

Sailing Study Guide

Chapter 1

Introduction

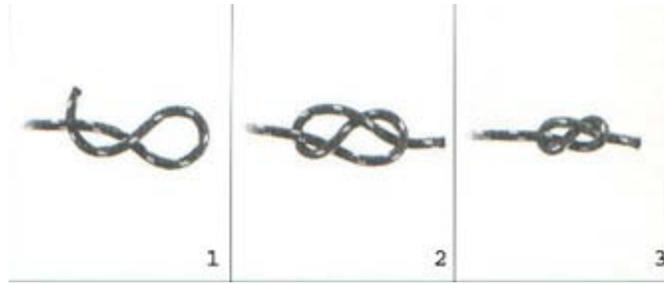
In order for a rope to be useful on a boat you need to know how to work its ends and ensure they link up with other elements of the rigging. Ropes can be used for mooring, anchoring, towing and fastening. On a sailboat, ropes can be used for raising sails, trimming sails, holding up the mast and countless other tasks. Once rope is placed on a boat it is referred to as line. Knots are used to tie the halyards to the sails, the sheets to the boom and traveler, as well as cleat the boat to the dock.

Rope is measured by its diameter and by the load that it will support without breaking. Common sizes range from 1/8" to 3/4". Different types of ropes have different characteristics. Natural rope, which is made from vegetable fibers, were used for thousands of years but have mostly been replaced. It is easy to work with, but will weaken quickly once weathered. During World War II a need for a more abundant material was created and as a result synthetic rope-making materials were produced. Most ropes used today are synthetic ropes because of their superior strength qualities and ability to resist rotting, although UV rays can damage them. The chart below shows traits of four common types of rope.

TYPE	ADVANTAGE	DISADVANTAGE	TENSILE STRENGTH (³ / ₈ " diameter)
Nylon (Polyamide)	Little stretch until 25% of breaking strength at which the amount of stretch increases.	Vulnerable to UV rays.	4200 lbs
Dacron (Polyester)	Highly elastic until 25% of breaking strength, then little to no stretch. Durable against UV rays.	Expensive and not as strong as nylon.	3600 lbs
Polypropylene	Low elasticity and inexpensive. Great for mooring because it floats	Highly vulnerable to UV rays and weak.	2500 lbs
Manila (Natural)	Cheap and easier to splice. Best price for natural line.	Weaker, heavier and will rot	1350 lbs

Figure 8

This knot is used as a stopper knot. It is easy to take apart when needed, even after heavy load is applied and the line has been wet.

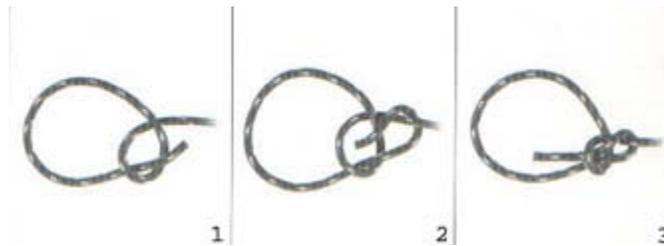


Make a bight in the end of the line. Take the bitter end of the line and wrap it around the other half of the bight. Complete the knot by placing the bitter end through the eye of the bight and pulling tight.

Bowline

This knot is used to create a loop at the end of a line. It becomes stronger with greater load and can be easily take apart with one hand.

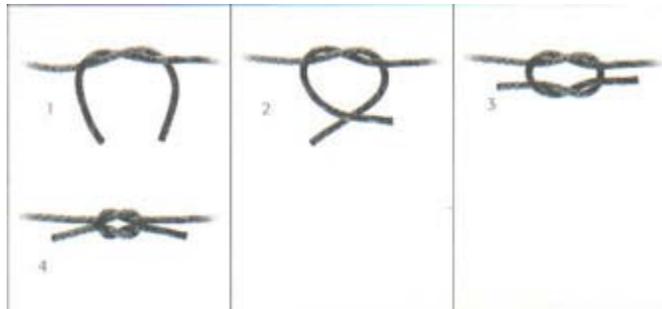
Make a small overhand loop in the line (bitter end of the rope on top of the fixed end). Take the bitter end and pass it through the bottom of the overhand loop, creating a larger loop. (This larger loop is what you are trying to create) With the remaining length of the bitter end, go around the back of the fixed end and then into the overhand loop from the topside. Pull tightly and evenly.



