



ASA 102 - Keelboat Sailing 2

Study Guide and Review Questions

Bob Diamond and Patrick Twohy

Spinnaker Sailing School



Spinnaker Sailing is
an affiliate of
American Sailing.

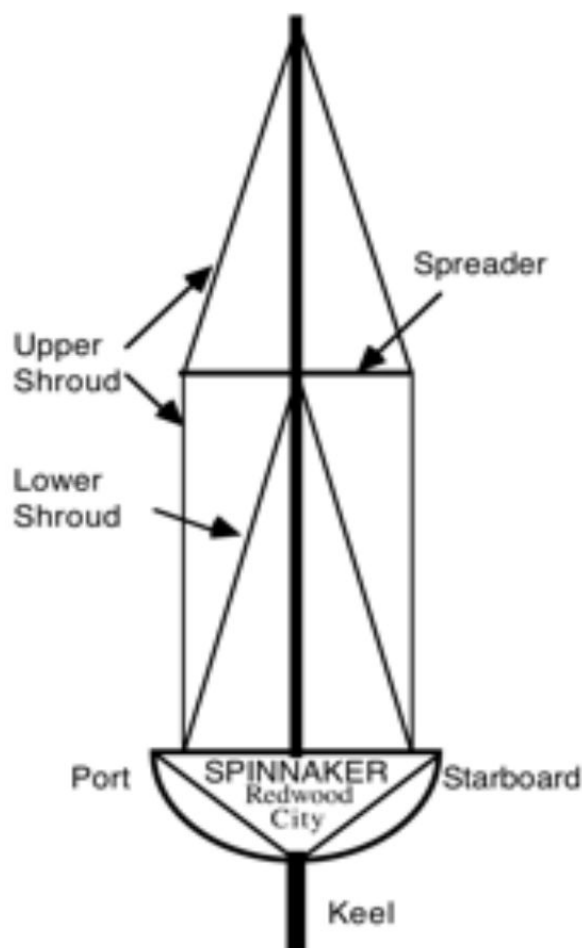
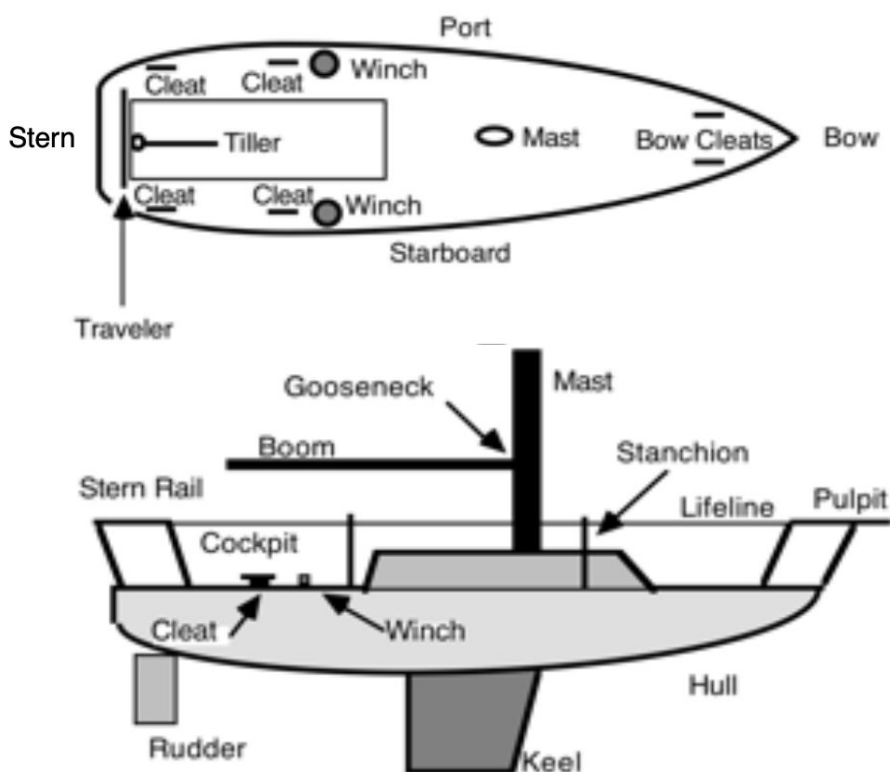
Spinnaker Sailing 451 Seaport Court, Redwood City, CA 94063

(650) 363-1390 | office@spinnakersailing.com

© 2026 Spinnaker Sailing

Lesson 1 - Equipment and concepts

Parts of the boat



Boat parts

Bow: The front end of the boat.

