



Grafham Water Sailability

Notes on Challenger Sailing

By Roy Beard

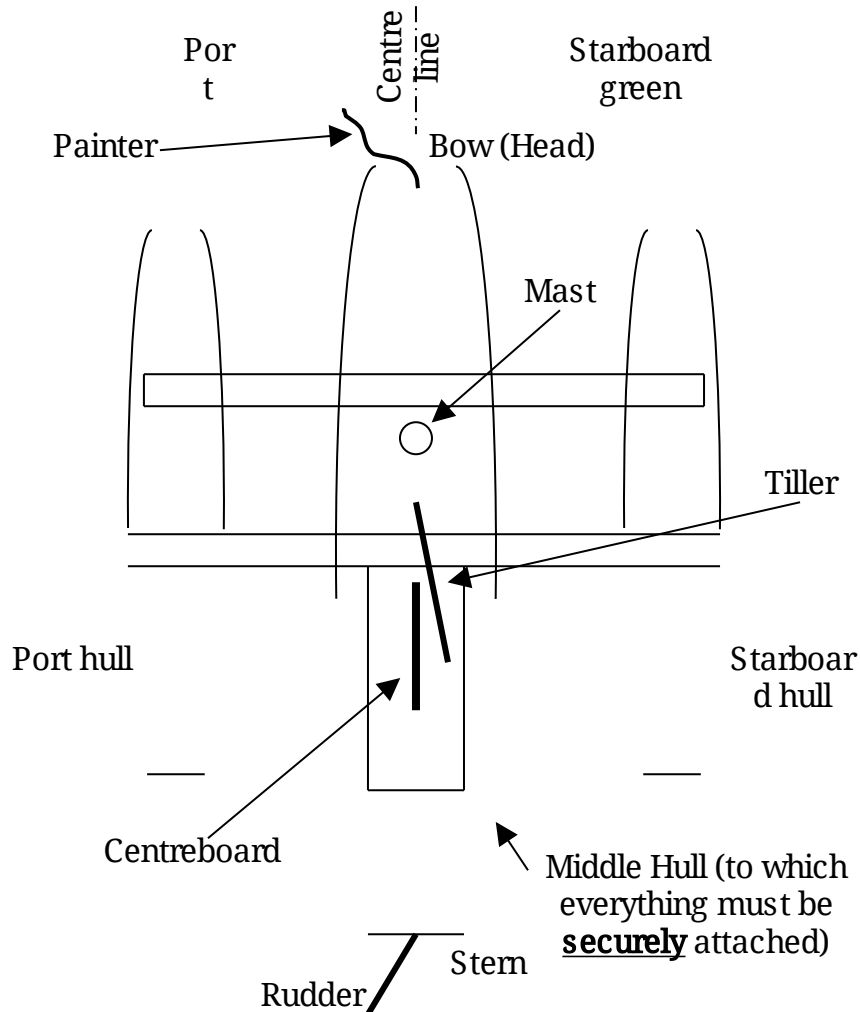
Introduction

Now that you have had an introduction to sailing it is time to understand the basic sailing skills and to learn the basic rules of sailing, “rules of the road”, to avoid collisions between boats in preparation for your solo sail. The attached notes will provide a reference for what you have been, or are about to be, taught on the water. The notes cover: -

- **The “bits” on a Challenger dinghy and its sail**
- **How a sail works**
- **Port and starboard sides**
- **Windward and leeward sides**
- **Port and starboard tacks**
- **Points of sailing, speed and stopping**
- **Tacking and gybing**
- **Rules to avoid collisions**
- **Sailing terms and techniques, and rope work**