Square Knot

This knot is used to secure two bitter ends together. It can come apart on its own although it does become stronger with increasing load. Like most knots used in boating, it can be taken apart easily after heavy load is applied and when wet.

Start by holding one of the bitter ends in each hand. Cross the line in your right hand over the one in your left hand and tie an over hand knot like you would when tying your shoe. Do this one more time but cross the new left line over the new right line. (Right over left, Left over right) If tied incorrectly you will get a useless Granny knot.



Cleat Hitch

This knot is used to secure a loaded end of a line. It can be used wherever there is a cleat.

Make a loop around the cleat making sure to go under the horn of the cleat furthest from the load first. Once the loop around the cleat is done, cross over the top of the cleat and under the horn that you first went under. (In the opposite direction) Complete the hitch by making an underhand loop and hooking it on the second horn and pulling the hitch taught.



OTHER KNOTS OF INTEREST

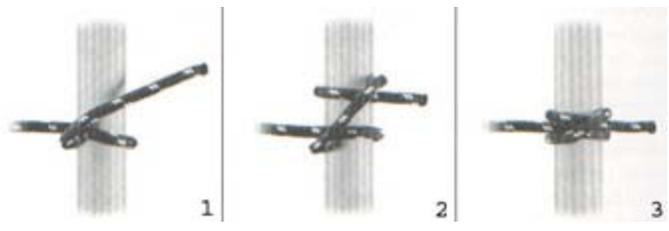
Sheet Bend

This knot is used to join two lines of different diameters. This knot will come apart easily and is easily tied.

Make a bight in the larger diameter line. Take the bitter end of the smaller diameter line and pass it through and around the bight of the first line. Weave the bitter end of the smaller line over the fixed end of the bight, under the bitter end of the smaller line and then over the bitter end of the bight.



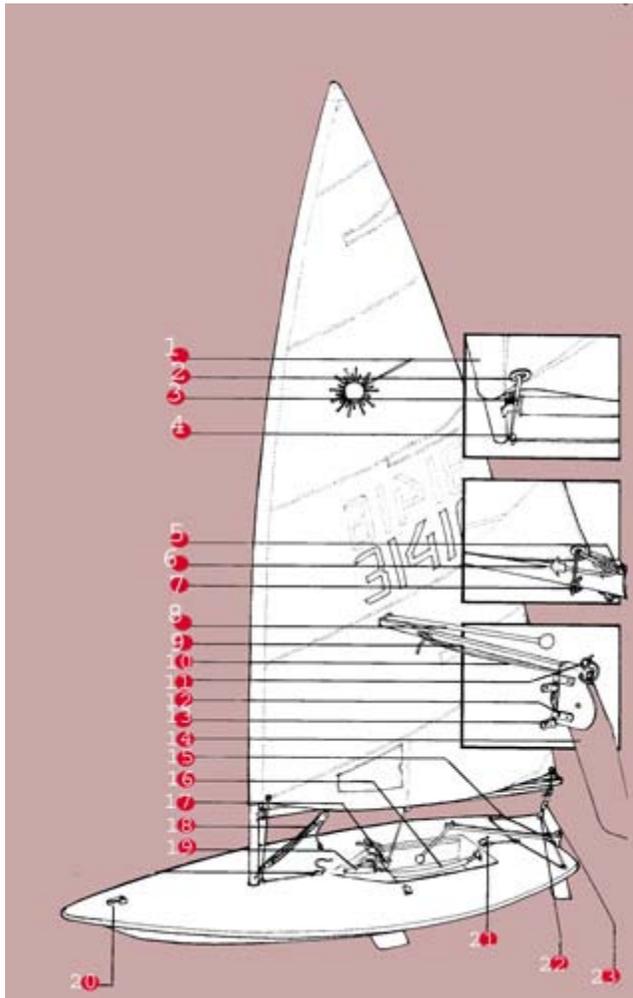
Clove Hitch



Chapter 2

PARTS OF THE BOAT

LASER RIGGINGS (NOT ON TEST)