Stern: The back end of the boat.

Port: The left side of the boat when facing forward while aboard the boat.

Starboard: The right side of the boat when facing forward while aboard the boat.

Cockpit: The open area where the crew operates the boat.

Cabin: The sheltered part inside of the boat.

Keel: The weighted fin at the bottom of the boat that keeps the boat from tipping and keeps the boat from slipping sideways through the water.

Rudder: The spade-like object under the stern of the boat that steers the boat by deflection of the water.

Tiller: The lever that controls the rudder to steer the boat.

Winch: Cylindrical device that gives mechanical advantage in the pulling of lines.

Cleat: Device used for securing lines.

Fairlead: A fitting specifically made to guide a line at a certain angle to a part such as the jib.

Lifelines: Wire lines to help keep the crew aboard.

Stanchions: Vertical posts that hold lifelines in place.

Pulpit: The metal railing around the front of the boat.

Gooseneck: The fitting that connects the boom to the mast. It works like a swivel, allowing the boom to move up and down and swing from side to side.

STANDING RIGGING

Mast: The large vertical spar that supports the sail and boom

Boom: The projecting horizontal spar used to hold and extend the foot of the main sail

Forestay: The wire (cable) that supports the mast from the bow and prevents the top of the mast from moving aft

Backstay: The wire that supports the mast from the stern and prevents the top of the mast from moving forward

Shrouds: The wires that support the mast from the sides and prevent it from moving athwartships (sideways)

RUNNING RIGGING

Halyards: Lines used to hoist the sails

Sheets: Lines used to control the angle of sails by trimming and easing. Trimming is the tightening the sheet to make the sail move towards the centerline of the boat and easing is letting it out.

Outhaul: Line used to tighten or tension the foot (bottom edge) of the mainsail

Cunningham: Line used to tighten or tension the luff (forward edge) of the sail by

pulling downward at the tack (bottom forward corner)

Boom Vang: Line used to pull the boom down. It prevents the boom from lifting, top part of the sail to twist.

Topping Lift: Holds the end of the boom up and prevents it from falling into the cockpit when the main sail is lowered.

Traveler: A bar or track secured athwartship to the deck allowing the mainsheet to travel sideways. It is used to control twist of the mainsail.

Reef tack: Functions as a cunningham when the mainsail is reefed (reduced).