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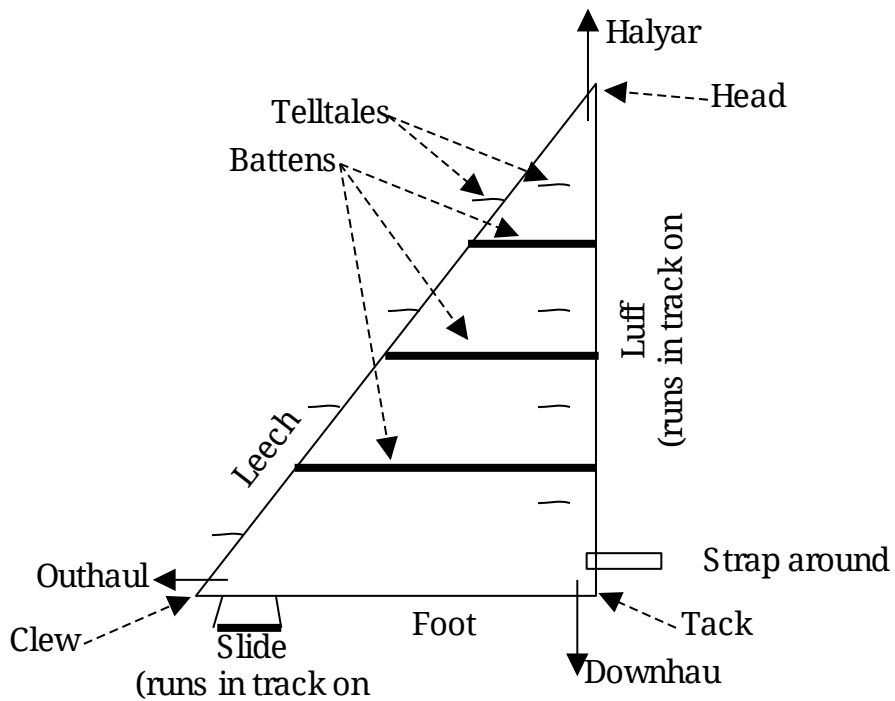
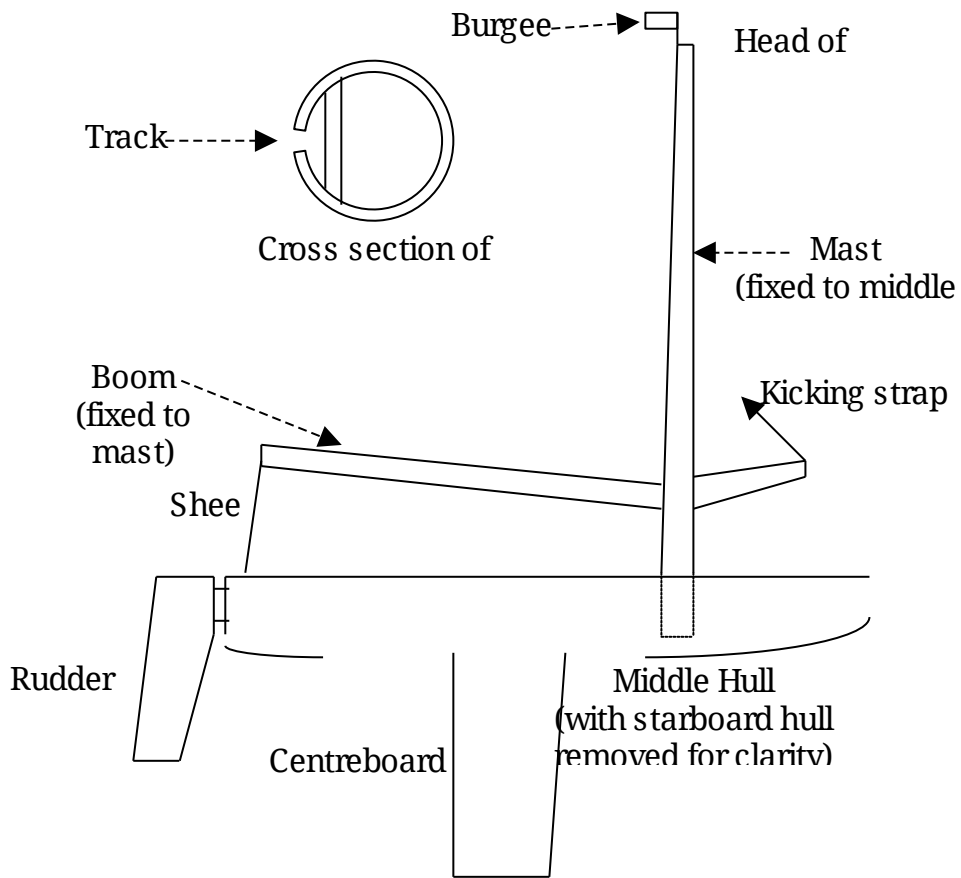
Introduction to Sailing and the Challenger



Buoyancy

All three hulls are hollow and form buoyancy chambers, with a drainage bung in the stern of each. Ensure that the chambers are empty of water and full of air and the bungs (either a screw or bayonet type) secured before sailing.

