeds and in reverse, but rear-mounted tow bars can affect steering when pulling a heavy skier, skiing tandem, or wakeboarding.

Outboards, where the entire power system is mounted at the stern of the craft, are best for platform boats and fishing craft. Today, outboard motors usually are large, powerful engines and should not be mounted or serviced on the water in Scouting programs. Although some smaller outboard motors are still used on rowboats and for trolling, the use of outboard configurations in the Scouting program should be limited to lightweight electric motors specifically intended for such craft.

Inboard motor

Whether you are using a motorboat with an inboard, outboard, or inboard/outboard configuration, never operate the boat unless it is equipped with a kill switch.

Inboard/outboard motor

Outboard motor

Fueling

All gasoline-powered engines are required to have a natural ventilation system for every engine and fuel tank consisting of a fresh-air supply and an exhaust duct.

Most motorboats today use the same fuels as cars. Before you refuel, carefully read the manufacturer's fueling instructions for your motor. Use only the grade and type of fuel recommended by the manufacturer. Some older outboards may still require hand-mixing of an oil and gas blend, but these motors usually are small and unsuitable for Scouting programs.

The safest and most convenient way to fuel is to use the retail pump at a local marina or fuel dock. Usually, a gas attendant will fill the tank with the appropriate grade and amount. If you find a self-service pump, follow the safety procedures for home dock fueling, as discussed here.

Fortunately, many boats today can be fueled on the trailer at the same pump where you fuel the tow vehicle. Remember, however, that the same safety precautions apply.

Fueling should be done only under supervision of your adult leader or a trained instructor. Take the following precautions.

1. Have passengers and any crew not needed for fueling go ashore.
2. Make sure no one is smoking, and that there are no other open flames or potential sources of ignition.
3. Fuel only in a well-ventilated area with the ignition in the "off" position.
4. If the fuel tank access is inboard, make sure all ports and hatches are closed to prevent fumes or spills from going below.
5. Before beginning fuel flow, touch the metal tip of the fuel nozzle to a metal piece on the boat to discharge any static charge.
6. Do not start pumping the fuel until the nozzle is securely set in the tank opening. To avoid spills or drips, keep the nozzle turned upward when removing it from the tank opening.
7. Wipe up any spilled fuel.
8. Be sure to tightly secure the tank cap.

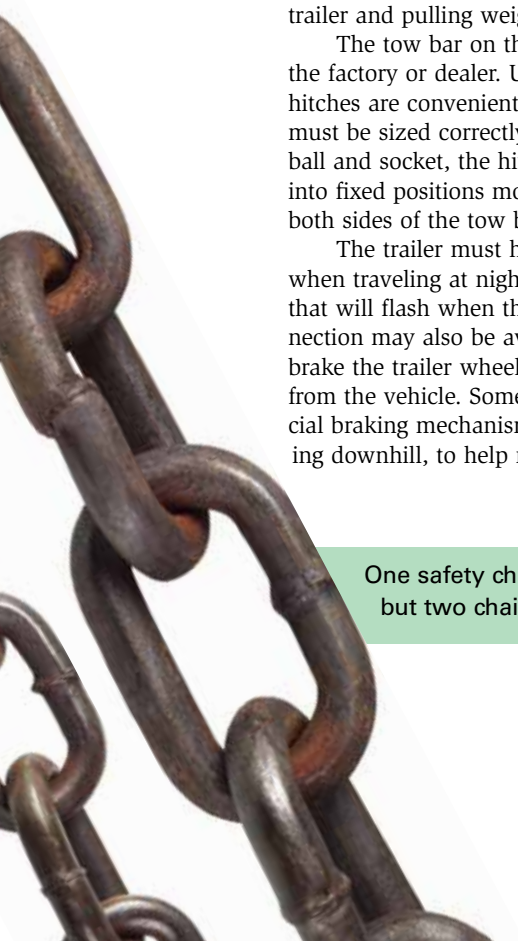
Hitching the Trailer

Although larger craft are often kept on the water when not in use, recreational boats used for skiing, fishing, and cruising usually are kept on trailers, which is convenient for taking them to and from recreational waters. For this reason, most boat outings begin with the hauling of the boat to the launch ramp.

Boats up to 26 feet, carried on a trailer that matches the boat weight and shape, can be towed behind most full-size sport utility vehicles, pickups, or sedans. It is important to make sure the trailer is appropriate for the boat and that the tow vehicle has enough weight and power to safely haul the boat not only to and from the launch area, but also up and down the ramp without slipping or stalling. Information from boat and trailer dealers and manufacturers should explain trailer and pulling weight requirements.

The tow bar on the towing vehicle should be installed by the factory or dealer. Underbody sleeves with interchangeable hitches are convenient. Hitch balls come in several sizes and must be sized correctly for the hitch socket. In addition to the ball and socket, the hitch should have safety chains that hook into fixed positions mounted to the frame of the vehicle on both sides of the tow bar.

The trailer must have an electrical connection for lights when traveling at night and for warning lights on the trailer that will flash when the brakes are applied. A breakaway connection may also be available on some trailers to automatically brake the trailer wheels should the trailer suddenly disconnect from the vehicle. Some trailers also come equipped with a special braking mechanism that applies automatically when heading downhill, to help reduce the "push" of the trailer.



One safety chain may be sufficient for lighter craft, but two chains are recommended.

To engage the hitch, do the following.

Step 1—Crank down the front wheel of the trailer until the hitch socket is above the level of the ball top.

Step 2—Back up the vehicle to position the ball directly below the socket; set the vehicle brake and turn off the engine.

Fold up the front wheel assembly.

Step 3—Crank up the trailer's front wheel until the socket has settled down completely onto the ball. If the socket does not settle smoothly onto the ball, raise it back up and either shift the front end of the boat or reposition the vehicle.

Do not try to shift the front of the trailer if the weight is resting on the ball. A sudden drop could cause serious injury or damage the equipment.