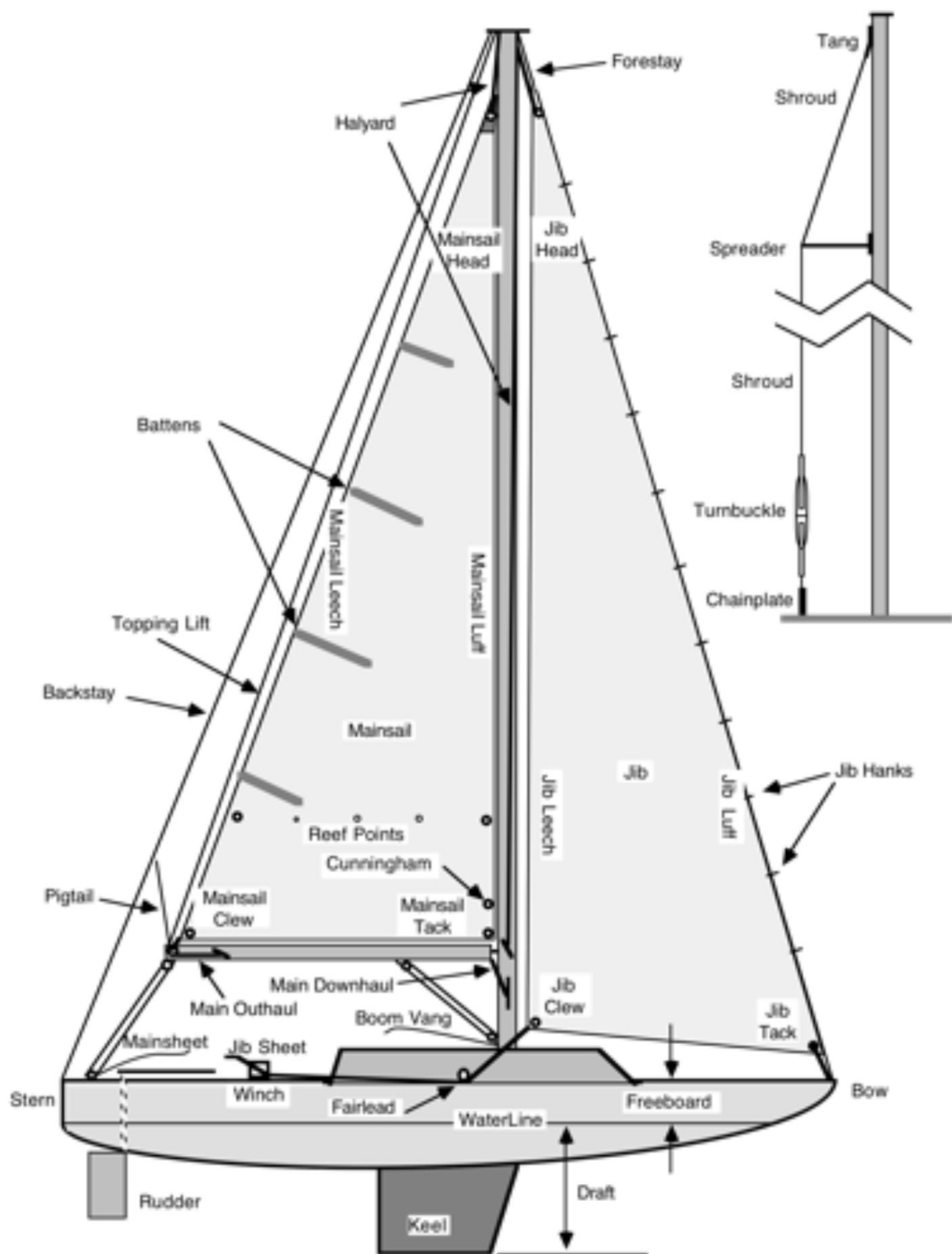
Reef Outhaul: Functions as outhaul to the reefing clew when sail is reefed (reduced).

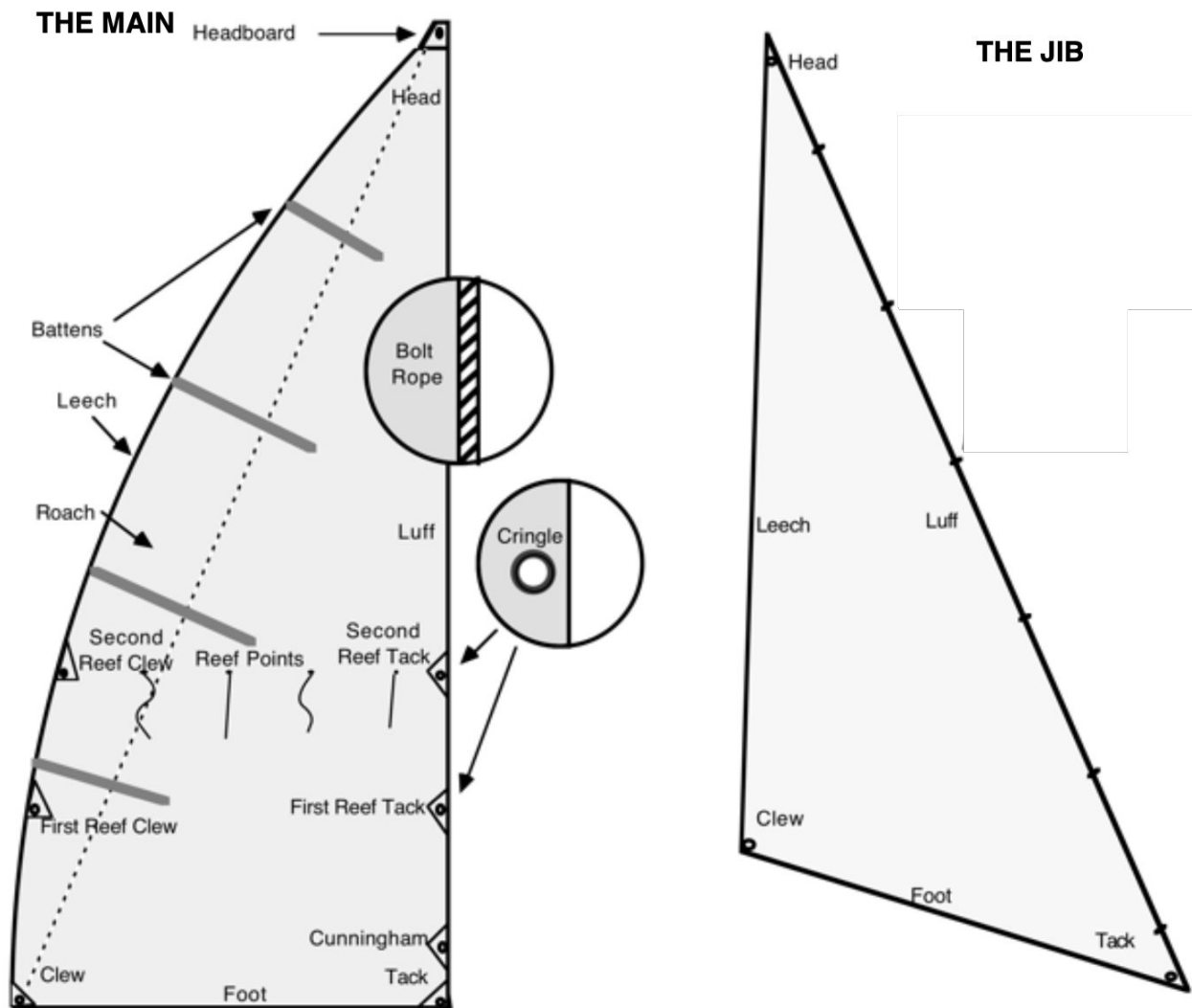
Reef Points: Used to tie up the excess sail to the boom when the sail is reefed