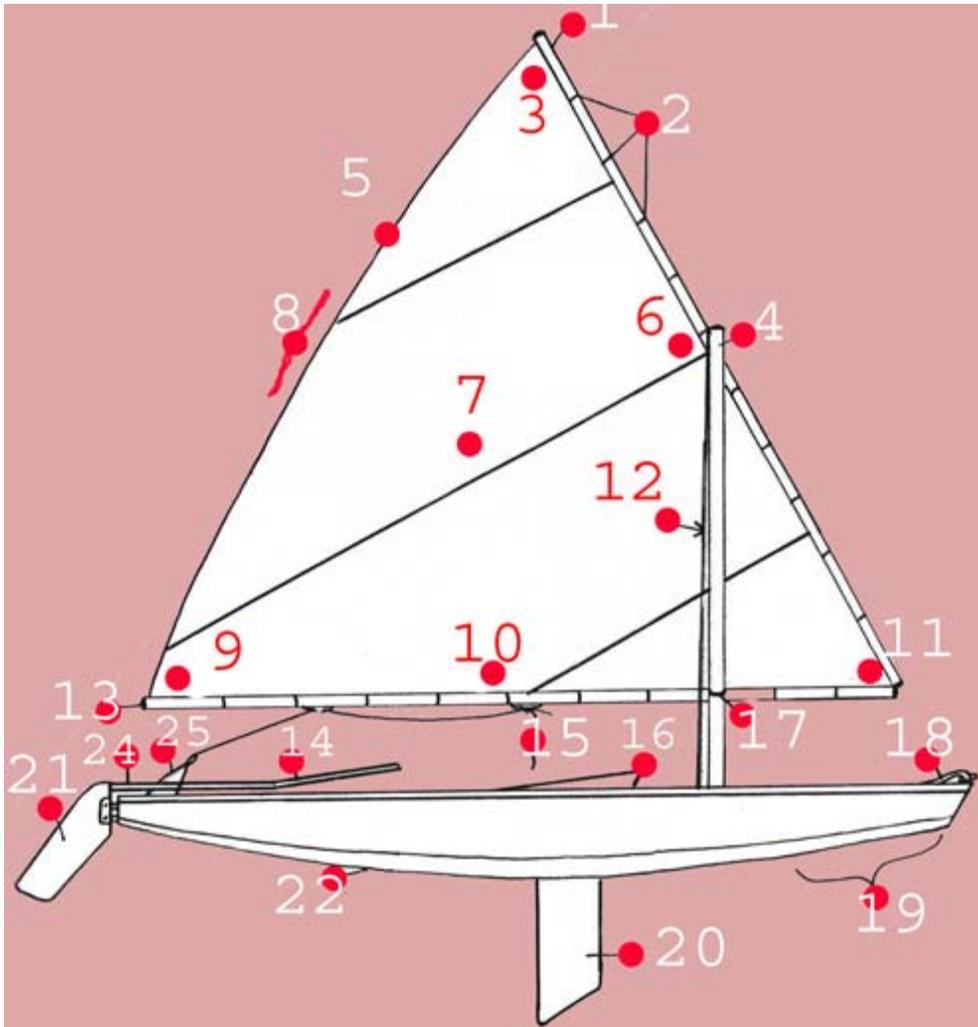


Match the Number with the given Description

NOT ON TEST

1. Luff sleeve
2. Tack grommet
3. Cunningham
4. Cunningham fairlead
5. Outhaul fairlead
6. Outhaul
7. Clew tie-down
8. Tiller extension
9. Tiller
10. Rudder securing line
11. Tiller retaining pin
12. Pintle
13. Gudgeon
14. Rudder
15. Traveler
16. Hiking strap
17. Mainsheet block
18. Boom vang
19. Dagger board
20. Bow handle
21. Traveler cleat
22. Small block with brummel
23. Large block with brummel

SUNFISH RIGGING



Match the Number
with the given
Description

-
- 1.Gaff spar
 - 2.Sail clips
 - 3.Head
 - 4.Mast
 - 5.Telltale
 - 6.Luff
 - 7.Sail
 - 8.Leech
 - 9.Clew
 - 10.Foot
 - 11.Tack
 - 12.Halyard
 - 13.Boom
 - 14.Tiller extension
 - 15.Mainsheet
 - 16.Splash rail
 - 17.Gooseneck
 - 18.Bow chock
 - 19.Bow
 - 20.Dagger board
 - 21.Rudder
 - 22.Self bailer

Chapter 3

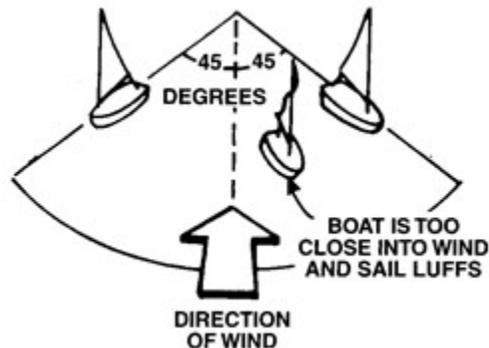
POINTS OF SAIL

Introduction

When sailing, it is often necessary to change the direction the boat is heading with respect to the direction the wind is blowing. For instance, you may have to avoid an oncoming vessel. You may see something that you would like to get a look at, or you may have to turn back to the dock to avoid a storm. The direction the boat is heading with respect to the wind direction is its respective point of sail.