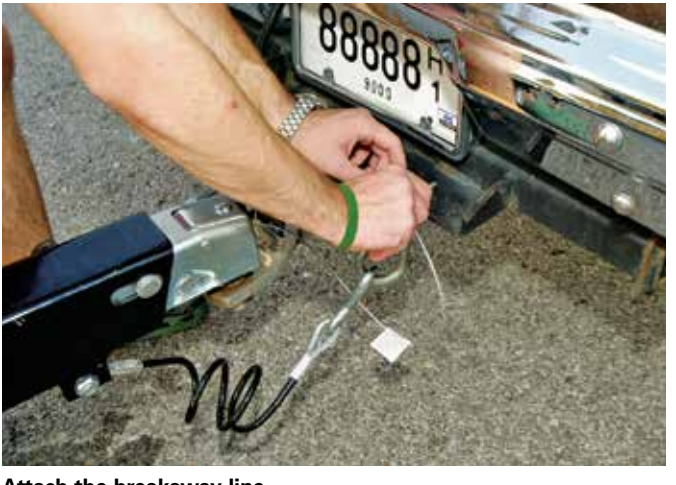
Depending on the style of the trailer, once the front wheel is off the ground with the front weight entirely on the hitch, the wheel assembly can be folded out of the way or removed and stored. Never leave the wheel in a position where it might contact the ground while traveling, launching, or loading.

Fold down the hitch locking mechanism.

Secure the safety catch or pin on the hitch lock (1), hook the safety chains (2), and join the electrical connections (3).

Step 4—Before towing, remember to set and pin the locking mechanism on the socket, hook the safety chains, join the electrical connections, and engage the breakaway line, if available.

Step 5—Have the driver move the vehicle forward slowly to take out the slack in the hitch. Watch to make sure everything is connected and working properly. You are now ready for the drive to the launch area.



Attach the breakaway line.

To unhitch the trailer, reverse the hitching procedures. Remember to chock the wheels securely before lifting the socket from the ball.

Launching From the Trailer

At public access areas there may be a waiting line to launch. Get your place in line before beginning launch preparations.

When you arrive at the launch area, park above the ramp with the rear of the trailer toward the water. When you are in position, the rear of the trailer should be at least a trailer length from the waterline. Set the tow vehicle brakes securely. If the ramp is steep or if conditions are slippery, chock the wheels.

Before launching, remove the boat cover and tie-down straps.

Every boat has a drain plug somewhere in the bilge, the part of the hull below the deck. Be sure the plug is firmly in place before you launch. Unplugged boats usually sink just off the launch ramp.

Before beginning the launch, remove the boat cover and tie-down straps. Be sure the bilge plug is securely in place. Check the battery connections and any other connections that could have loosened during transport.

If the boat has been out of service for a lengthy period, be sure to test the battery before launching. One quick test is to flick on the lights or the vent fan.

Walk down the ramp to the water's edge and look for hazards. Check the water depth and note the steepness of the ramp. Decide whether one person can be in the boat safely without damaging any equipment as the trailer is backed down the ramp. If this is appropriate and at least three people are available, one person can get in the boat while a second one stands to the left side of the vehicle. The third person can be the driver.

With one person standing near the water's edge in mirror view of the driver and giving directions, the driver should back slowly into the water until the boat first begins to lift from the trailer. At this point, the trailer brakes should be locked or held securely. If someone is in the boat, then the driver should remain in the vehicle while the third person releases the lock on the trailer crank and loosens the trailer bow line.

If the ramp is steep and the driver needs to get out to complete the launch, the front wheels of the tow vehicle should be chocked.

When the line is slack, disconnect from the boat, push the bow out gently to confirm that the boat is floating free of the trailer, and signal to the boat driver to start the motor and back clear of the trailer. As the trailer and tow vehicle are moved off the ramp to the appropriate parking and storage area, bring the boat to a dock or shallow area to load passengers and equipment.

Loading the Trailer

Loading the boat on the trailer is basically just the reverse of the launch procedures.

Step 1—Back the trailer down the ramp, guided by one person at the water's edge.

Step 2—When the trailer is in position at the proper depth, signal the boat operator to bring the boat in slowly.

Step 3—The boat operator cuts the motor's power as the bow slowly passes over the rear of the trailer and coasts into position.

Step 4—As the bow point of the keel touches the front roller of the trailer, hook the tow strap to the bow tow ring.

Step 5—Now crank the boat forward until the bow touches the front trailer rest. At this point, lock the crank. Be sure the safety lock bar goes through the boat ring.

Step 6—When everything is secure, signal to the vehicle driver to pull up slowly while observing how the boat settles onto the trailer as it exits the water. If for some reason the boat does not settle properly onto the trailer supports, stop and back the trailer down the ramp until the boat begins to lift so it can be pushed into position.

When in proper position on the trailer, the bow should be on the bow support. The hull should be supported without depressing or distorting the boat's contours.

Once the boat and trailer have cleared the ramp, you can load or unload gear for transport, open the drain plug, replace the boat cover, and attach the tie-down straps. When everything has been secured, you are ready to travel.

Loading the Boat

Your boat's performance is affected by how it is loaded and how the weight is distributed both fore and aft and side to side. Naturally, if everyone sits toward the stern, the bow will be high. If, instead, you have everyone seated in the bow, your boat will be "down by the head," as the sailors say, and will be difficult to maneuver.

Do not crowd your boat. It will carry only a limited number of people safely, and the number of seats is not a reliable measure of capacity. Take into consideration the weather and water conditions, too. If the water is rough, take fewer people.

The U.S. Coast Guard capacity information label (prominently displayed on every boat) provides safety information to reduce the dangers of inadvertent overloading or overpowering. These recommended values are for fair weather. Follow them, but also take into consideration the weather and your crew's boating experience. Always exercise good judgment and caution.

While the boat is held at dock, pass gear to a person in the boat for proper storage.

The same principle of weight distribution applies to the loading of supplies, equipment, and camping gear. Regarding the boat's equipment—anchor, tools, paddle, fenders—never forget the old seaman's adage: "A place for everything and everything in its place." Nothing is quite so lubberly (unseamanlike) as a boat with things lying about loose in the bilges or on the floorboards or seats. Unstowed gear can be dangerous in rough water; you also risk losing it over the side. Store gear in the storage compartments in the bow or under the seats or deck.

Storage under seats helps passengers avoid cluttering the deck with loose lines, anchors, and other equipment.