Also ensure you have personal buoyancy by wearing a buoyancy aid or life jacket before going afloat.

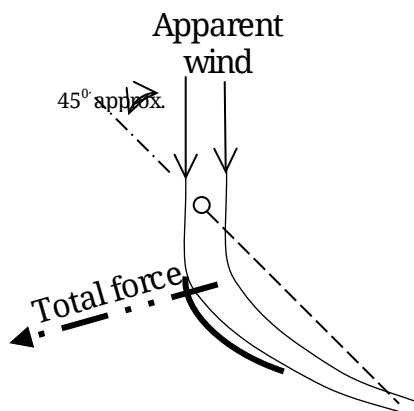


The Sail

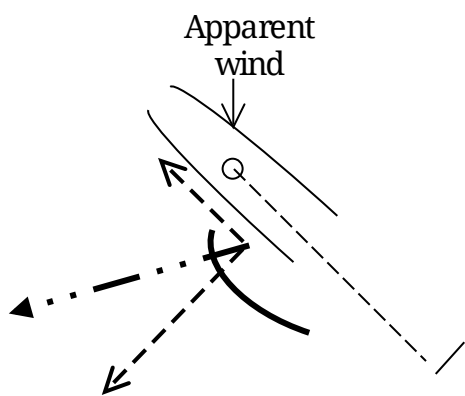
Controls

<u>Rudder</u>	Downhaul and up haul - lowers and raises rudder Tiller – connected to the rudder for steering
<u>Centreboard</u>	Downhaul and up haul – lowers and raises
<u>Boat</u>	Tiller connected to the rudder for steering Centreboard – reduces (but does not eliminate) sideways
<u>Sail shape</u>	Downhaul – removes creases from luff and bends mast to flatten sail Outhaul – pulls clew towards end of boom to flatten foot of sail
<u>Sail position</u> relative to hull	Sheet connected to the boom to which sail is connected – controls speed and when used with tiller acts as accelerator and

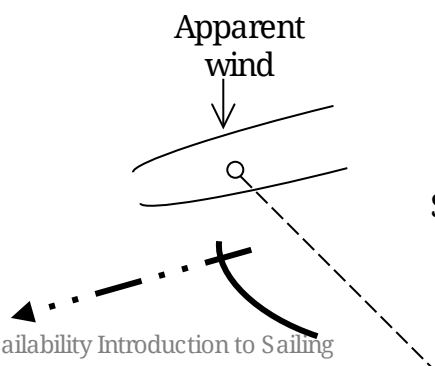
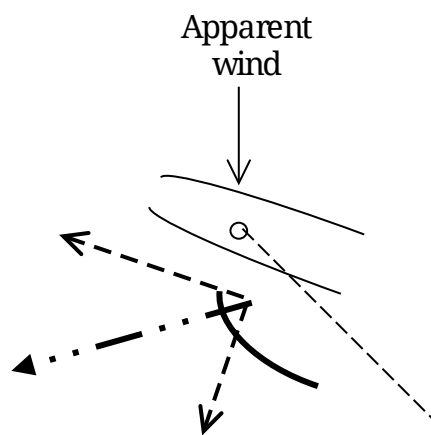
How a sail works



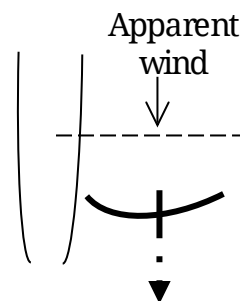
The apparent wind speed and direction is the combination of the true wind speed and its direction and the boat speed and its direction. The wind passing over the sail creates a total force on the sail as illustrated in the diagram on the left.