No Go Zone

The first thing that one must understand when setting a course is that a sailboat cannot sail directly into the wind. The angle that a boat may sail off the wind varies, but it is typically 45 degrees on either side of the wind.



The angle that a boat cannot produce power to move is known as the no go zone.

Close Hauled

This is the point of sail when the boat is headed as close to the wind as it can while still maintaining power in the sails. This is typically 45 degrees off the wind.

When a boat is heading to either side of the no go zone it is considered to be close hauled. When a boat is close hauled the sails should be trimmed in tight. The daggerboard should be all the way down. **Beam Reach**

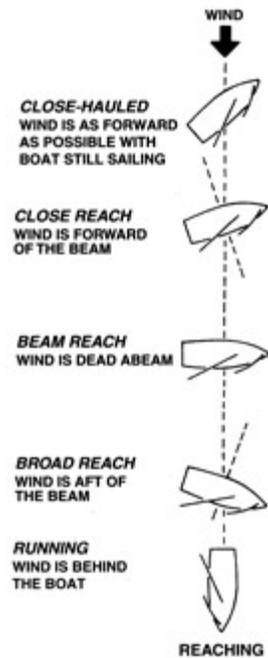
The point of sail where a boat is headed 90 degrees off the wind

When a boat is on a beam reach, the wind is blowing across the side, or beam, of the boat and the sails should be trimmed about halfway. The daggerboard can be raised about halfway. On this point of sail, the boat is still mostly using the lift principle to move. On many boats, the beam reach is the fastest point of sail.

Broad Reach

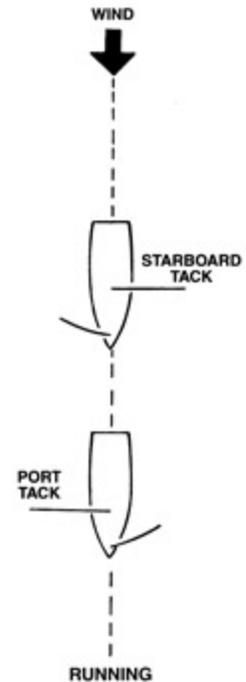
When a boat is headed so that the wind is hitting the boat on one of its back corners it is sailing a broad reach

On a broad reach, a boat should have its sails about $\frac{3}{4}$ of the way out. The daggerboard can have about $\frac{1}{3}$ of its surface in the water. On this point of sail, a combination of lift, as well as the pushing force of the wind is moving the boat.



Run

When a boat is headed directly away from the wind, or directly downwind, it is said to be on a run. On a run, the sails should be let out completely, as they do not provide any lift at this angle. The force of the wind pushing the sails moves the boat through the water. When on a run, maximizing the sail area that the wind can push against helps maximize speed. The daggerboard can be raised almost all the way to reduce drag. On this point of sail, the fastest that the boat can move is the speed of the wind.