Boarding the Boat

When you are boarding from a float or low pier, step aboard as nearly amidships (center) as possible, keeping your weight low and using your hands on the gunwales (sides) for balance. When getting aboard from a high pier, step down to the bow deck or other high part of the craft that will easily support your weight. Inboard engine housing may provide a good step-down point. From the high point, step quickly but carefully down to the deck. Do not step or stand on the gunwale unless there is a factory-installed step position.

Never jump into the boat.

Keep the dock lines tight or have someone steady the boat for you as you board. Also, do not carry things aboard; keep your hands free. Have someone hand you your packages after you are aboard, or reach back to the float for them after you are on board.

If you are embarking from the beach, get in over the bow or over the gunwale near the bow, with the forward point of the boat kept lightly grounded. Then move to the stern to lift the bow so the boat can be paddled or powered to deeper water without dragging bottom.

Starting the Engine

All watercraft with an inboard engine should have an engine compartment vent fan that can be operated with the ignition off or in the accessory position. Fuel vapors can accumulate in the enclosed engine compartment and ignite explosively when the engine is started, so always vent before you start. Run the vent fan for a minute before ignition if the boat has been sitting for an hour or more, particularly if it has been sitting in the sun.

After running the vent fan, put the shift lever in neutral and start the engine by turning the ignition key or pressing a start button. Let the engine start and idle for a moment before engaging the propeller. During this moment, check the dials to be sure everything is running properly, fuel is sufficient, and the computer (commonly installed in modern boats) signals no needs or problems.

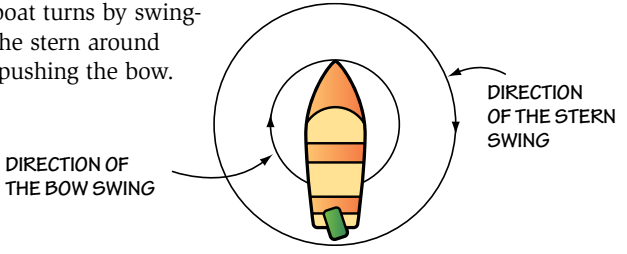
Starting the engine requires a few precautions to ensure the safety of all passengers.

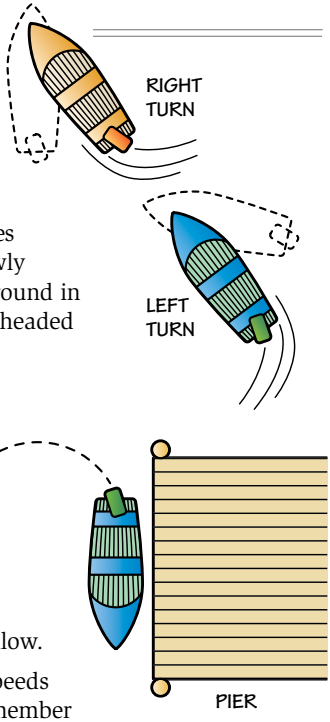
Getting Underway

Be sure to perform a safety check of the boat's equipment before getting underway.

If you are getting underway from a beach or shallow area, push, pole, or paddle out of the shallow water before going through your starting routine. You do not want to churn up the bottom and damage the propeller. If you are launching an outboard or I/O, tilt the motor up or raise the lower unit to protect the propeller while your partner paddles or pushes off from the bow.

When you are getting underway from a float or pier, remember that boats do not steer like cars or bikes, which follow their front wheels. In a motorboat, the stern responds first to the steering impulse and goes in the *opposite* direction from how the bow is being headed. In other words, the boat turns by swinging the stern around and pushing the bow.





For this reason, if you turn out sharply from a dockside or pier, the stern will be driven against the dockside. This results in a common type of damage on boats driven by novice drivers. To avoid this problem when there is sufficient open water in front of the dock, or when the wind or waves are pushing the craft into the dock, turn out and slowly reverse so that the stern moves out. Bring the bow around in a half circle. When the bow has come around and is headed toward open water, shift to forward and proceed.

Note that inboards with a hull-mounted propeller forward of the rudder will be less steer-responsive in reverse (as compared to an outboard or I/O motor) and will have somewhat less of a stern swing when turning but still will have the rear-steering dynamic.

Underway Maneuvers

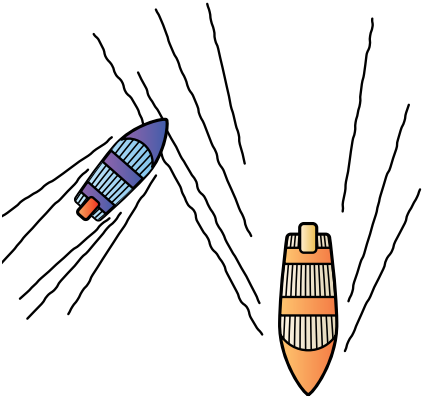
Once underway, there are three important rules to follow.

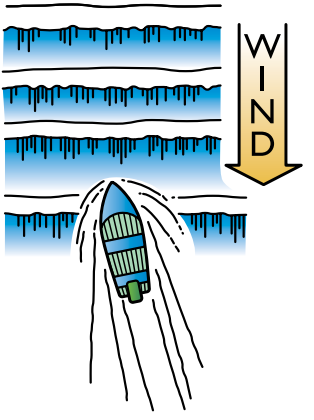
Keep the boat under control. Do not run at high speeds where sudden turns or stops might be necessary. Remember that higher speeds require wider turns. Heavier loads also require slower and wider turns. For both safety and courtesy, reduce speeds and avoid sharp maneuvers when other craft are present.

Always be alert. Keep an eye on other boats, and watch for floating hazards, shoals, markers, and other obstructions. If you have a skier or a boarder in tow, be sure at least one other person is watching the skier/boarder and communicating with you. Plan your route well ahead of the boat to avoid last-second decisions and sudden maneuvers. Without being distracted, be aware of what is going on in your boat.

Follow the rules. The nautical "rules of the road" and the safety procedures put out by the U.S. Coast Guard, Scouting America, and your state can assure safety and fair opportunity only if they are followed. Be a good citizen and a safe boater.

For inexperienced boat handlers, waves can be intimidating. When crossing the wake of another boat or heading into waves caused by the wind, angle in slightly off the perpendicular.