See note 1 on



See note 2 on



Note 1

Part of the total force on the sail goes to pushing the boat in the forward direction and part of the force goes in pushing the boat sideways, which is increased by the wind blowing onto the side of the boat.

When close hauled, the force from the sail pushing the boat forward is small (short arrow) whilst the force pushing the boat sideways is large (long arrow). As the boat sails more off the wind (away from the wind) the forward force increases and the sideways force decreases.

Note 2

On a broad reach the total force from the sail is all in the forward direction of the boat. It is for this reason that the broad reach is the fastest point of sailing. There is still wind on the side of the boat giving a small sideways drift. On a run the total force is also all in the forward direction of the boat but because the boat is “running” away from the wind the total wind force, and hence the boat speed, is reduced (shorter arrow). The apparent wind speed is the true wind speed minus the boat speed.

CENTREBOARD POSITION

The centreboard reduces, but does not total eliminate, sideways drift. Thus when sailing close hauled the centreboard needs to be fully down. For other points of sailing the centreboard can be left fully down but it is creating drag and slowing the boat. So when maximum resistance to side ways drag is not required the centreboard can be raised. For the amount, see the following table: -

Point of sailing	Centreboard position	Comment
Close	Fully down	Maximum drift to sideways drift required
Close reach	Fully down	Although the board could be raise a small amount it is preferable to leave it fully down as the boat may go to close haul due to wind shifts or other
Beam	$\frac{3}{4}$ down	Raise the centre board a small amount.
Broad	$\frac{1}{2}$ down	Raise it more to about half way.
Training run	$\frac{1}{4}$ down	Very little side thrust therefore only a small amount of centreboard required and it is also set
Run	$\frac{1}{4}$ down	Although for a run the centreboard could be raised completely, it is advisable to leave a small amount down as the boat may come off the run slightly due to wind shifts or to avoid other boats.

When should the centreboard position be changed?

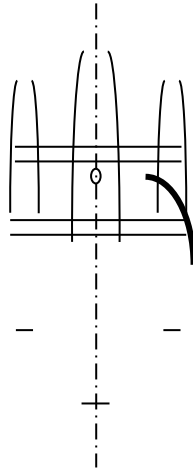
The centreboard should be **raised** when bearing away from the wind onto a new point of sailing e.g. going from a close reach to a beam reach, but make the change **after** the boat is on the new point of sailing.

The centreboard should be **lowered** when coming up into the wind onto a new point of sailing, e.g. going from a beam reach to close hauled, but make the change **before** the boat is on the new point of sailing.