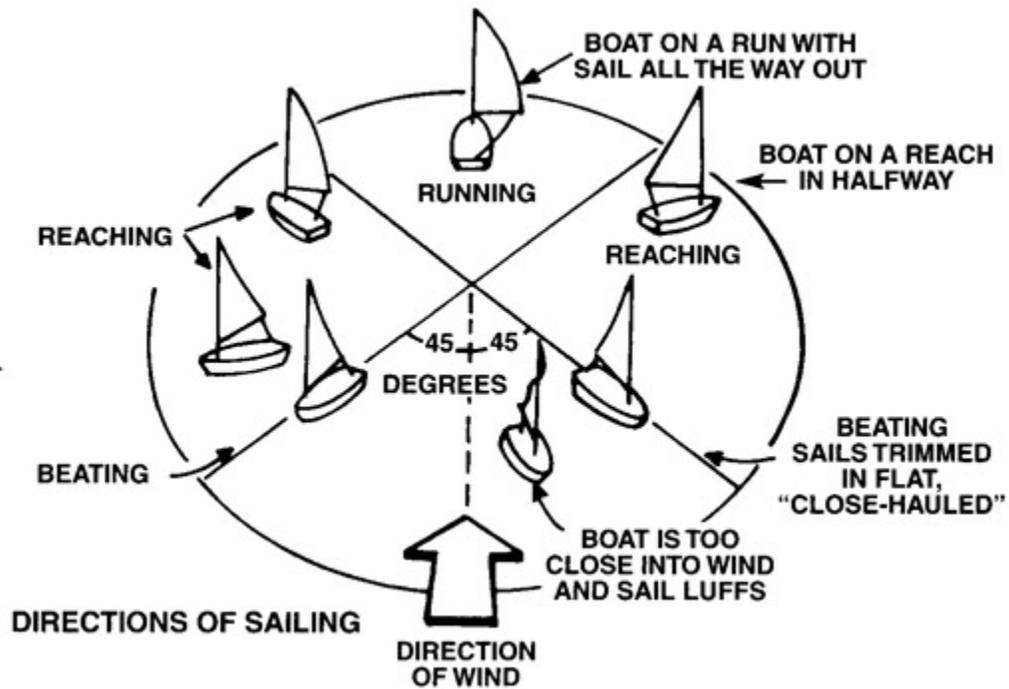
Docking

A boat is rigged into the wind, launched into the wind, and also docked into the wind. Docking should always be done very slowly so that the boat is not damaged and the docking point is not passed. If there is no way possible to dock into the wind, then get as close to that point as possible and maintain a slow speed. When nearing your landing point, let your sails out all the way to slow the boat, and once close to the dock, turn the boat up into the wind along either the dock or the shore. When landing on shore, as the water gets shallow, you will need to pull up your daggerboard so you do not hit the bottom of the lake. In very shallow water, you will need to remove your rudder. Once the daggerboard and rudder are removed, you can pull your boat on shore or the dock and de-rig into the wind.

Docking Demonstration: [Click to Play](#)

Summary

When a boat changes its course, it is most often changing its point of sail, or directional heading in the wind. As a boat changes its point of sail, the sails will have to be adjusted in order for the boat to maintain speed. A boat cannot head directly into the wind. This area is known as the no go zone. On this heading into the wind, the sails cannot produce the power that is needed to move the boat.



Chapter 4

MANUEVERING

Steering

A sailor steers a sailboat with the tiller, a stick which is attached to the rudder (a pivoting, vertical, foil that goes through the water). When the sailor points the front of the tiller to the left (port side) of the boat, the boat will steer to the starboard (right side) and vice versa. If you have ever operated a small outboard engine on a motorboat, the steering is set up the same way. The sailor steering the boat will always be sitting on the windward side (side the wind hits first, opposite of the sail) of the boat. When pushing the tiller away from your body, the boat will steer closer to the wind, or farther upwind. Sailors refer to this action as heading up. Conversely, when pulling the tiller towards and behind your body, the boat will steer farther away from the direction the wind is coming from. Sailors refer to this action as falling off or heading down. This is difficult to visualize without being on or seeing a sailboat.

Summary: The boat turns opposite the direction you move the tiller, pushing the tiller causes you to head up into the wind, and pulling the tiller causes you to fall off the wind.

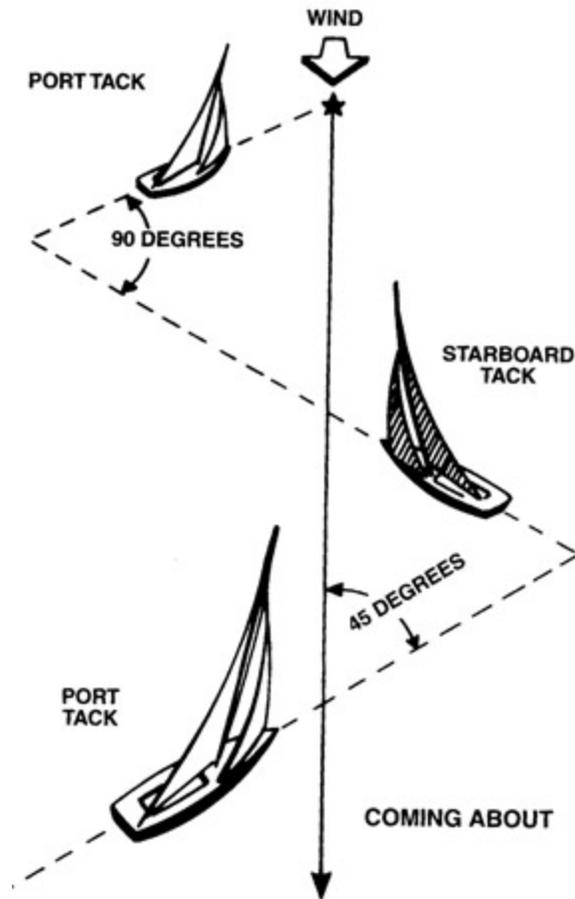
The boats that are available to sail at Lake Wauburg have a tiller extension which is a stick attached to the end of the tiller by a universal joint. The single purpose of this device is to allow you to steer the boat from places in the boat where your arm would not be able to reach the tiller. You still want to be thinking about where the tiller is placed; just use the tiller extension as an extension of your arm, and focus on the tiller.