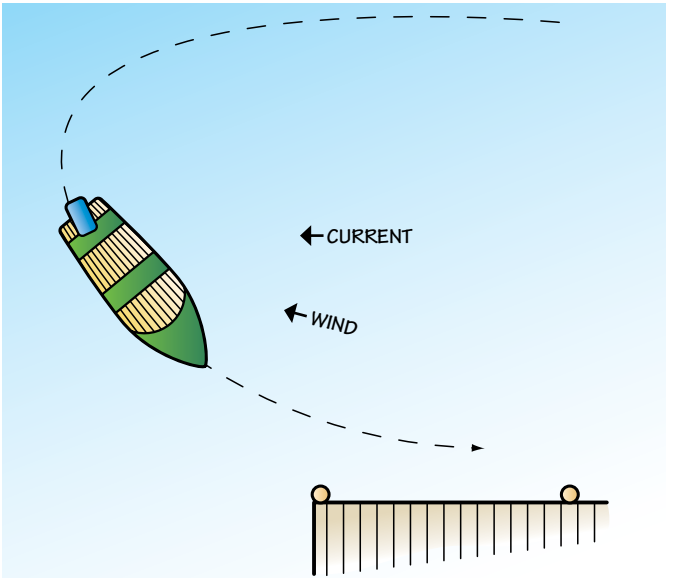


Landing

One of the maneuvers in which you will take pride is making a landing (or picking up a mooring if your boat lies offshore instead of being beached or snugged against a pier or float). A good landing requires control of the boat and knowledge of what effect, if any, the wind and current will have on the boat.

In tidal waters or streams where there is noticeable current, it is best to make uptide or upstream landings unless the wind is so strong that it more than offsets these factors. Where current or tidal flow does not have to be considered, make your landing with the bow into the wind, if possible. A glance at a buoy or a look at the way other boats are lying to their moorings will tell you the direction of the current.

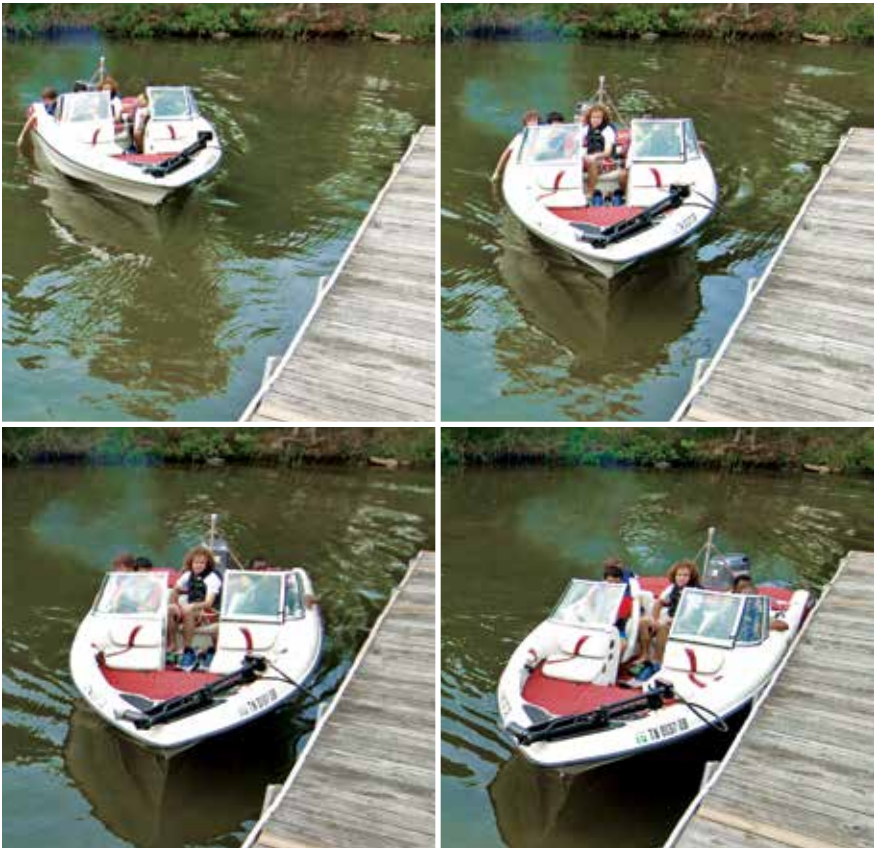
Suppose you are heading downstream with the current, and the float you wish to tie up to is on the left bank. To make a good landing, wait until you are abreast of the float and then throttle the motor down and begin an easy left turn. When you are below the float, head upstream in such a way as to bring the starboard side of your boat parallel to the outside edge of the float and a foot or so away from it.



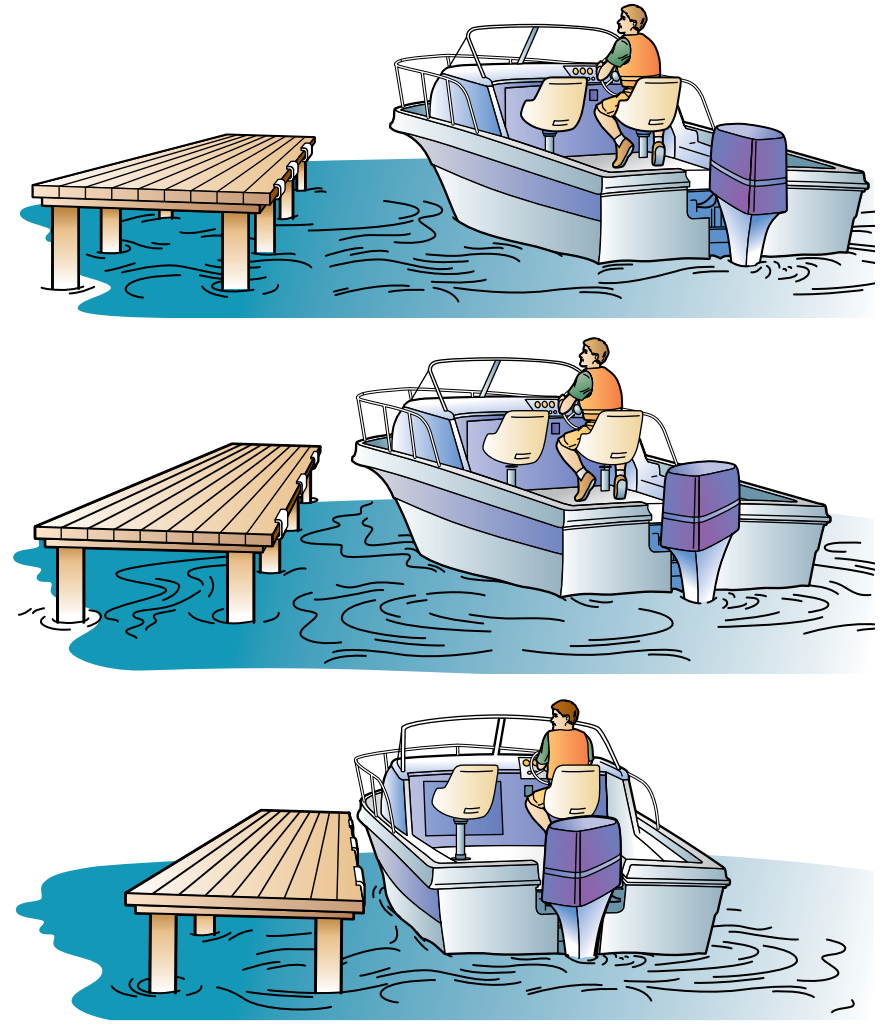
When your bow passes the lower end of the float, stop the engine and put it into neutral, flip the fenders over the rail, and steer the boat gently alongside. Hold onto the float until someone takes your bow line, or step ashore with it yourself. The same principles of speed and approach apply to picking up a mooring buoy.