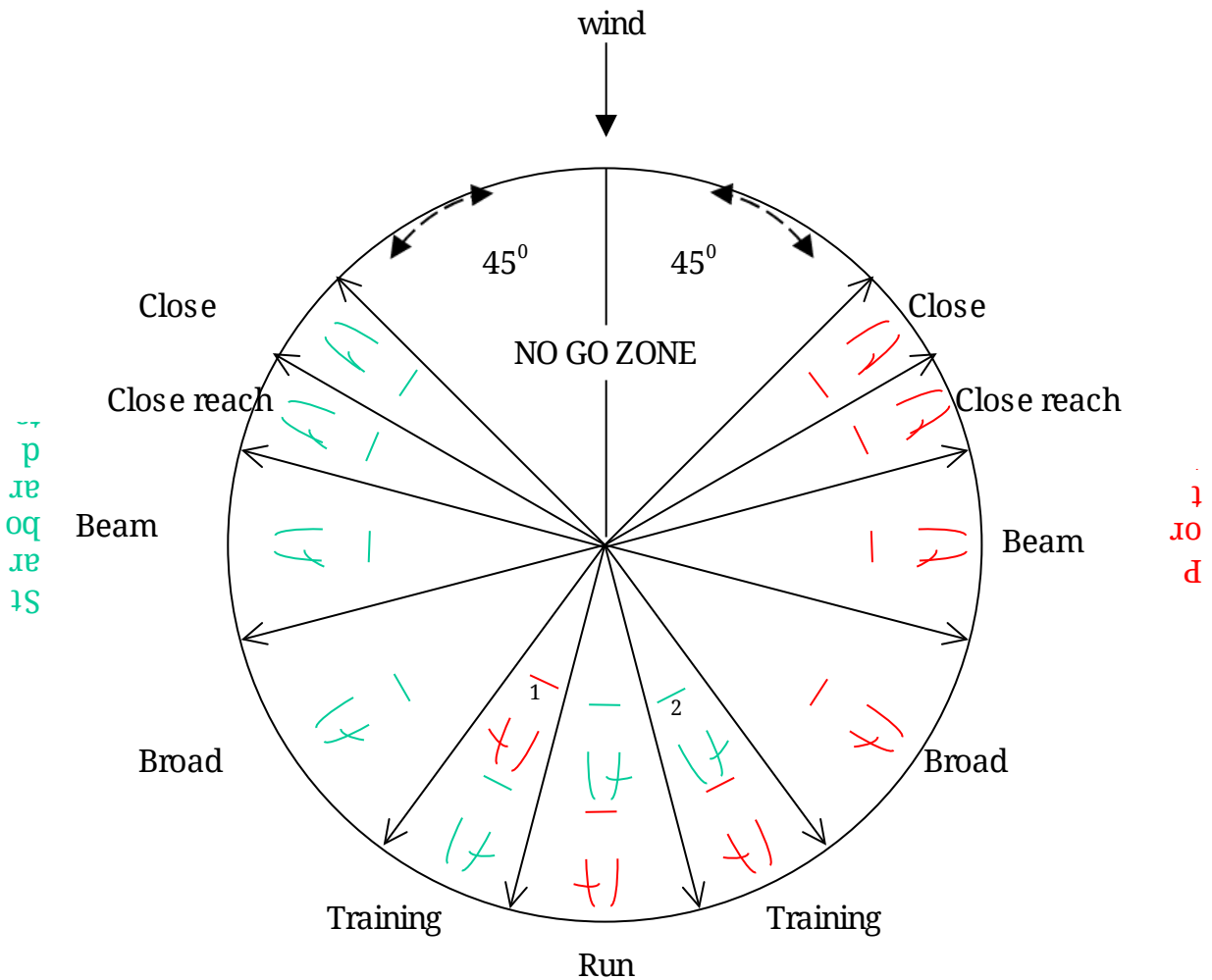
Windward side
[opposite side to the leeward

Leeward (pronounced loo'ard)
side

Boat shown on port tack
[tack equal to the windward side i.e the side opposite to the one on which the main sail