No Go Zone

A sailboat cannot sail directly into the wind. The closest a sailboat can sail to the wind, depending on the boat, is about 45 degrees. This means the angle from a line parallel to the wind and a line representing the course the boat is traveling, the heading, can be at a minimum of 45 degrees. There is 45 degrees of No Go Zone on each side of the wind, therefore the total No Go Zone is 90 degrees centered at the direction the wind is coming from. That leaves 270 degrees of open sailing area!

Tacking

A tack is a certain type of turn in a sailboat in which one takes the heading of the boat all the way through the No Go Zone. This means the bow will cross through the direction of the wind. The first question most new sailors have is how this can happen if we can't sail through the No Go Zone. It is true that going through the No Go Zone the sailboat will not have any power. This is why we really need speed before the tack. It is the momentum that will carry the boat through the tack. If the boat doesn't have enough speed, it will get stuck without power in the middle of the No Go Zone. Sailors have a special name for this; it is called being stuck in irons, To properly execute the tack, you need to be sailing relatively close to the wind with your sail properly trimmed for maximum speed. Sail trim will be covered in other sections. The first step is to look behind you at about 90 degrees to the heading your boat is currently at. This will be your new course after the tack so it is important to make sure it is clear of other boats or obstructions. Now that you see your new course will be clear, you want to gently push your tiller towards your sail. You don't want to jam your tiller over too forcefully as it may slow down the momentum. However, if you push it too slow you could get stuck in irons.. As your boat approaches the wind, the sail will start to luff. Luffing is what sailors call it when their sail is flapping like a flag. As the sail starts to luff more and more, it will approach the middle and eventually your side of the boat. You need to be ready for this and duck as you see the boom come towards you. You want to switch sides as the sail is switching sides to keep the boat balanced. As you switch sides there are a few key things you need to do with your hands and body to keep yourself from getting tangled up. The first step in crossing the boat is to move your back foot across the boat, then you take the hand that is holding the line and put it behind your back as you shift your weight to the middle of the boat. The next step is a behind the back pass, switching the line into your tiller hand.



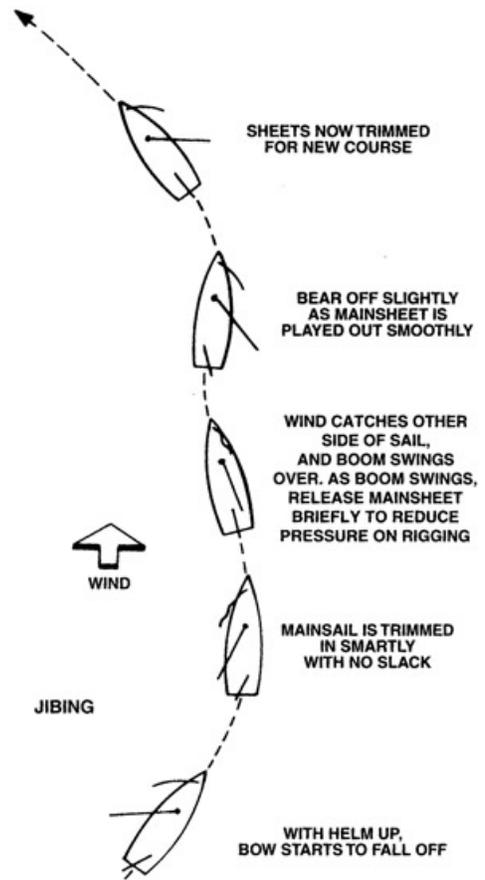
With both the tiller and line in one hand you then sit on the other side of the boat as the sail fills on the opposite side. Now with your free hand grab the line from the hand holding both the tiller and line. You should now be sailing on the other side of the wind than you were before the tack.