If there is no wind or current, approach the dock at a forward angle at very low speed with bumpers in place, cut forward power 8 to 10 feet from your intended point of contact, tap into reverse just before contact so the boat stops, and slip into neutral before the boat begins to back. On a good landing approach, the passenger on the dock side is easily able to place his or her hand on the pier. Secure or hold the boat at the pier while passengers and equipment are loaded or unloaded.

Avoid making dangerous "landlubber" mistakes, such as coming in for a landing at high speed or at a right angle to the float. Even when you must head right for the beach, go slowly and swing your engine up before it hits bottom.



If your only option is to land in shallows, direct the bow toward the beaching area under very low power, cut forward power several boat lengths from shore where there is still propeller clearance, and tap into reverse just before the bow touches bottom. With the boat momentarily stationary and before it begins to drift, someone wading from shore can take hold of the bow or bow line. If no one is on shore to meet the boat, then someone in the boat should go overboard in the shallow water to hold or secure the boat. If the beach area is suitable, an outboard or I/O can be pulled or paddled (with motor in the up position) parallel to the waterline for loading or unloading. Otherwise, loading and unloading should be over the bow.



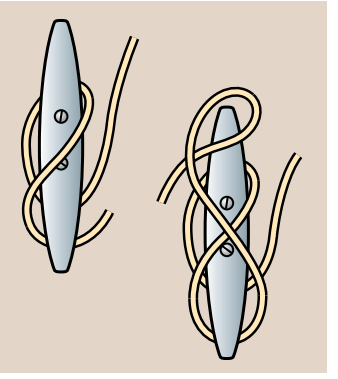
When landing an outboard or I/O, approach at a slow speed, approximately 30 degrees to the pier, alternately going ahead slowly and stopping the engine as necessary. When the bow is close to the pier, turn slowly and head parallel to the pier. Then reverse the engine, give left rudder, and move in against the pier.

Mooring

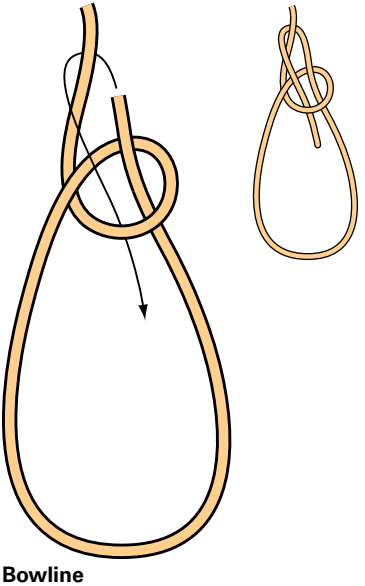
How you secure your boat depends on the arrangement of cleats or rings on the wharf, pier, or float where you plan to moor.

Floats usually are fitted with cleats or rings and are sometimes held in place by stakes or piles, which also may be used for your mooring lines. Wharves and piers may have rings or cleats, depending on their size and purpose.

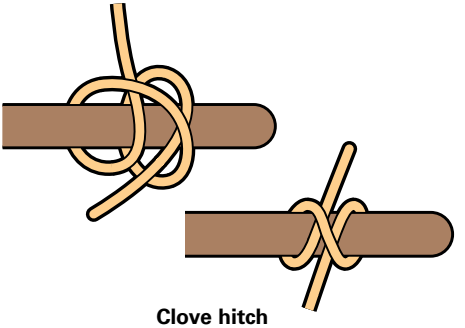
If your bow and stern lines have an eye, or loop, spliced into one end, mooring will be quite simple. You can throw the eye over a cleat and take up the slack on board. If your lines have no eyes, a couple of figure eights around a cleat with a final half hitch to lock them will do well. For securing to piles or stakes, a round turn and two half hitches will work in quiet water, but a clove hitch or bowline is a better choice. Usually, one line leading from the bow is sufficient to moor a boat alongside for a short time, but using a stern line as well is a better practice.