Direction and tack on which boat is sailing relative to the wind



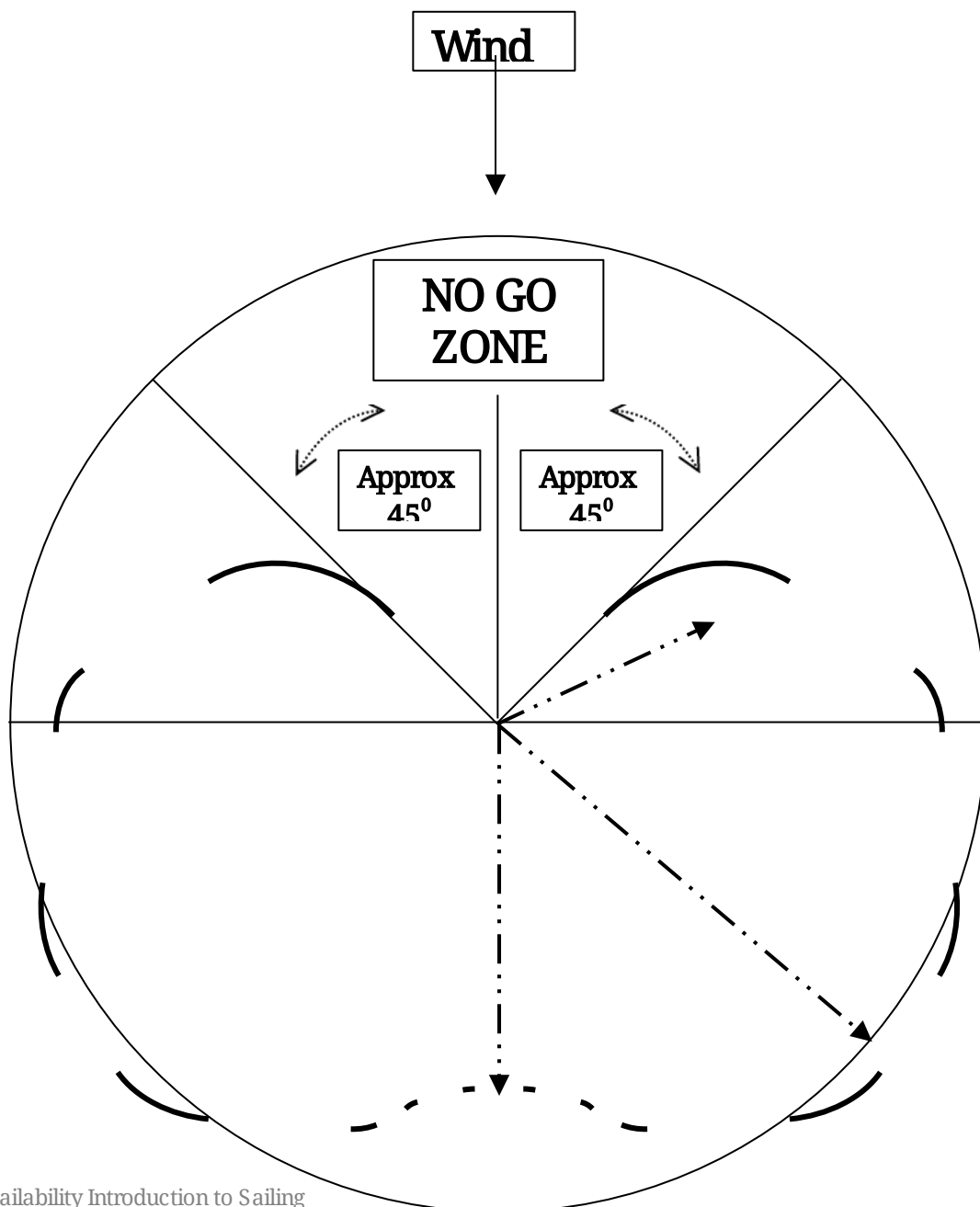
Boat 1 has its main sail on its starboard side and therefore is sailing on a port tack. This means that its starboard side is its leeward side and since the wind is blowing onto its leeward side it is said to be sailing by the lee on a port tack.

Boat 2 has its main sail is on its port side and therefore is sailing on a starboard tack. This means that its port side is its leeward side and since the wind is blowing onto its leeward side it is said to be sailing by the lee on a starboard tack.

Polar Diagram of Boat Speed and Direction

This diagram shows the maximum boat speed for the points of sailing. The direction of a line for the centre of the circle is the direction the boat is sailing and the length of the line to the curve (heavy line) is proportional to the forward speed of the boat. Three examples are shown for close reach, broad reach and running points of sailing.