Tacking Demonstration: [Click to Play](#)

Jibing

Like tacking, jibing is another useful sailing maneuver. During the tack, the front of the boat, the bow turns through the wind to make a directional change. The jibe, in simple terms, is the opposite of a tack where the rear of the boat, the stern, turns through the wind. While sitting in proper sailing position, gently pull the tiller toward you, and the boat will begin to turn away from the wind. As the sail comes over your head, duck under it, switch sides of the boat, and straighten out the tiller so you are headed toward your destination. This will happen much quicker than during a tack, but the same process applies. Make your first step across the boat with the leg closest to the stern. As you step across, reach behind your back to take the tiller with the hand holding the mainsheet. Bring your other leg across then sit down on the rail of the boat. Now take the mainsheet into your free hand. Don't forget, when switching sides of the boat, always look forward to where you are going, and never let go of the tiller or the mainsheet.

Jibing Demonstration: [Click to Play](#)



Chapter 5

RULES OF THE ROAD

Rules of the Road

On the water, vessels of all kind need to follow a set of rules that govern those waters. This set of rules is called the Rules of the Road and it is very important that both skipper and crew are aware of these rules. Small boats should stay out of the way of a larger vessels. However, if there is a risk of collision the Rules of the Road clearly apply to large and small vessels alike. The first and most important rule that applies to all vessels is to avoid collision at all cost. With that in mind, there are rules applied to who the stand on vessel and who is the give way vessel is, determined by their ability to move and power. In the list below, a vessel is the stand on vessel to all vessels below it.

N – A vessel Not under command

R – A vessel Restricted by maneuverability

C – A vessel Constrained by draft

F – A vessel engaged in Fishing or Trawling

S – A vessel under Sail power only

P – A vessel that is Power-driven

S – A Seaplane

An acronym to remember the order is, “New Reels Catch Fish So Purchase Some”

In the case of sailboats, a few other rules apply. These rules come from the Racing Rules of Sailing, Part 2 Section A, Rules 10-13

Rule 10: Sailboats on Opposite Tack

“When boats are on opposite tacks, a port tack boat shall keep clear of a starboard tack boat.”

Remember that a port tack boat has the wind blowing over her port side and the sail is on her starboard side. The port tack boat can keep clear by turning around, sailing behind the stern of the starboard tack vessel or crossing the bow of the starboard tack vessel. The important thing to remember is that the port tack vessel cannot cause the starboard tack vessel to alter course in order to avoid contact.

Rule 11: Sailboats on the Same Tack, Overlapped

“When boats are on the same tack and overlapped, a windward boat shall keep clear of a leeward boat.”

Rule 12: Sailboats on the Same Tack, Not Overlapped

“When boats are on the same tack and not overlapped, a boat clear astern shall keep clear of a boat clear ahead.”

Rule 13: While Tacking

“After a boat passes head to wind, she shall keep clear of other boats until she is on a close-hauled course. During that time the previous three rules do not apply. If two boats are subject to this rule at the same time, the one on the other's port side shall keep clear.”

Chapter 6

SAFETY AND WEATHER

Clothing and Safety Equipment

Sailing can be done in almost any weather condition. However, to fully enjoy experience and to do so safely, you must have the proper clothing. Weather can change rapidly and having the right gear at hand is essential.

Small one and two man sailboats are easily capsized. Small boats also have less freeboard, or less distance between the rail and the water, therefore sailors are often exposed to sea spray. For warmer water conditions and light wind, normal swim wear under a T-shirt is appropriate. When conditions turn colder, the use of a spray suit, or layer of wind/water-proof material and in more extreme cases a wet suit, is necessary. Vital body heat can easily be lost when immersed in water for even short periods of time. If the combined water and air temperatures equal less than 120 degrees Fahrenheit, hypothermia is a threat. Being prepared with a wet suit or spray suit will keep you warm and out of danger. Heat is also a cause for concern. It is of the utmost importance to bring a water bottle on the boat and to drink water at regular intervals. At least one pint of water per hour is recommended while on the water. Heat stroke or exhaustion is a threat whenever the air temperature is above 90 degrees Fahrenheit and the relative humidity is above 70% according to the U.S. Sailing Instructor Manual.

A good set of gloves is helpful regardless of weather conditions. Beginning sailors always have an assortment of blisters and cuts from a hard day in the boat. Gloves keep the hands protected and also provide additional grip when winds increase.

Footwear is a good idea, and sailing boots or shoes can provide protection for your feet and traction in the boat.