Making fast to a cleat



Bowline



Clove hitch

Neat and efficient figure eights on a cleat with slippery hitch and coil

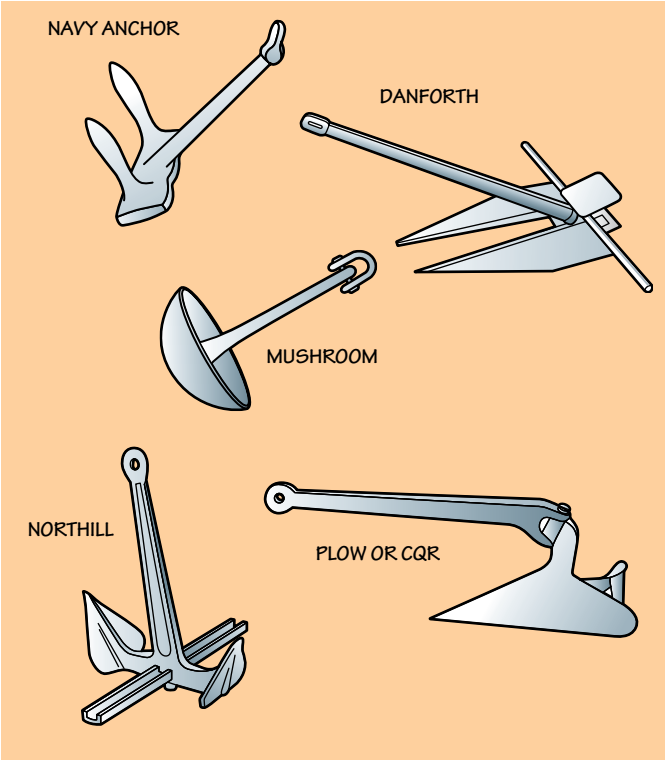
When making fast to a wharf or pier in tidal waters, be sure to leave enough slack in the lines to allow for the rise and fall of the tide. If you don't, you are likely to either pull out the deck cleats when the tide falls away from under the boat or jam the boat into such a position that it will swamp when the tide comes in again.

Anchors and Anchoring

Every boat needs an anchor. What size and type of anchor you use depends on how large the boat is and what sort of bottom you generally will anchor in: rocky, muddy, or sandy. A short stockless anchor might do, or you could use one of the many lightweight patented hooks, some of which hold better than others in different kinds of bottoms. No matter what type of anchor you have, be sure to have it made up with the line secured to it, ready to use when you are cruising or making long runs.

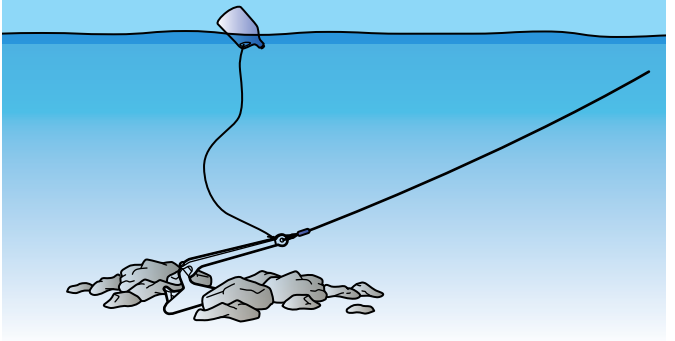
In moderate weather, a safe ratio of length of anchor line to water depth is 7-to-1. In other words, if you anchor in 10 feet of water, 70 feet of line is generally the proper length. If your boat is light and there is no breeze or current, half that length would do for a short time but not overnight or if the boat is to be left unattended.

The Danforth anchor folds flat for safe, convenient storage.



Buoying the Anchor

When anchoring on a rocky bottom, it is a good idea to tie a buoyed line to the anchor's crown so it can be pulled out backward in case it jams. A plastic bleach bottle or milk jug with the cap permanently secured makes a good buoy.



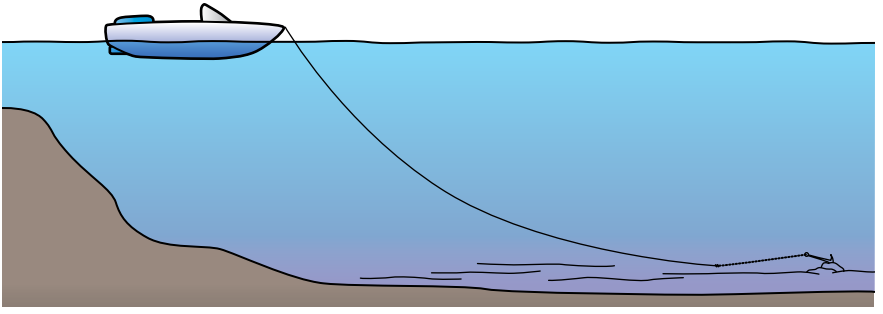
Good Anchoring Technique

Here are a few points to remember when anchoring.

- Before dropping the anchor into the water, be sure that the line is attached properly—to the anchor as well as to the boat.
- Do not throw the anchor out into the water; just lower it alongside the bow.
- Have the anchor line coiled clear for running, with no kinks, bights (loops), or knots in it.
- Do not stand on the coil when letting the anchor go—unless you want to go, too.

When you prepare to anchor, look over the place first and then head into the wind or tide (whichever is stronger), nosing your boat in slowly until you find the spot you want. Put over the anchor when stopped and then move back under reversed engine, playing out the anchor cable about six times the depth of the water. Next, take a turn around the bitts or Samson post and set the anchor under the momentum of the reversed engine. Have a second, heavier anchor on deck, ready to use in an emergency.

Remember that for good anchoring, the length of anchor line used should be about seven times the distance from your boat's gunwale to the bottom. Adding a 6-foot length of chain between the anchor and the line will help keep the anchor flat and reduce the chafing as the boat swings.



Care of Boat, Motor, and Equipment

With the fun of owning or operating a boat comes the responsibility for keeping that boat, its power plant, and equipment in first-class condition.

A boat constructed with quality materials will remain seaworthy for many years if it gets proper care along the way. It can become a pitiful hulk in a few years, however, if carelessly treated and neglected.

Maintaining the appearance and efficiency of your boat can be a source of great pride. Not too long ago, the highest compliment a good boater could get was this: "Everything about your boat is shipshape and Bristol fashion." The origin of the expression is somewhat obscure, but it is believed to have come from the heyday of sailing ships when windjammers out of Bristol, England, had a lofty reputation for being scrubbed and polished with their gear kept in the best possible shape.

Cleaning and Polishing

It is fairly easy to keep a boat looking good and performing like new. Today's fiberglass boats are much easier to maintain than the wooden-hulled boats they have largely replaced. Here are some hints for easy boat maintenance.

Keep the hull and topsides cleaned and polished. A fiberglass boat is built up with layers of glass matting bonded together with a plastic. The outer surface is covered with a material known as gelcoat. When exposed to the sun and weather, the gelcoat can become dull and faded and can oxidize (break down) to powder.