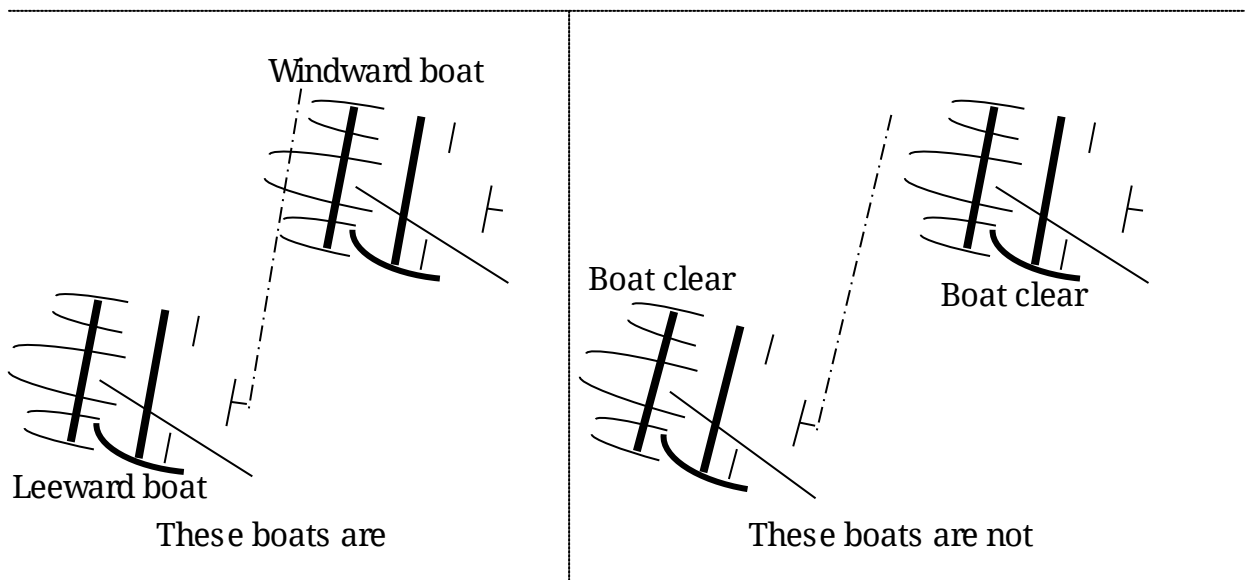
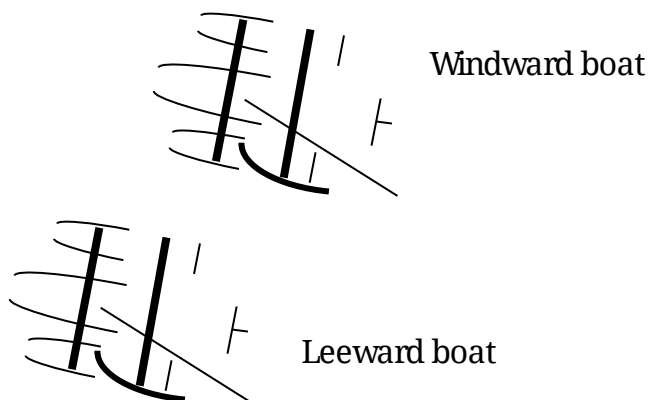
When sailing very close to the to no go zone, the forward speed is very low but increases rapidly for a small change of direction away from the wind.



Rules – For general sailing there are five basic rules that are required to avoid collisions with other boats.

- **Boats on opposite tacks.** When boats are on opposite tacks, a port tack boat shall keep clear of a starboard tack boat.
- **Boats on same tack, overlapped.** When boats are on the same tack and overlapped, a windward boat shall keep clear of a leeward boat. *A windward boat is the boat on the other boat's windward side. A leeward boat is a boat on the other boat's leeward side. See illustrations below.*
- **Boats on the same tack, not overlapped.** When boats are on the same tack and are not overlapped, a boat clear astern shall keep clear of a boat clear ahead. *A boat is clear astern of another boat when her hull and equipment in normal position are behind a line abeam (at right angles to centre line of the boat) from the other boat's hull and equipment in normal position. See illustrations below.*
- **Tacking.** A boat shall keep clear of other boats whilst she is tacking.
- **Avoiding contact.** A boat shall avoid contact with another boat if reasonably possible, even one, which has not obeyed the above rules.

Note that the terms windward boat and leeward boat only apply when the boats are



Burgee – shows apparent wind direction relative to boat.

To start – with sheet free to allow sail to flap and boat in close to beam reach point of sailing (course) gradually pull the sheet in to fill sail with wind.

To slow down or stop – turn boat onto close reach or close hauled point of sailing (course) and release sheet to allow sail to flap and the boat will slow down and almost stop in the lying-to position. To stop turn into the no go zone until sail flaps on the centre line and the boat will stop, but then drift backwards.

Tacking – turning bow through the wind, must have sufficient speed to get through the no go zone.