OTHER PARTS

Turnbuckle: Device for adjusting tension on shrouds and stays

Chainplate: Fitting that connects shrouds to the hull





PARTS OF THE SAIL

Battens: Wood or plastic strips that stiffen the sail

Batten pockets: Pockets sewn into the sail to hold the battens

Roach: The unmeasured sail area within a curved leech

Cunningham cringle: A reinforced point just above the tack that can be pulled down to achieve more tension along the luff.

Reef points: Reinforced points on the sail where lines or straps can be attached to tie up the unused part of the sail (bunt) when reefing.

Head: Top corner (where halyard connects to the sail)

Tack: The bottom forward corner of the sail

Clew: The bottom back corner of the sail

Luff: The forward (leading) edge of the sail

Foot: The bottom edge of the sail

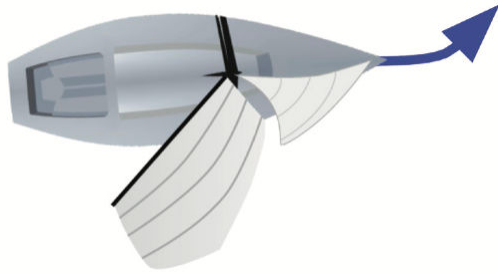
Leech: The back (trailing) edge of the sail

Bolt rope: The rope reinforcement at the luff of a sail

Cringle: A metal reinforcement ring (sometimes called a grommet).

Concepts

See *Sail and Rig Tuning*, (Ivar Dedekam) pp 3 - 9 for complete explanations and illustrations



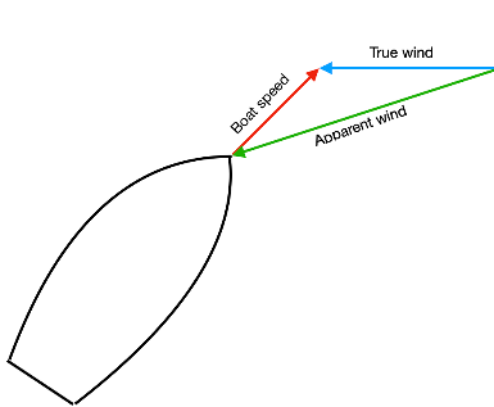
Weather helm



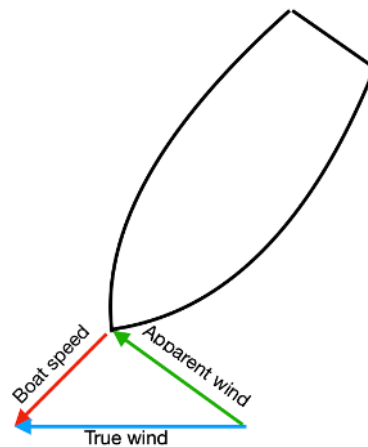
Lee helm

Weather helm: The tendency of a boat to turn toward the wind.