Several brands of cleaners and boat polishes on the market can protect the gelcoat finish and restore one that has been neglected. Visit a marine dealer or a good hardware store and find out which brand would work best for your boat. Carefully follow the label instructions. The first application in a badly oxidized surface will take some elbow grease, but a quick wash and polish every month or so will keep things shining.

Most boats have a few fittings of teak, a wood traditionally used on boats because it resists weathering. The best way to protect this fine wood is with teak oil. If the teak is in bad shape, you can use cleaners, bleachers, and oil finishes to help restore it. It is not a good idea to varnish teak unless you are prepared to sand it down and refinish it regularly.

Be a good housekeeper. Wash down the boat after every use. If you have been boating in the ocean, use freshwater if possible. Mop the topsides and sweep the cockpit carpeting. Put everything away, making sure all gear is thoroughly dry before storing it in a locker or closed space. Keep your bilges clean and dry. Remember, all boats take on a certain amount of water and engines drip oil, so you will have to swab out bilges regularly. Antipollution laws prohibit pumping oily bilges over the side, so you will need to pump or bail the oily water into a bucket and properly dispose of it ashore.

Invest in a properly fitted boat cover. A boat cover will shield the boat from the sun, keep rainwater out, protect it from birds and other wildlife, and help keep dust and dirt from blowing into the boat.

Don't forget the underside. If your boat is kept at a mooring or pier slip on the water, it should be periodically taken from the water to clean and treat for marine growth. The frequency of this care depends on the characteristics of the local water. A buildup of algae or barnacle growth can damage the hull and affect speed and fuel consumption. Even boats that are trailered between outings will need a good bottom cleaning from time to time, particularly at the waterline. Watch for stains and clean the boat when buildup appears. A nonabrasive tub and tile cleaner will remove stains and keep the gelcoat shining.

A good crop of barnacles—a form of marine life that grows on the bottoms of boats in salt water—will reduce a boat's speed.

Dings and Dents

Sooner or later you are going to bump into something and scratch or gouge the hull. It is important that these dings be sealed promptly to keep moisture from invading the fiberglass. Patching compound is available from marine dealers. Follow the manufacturer's instructions on the label. Mix the hardening agent with the color-matched plastic, and work quickly before it sets. Apply the patch a little higher than the surrounding surface. When it has hardened and cured, you can then sand it down with fine sandpaper. Finish it off with rubbing compound, and it will look as good as new.

For deep gouges or holes punched through the hull, it is best to have the damage repaired professionally.

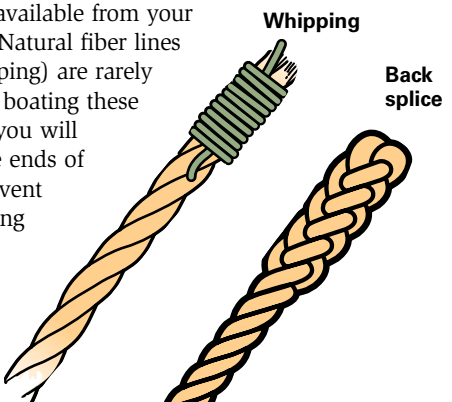
Caring for Your Equipment

Dock and anchor lines, life jackets, cushions, canvas-covered fenders, and other such equipment are bound to get wet on boats. Careless handling of such equipment means a shorter life for them and expensive replacements. Stow your equipment neatly so that you can get at each piece when you need it without upsetting everything else. To help prevent mildew and rot, dry your lines, cushions, and other gear in the shade before stowing them. Be sure the storage area is well-ventilated.

Equipment lasts longer when it is neatly stored in a secure, dry area.

Fusing and whipping are Tenderfoot skills that you can review in your *Scouts BSA Handbook.* You will find information on splicing in the *Pioneering* merit badge pamphlet.

Few things are more annoying and less seagoing than line with ends that have been allowed to unravel and fray into "cows' tails," as sailors mockingly call them. Ends should always be protected by back-splicing, whipping, or fusing. Lines made of synthetic or natural fibers can be back-spliced or eye-spliced if they are made of twisted strands. Woven plastic lines can be easily eye-spliced using a special splicing tool available from your plastic line supplier. Natural fiber lines (which require whipping) are rarely used for recreational boating these days, so most likely you will need to heat-fuse the ends of synthetic lines to prevent unraveling and prolong the life of the lines.



The Motor

Today's boat motors—inboard and outboard—should be serviced and repaired by professionals. The owner's manual will provide a maintenance schedule and will identify servicing procedures. Learn and follow these manufacturer recommendations.

Although much of your motor's servicing will need to be done professionally, you should learn a few basic maintenance practices. For example, you should learn how to maintain and service the battery and how to check and maintain fluid levels (oil and hydraulics). Boat engines that are water-cooled using water drawn from a lake or river require seasonal winterizing to prevent freezing damage. The water is drained from the engine block and usually replaced with chemical antifreeze. For environmental reasons, it is best to dewinterize by draining and properly disposing of the antifreeze rather than allowing it to flush into the waterway when the boat is first used in the spring.

If the boat motor is professionally serviced and inspected at the beginning and end of the boating season, and properly used and serviced by the operator during the season, most problems can be avoided. For boats used year-round, manufacturer service schedules and procedures, usually based on operating hours, should be followed.

Pull the dipstick to check the engine fluid levels.

Weather

Always check weather conditions and forecasts before going out on the water. Constantly updated information from the U.S. Weather Bureau is available on weather station monitors in most marinas, on continuous radio broadcasts, and on the Weather Channel broadcast on most cable and satellite TV providers. This information is also available online and on most mobile phone systems.

Weather service monitors in marinas or online provide up-to-date information.

Remember that the only constant in the weather is change. Check and recheck weather information sources periodically—hourly while on the water.

Weather systems usually move in patterns unique to the region and time of year, so seasonal patterns should always be considered when planning any boating activity. Directional movement of fronts—weather systems where masses of warm and cool air meet and produce storms—is predictable in most locales, based on historical data. Learn these seasonal weather patterns for your area and the signs that indicate the weather is about to change.

Taking a mobile phone out on your boat can help you keep tabs on the weather, but remember that they are not always reliable. Also, if you take a mobile phone onboard, be sure to keep it protected in a resealable plastic bag.