Gybing – turning stern through the wind.

Come up or luff – turning towards the wind.

Bearing away – turning away from the wind

Speed control - to slow down on a close hauled and all reaching courses ease the sheet (let sheet out) until luff of sail (near mast) flaps. Keep easing the sheet until desired speed is obtained. On a run or training run sheet in (pull sheet in) to bring boom and sail to centre of boat. Alternatively in either case, come up into wind (turn towards the wind).

- **to accelerate** from a slow speed or lying-to to maximum speed on a close hauled and all reaching courses sheet in and bear away slightly as required to get all telltales flowing horizontally backwards (not lifting or dropping). On a run or training run ease the sheet to position boom and sail at, or near to, right angles to wind.

Centreboard – reduces sideways drift from side thrust of wind on sail and boat. The centreboard can be left fully down, particularly while learning to sail. It is one less item to worry about. As the board creates drag, which slows the boat, experienced sailors progressively lift the centreboard as the side thrust is reduced on different points of sailing. Thus for close hauled and for tacking the board needs to be fully down, for close reach $\frac{3}{4}$ down, for broad reach $\frac{1}{2}$ down and for training run and run $\frac{1}{4}$ down. Although on a dead run there is no side thrust, there is a turning action on the boat due to the sail and thus the thrust is on one side of the boat. A small amount of centreboard and use of the tiller (rudder) is required to stay on a run or training run.

Three essentials – sail trim, centreboard position, and course made good.

Experiment – while learning to sail experiment with all that is in this guide and if it does not seem to be working ask an experienced sailor or your instructor to explain why. They have all been through the same learning curve and will be very willing to pass on their knowledge and advice.

Rope work – some useful knots are the figure of eight, round turn and two half hitches, and a bowline. Avoid putting twists in a rope, particularly when coiling it.

BEAUFORT SCALE

Admiral Francis Beaufort created the Beaufort Scale in 1805 for use at sea. The Royal Navy adopted the Scale in 1838. Later it was used to judge the wind strength on land by its affect on the surroundings.

The following table shows the Beaufort scale wind speed number and the corresponding speed in knots and mph with a description of its effects on land and on Grafham Water, from which an estimate of the wind speed can be made.

Please note the advisability of sailing for GWS sailors for each wind condition given in the right-hand column.

The wind force exerted on the sail is proportional to the square of the wind speed passing over the sail, so when the wind speed doubles, say 4 mph to 8 mph, the wind force increases four times, and when the speed increases three fold, say 4 mph to 12 mph, the force increases nine times.

BEAUFORT SCALE NUMBERS

N o	Knot s	mph	Descripti on	Effects on land	Effects on Grafham	Is sailing advisable?
0	0	0	Calm	Smoke rises vertically.	Like a mirror	No – no wind, no go!
1	1-3	1-3	Light air.	Smoke drifts in the wind.	Ripples	Yes for all abilities and those with a buddy
2	4-6	4-7	Light breeze.	Leaves rustle. Wind felt on face.	Small wavelets	Yes for all abilities and those with a buddy
3	7-10	8-12	Gentle breeze.	Small twigs in constant motion. Light flags extended.	Large wavelets	Yes for competent helms and those with a buddy
4	11-16	13-18	Moderate wind.	Dust, leaves and loose paper raised. Small branches move	Small waves some with white horses	Yes for competent helms and those with a buddy
5	17-21	19-24	Fresh wind.	Small trees sway.	Moderate waves more white horses	Yes for competent helms with experience of force 5 and those with a buddy
6	22-27	25-31	Strong wind.	Large branches move. Whistling in phone wires. Difficult to use umbrellas.	Large waves beginning to foam and some with pronounced white horses	Yes for competent helms with experience of force 6 and those with a buddy who decides whether to sail
7	28-33	32-38	Very strong wind.	Whole trees in motion.	Larger waves some breaking	Yes only for the very experienced
8	34-40	39-46	Gale.	Twigs break off trees. Difficult to walk.	Very large breaking waves with foam blown down wind	No sailing

Good luck and good sailing.



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