The most important piece of safety equipment is the personal flotation device (PFD, which are always worn on the water. A simple gust of wind from a new direction can send the boom across the boat and knock you into the water, perhaps even knocking you unconscious. Type III PFDs are the most common worn while sailing. A proper fit is key to comfort and safety. If it is too loose it will ride up while you are in the water and chafe your neck when you are seated. If it is too tight it will prohibit movement. In a proper fitting PFD, you should be able to turn your head and be seated without it interfering.

Safety concerns on the water are mostly weather related. Storms can quickly form with high winds and lightning. Try to maintain an awareness of the changing weather conditions. The boom is a cause of injury to many sailors. Changing winds and accidental jibes or tacks can cause the boom to swing with great force across the boat and into your head. Always be on the lookout for its movement.

Capsizing

Capsizing is a part of sailing. When it happens, it is important to know how to right the boat or un-capsize. All sailboats will float if capsized. Once capsized, check to make sure the situation is safe (i.e. no injuries or damage to the boat). Release all lines so the sails are no longer cleated. Check the centerboard to make sure it is all the way down and find the main sheet. Point the boat upwind by swimming the bow into the wind (if possible) and then, swim around to the centerboard holding on to the main sheet. Next, grab onto the centerboard pulling your weight onto the board. As the boat rights itself, reach up and grasp the side of the boat (the gunwale), scramble over the side with main sheet in hand. The mainsheet allows you to maintain control over the boat. Once inside the boat, check all sails and lines and prepare to continue sailing.

Man Overboard

If one person falls overboard in a two-man sailboat, actions must be taken to quickly recover that person. The jib should be left to luff so the only concern is the main sail. Sail the boat on a beam reach and tack onto a reciprocal beam reach keeping the man overboard in site. As you approach the man overboard bear leeward so you are not pushed into the man overboard. Let your main sail luff and turn the boat into the wind once you are in reaching distance. Stabilize the boat while the man overboard crawls back in.

Chapter 7

PRACTICAL

1 is task performed poorly, 5 is task performed excellent

Sailing Skills Evaluation Form

KNOTS	ABILITY LEVEL
Square Knot	1 2 3 4 5
Figure-8	1 2 3 4 5
Bowline	1 2 3 4 5
Cleat Hitch	1 2 3 4 5
PARTS OF THE BOATS	
Sunfish Rigging	1 2 3 4 5
Laser Rigging	1 2 3 4 5
BOAT HANDLING	
Point of Sail	1 2 3 4 5
Tacking	1 2 3 4 5
Gybing	1 2 3 4 5
Docking	1 2 3 4 5
Man-Overboard Rescue	1 2 3 4 5
Capsize Recovery	1 2 3 4 5

Note: This is the Sailing Skills Evaluation Form and is subject to change at the discretion of your sailing instructor

Glossary

Chapter 1

Mooring - the part of the boat to secure by a line or anchor.

Sheet - a rope attached to one or more ends of the sail allowing it to be pulled in or out depending on the wind.

Line - Ropes used for various purposes on or around a sail boat, it is the general sailing term instead of rope.

Chapter 2

-no terms to define-

Chapter 3

No Go Zone -The angle with respect to the wind that a boat cannot produce power to move.

Trimming in - When the sheet is pulled in.

Close Hauled - This is the point of sail when the boat is headed as close to the wind as possible while still maintaining power in the sails. This is typically 45 degrees off the wind.

Beam Reach - The point of sail where a boat is headed 90 degrees off the wind

Broad Reach - When a boat is headed so that the wind is hitting the boat on one of its back corners.

Chapter 4

Jibbing - (please refer to chapter 2 for a complete definition)

Tacking - (please refer to chapter 2 for a complete definition)

Chapter 5

Leeward - the lee side of the boat (side of the boat away from the wind).

Windward - the side of the boat closest to the wind.

Chapter 6

Capsize - a boat turned over on its side or upside down.

Cleat - a wooden, plastic or metal device used to hold or secure lines, (v.) to cleat- to secure a line in a cleat.

Freeboard - Distance between the boat rail and the water

Gunwale - Side of the boat

Heat exhaustion - Increase in body temperature caused by prolonged exposure to the sun, heat and humidity, also known as hyperpyrexia can lead to more serious conditions i.e. heat stroke

Hypothermia - Reduction in body temperature caused by prolonged exposure to cold temperatures or cold water

Luff - To stall or flap the sail at its forward edge or over entire sail.

PFD - Personal Flotation Device

Spray Suit - A lightweight pants and jacket set made of wind/waterproof material