Plan outings by taking into account seasonal weather patterns and by using your knowledge and experience of local weather patterns. With an understanding of seasonal patterns and signs of change, you will be able to recognize upcoming weather changes—particularly the onset of dangerous weather. For example, changes in wind direction or velocity, the development of certain cloud formations, and a drop in barometric pressure all signal that severe weather may be on its way.

Signs of Fair Weather

Expect pleasant weather when you see some of these signs:

- *"Red sky at night, sailor's delight."* The dust particles in the dry air produce a glowing red sunset.

- *"Swallows flying way up high mean there's no rain in the sky."* Swallows are birds that catch and eat flying insects. In the high air pressure that comes with fair weather, insects can be carried aloft by air currents.
- *"If smoke goes high, no rain comes by."* Campfire smoke rises straight up when there is no wind. Still air is generally stable and will not move moisture into an area.
- *"When the dew is on the grass, rain will never come to pass."* Dew forms when air moisture condenses on cool leaves and grass. This happens especially during the cool, clear nights that come with good weather and high pressure.

If you notice an approaching storm, get off the water as quickly as possible. If caught in a storm, stay low and get to the dock as soon as possible.

If you see lightning, keep a low profile in the boat until you reach shore. During a lightning storm, get off and stay off the water and away from open or exposed shorelines. On shore, stay away from tall geographical features such as trees. Remove your life jacket, place it on the ground, and crouch low on it. Stand at least 100 feet apart from your companions.

Signs of Stormy Weather

The following signs suggest bad weather is on the way:

- *"Red sky at morning, sailor take warning."* Dry, dusty air is moving away toward the east. Clouds and moist air might be coming in from the west.
- *"Swallows flying near the ground mean a storm will come around."* The low air pressure that pulls in stormy weather causes insects to fly close to the ground on heavy, moist wings. Swallows feeding on them will follow.
- *"If smoke hangs low, watch out for a blow."* Low air pressure can prevent campfire smoke from rising very high.
- *"When grass is dry at morning light, look for rain before the night."* On a cloudy night, grass might not cool enough for dew to form.


HURRICANE
EVACUATION
ROUTE

Service and Emergencies

Scouts with boating skills can offer service to people and their communities in many ways. Good Turns can range from everyday courtesies and errands to saving lives and property during serious emergencies. Nowhere does the Scout motto—Be Prepared—mean more than it does on the open water.

When bridges are out and roads are under water, the motorboat takes over. In regions where flooding is common, a Scout troop with a trained boater in its ranks should be organized and prepared to assist local authorities in critical situations. Such assistance can be invaluable.

When you are out on a lake, river, or bay in your boat, always be ready to assist someone in need. The loan of a little gasoline, the towing of a boat with engine failure, and the return of a boat that has gone adrift are small things, but the people you help will be grateful to you and your Scout training.

Sometimes you can loan a pump or bailing can to someone with a badly leaking boat and help keep it afloat until it can be beached. There might be times when you can help swimmers who overestimated their endurance and became tired before they could get back to shore.

You might even have to rescue people whose boat has capsized or swamped. If you find yourself in a situation that requires that you take people into your boat from the water, get them in over the stern, where you have the widest safety margin for such an operation.

In a person overboard situation—when someone falls out of your boat—first throw a life ring or floating cushion to the person. Then turn immediately, circling up to him or her slowly and carefully so the boat does not hit the person. When alongside the person in the water, stop the engine and help him or her back aboard over the stern.

As you become an experienced boater, you can help teach newcomers by sharing your knowledge.

Motorboating Resources

Scouting Literature

Canoeing, First Aid, Fire Safety, Fishing, Fly-Fishing, Kayaking, Lifesaving, Pioneering, Rowing, Scuba Diving, Small-Boat Sailing, Swimming, Waterskiing, Weather, and *Whitewater* merit badge pamphlets; *Scouts BSA Handbook for Boys, Scouts BSA Handbook for Girls,* and *Fieldbook*

With your parent or guardian's permission, visit Scouting America's official retail site, **scoutshop.org**, for a complete list of merit badge pamphlets and other helpful Scouting materials and supplies.

Books

Aarons, Richard N. *Small-Boat Seamanship Manual.* International Marine/Ragged Mountain Press, 2006.

American Red Cross. *American Red Cross First Aid: Responding to Emergencies.* Staywell, 2007.

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Eaton, Jonathan. *Chapman Piloting & Seamanship,* 68th ed. Hearst, 2017.

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Low, Charles T. *Boat Docking: Close Quarters Maneuvering for Small Craft.* Harvey Island Enterprises, 1997.

Siminoff, Roger H. *Boating 101: Essential Lessons for Boaters.* International Marine/Ragged Mountain Press, 1999.

Stagner, Eugene. *Understanding the Outboard Motor,* 3rd ed. Prentice Hall, 2002.

Thompson, Luke. *Essential Boating for Teens.* Children's Press, 2000.

U.S. Sailing Association. *Start Powerboating Right!* 3rd ed. United States Sailing Association, 2013.

DVDs

The following DVDs are available from Bennett Marine Video (bennettmarine.com):

Back to the Basics of Boating

Back to the Basics: Improve Your Boating Skills and Knowledge

Back to the Basics: What to Do When Things Go Wrong

Boating Basics for First-Time Boaters

The Encyclopedia of Boating Tips

On-the-Water Boating Tips

100 Boating Mistakes and How to Avoid Them

Top 60 Tips: Boat Handling

Organizations and Websites

National Association of State Boating Law Administrators (NASBLA)
www.nasbla.org

National On-Water Standards (NOWS)
www.onwaterstandards.org

National Safe Boating Council
www.safeboatingcouncil.org

North American Safe Boating Campaign
www.safeboatingcampaign.com

U.S. Coast Guard Auxiliary
www.cgaux.org

U.S. Coast Guard Boating Safety Resource Center
www.uscgboating.org

U.S. Sailing Association
1 Roger Williams University Way
Bristol, RI 02809
www.ussailing.org

Acknowledgments

Scouting America is grateful to the men and women volunteers serving on the National Merit Badge Subcommittee and the National Aquatics Subcommittee for the improvements made in updating this pamphlet.

Scouting America would also like to thank the many men and women of various agencies who have worked to develop the National On-Water Standards – Power. These voluntary standards have and will continue to guide the Aquatics Task Force in its effort to improve and revise this merit badge.

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