Lee helm: The tendency of a boat to turn away from the wind.



The length of each line indicates the relative speed of that factor. Apparent wind direction is always forward of the true wind direction. When moving upwind, apparent wind will be stronger than true wind.



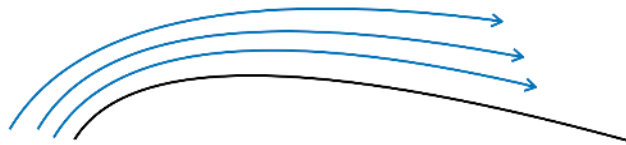
On a vessel going downwind, the apparent wind will be less than the true wind.

True wind: The speed and direction of the wind over a stationary object

Induced wind: The wind felt as a result of a vessel's motion. Equivalent to a boat's speed over ground.

Apparent wind: The combination of true wind and induced wind: The speed and direction of wind as felt on a moving sailboat.

Apparent wind triangle: A graphical representation of true wind, boat speed (induced wind) and apparent wind. (Dedekam illustration 8)



Laminar airflow of air along a sail

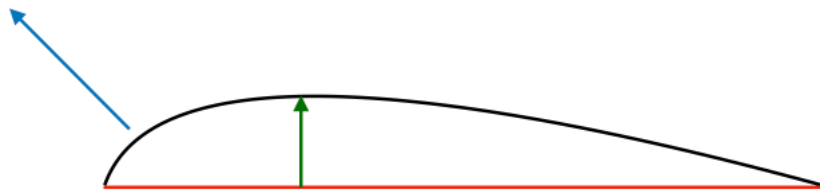


Airflow stalled by an overtimed sail

Airflow: The motion of air along a sail.

Laminar flow: When air flows smoothly along both sides of a sail.

Stall: When airflow separates from the downwind side of a sail.



Sail shape terminology

Chord: A straight line from a sail's luff to its leach

Draft (or depth): The distance from the chord to the sail

Lift: The force created by airflow along a sail

Chord: An imaginary straight line from the luff of a sail to the leech.

Draft (or depth): The amount the center of a sail is deflected away from the chord.

Draft position: The point where a sail's depth is the greatest. It is usually measured as a percentage of the chord length from the luff.

Angle of attack: The angle of apparent wind to a sail's chord.

Crew roles

Helm: Steers the boat, calls tacks, jibes and other maneuvers.

Mainsail trimmer: Adjusts mainsail using sheet and traveler.

Jib trimmer: Adjusts jib trim using jib sheets.

Skipper: In charge of a vessel. Responsible for the safety of the vessel and crew.

Other crew: Moves weight to balance hull; performs other duties as necessary.

Sail controls on a Merit 25

See *Sail and Rig Tuning* pp 10 - 11 for more details.

- Main

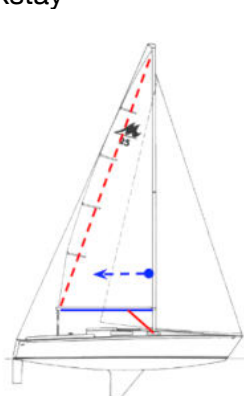
- Sheet; Outhaul; Halyard/Cunningham; Vang; Topping lift

- Jib

- Sheets; Jib cars

- Whole sail plan

- Backstay



Mainsail outhaul
Flattens lower 1/3 of
mainsail
Pulls draft aft
Vang (downwind control)
Holds boom down and
prevents excessive twist



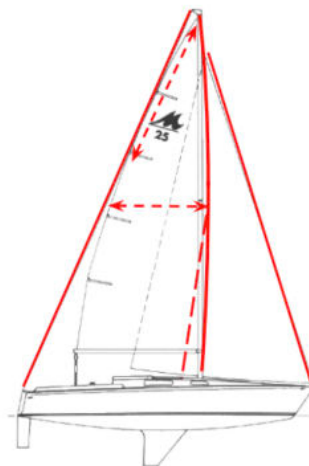
Mainsheet
Angle of attack of
mainsail
Leech tension twist of
mainsail when close
hailed
Traveler
Angle of attack of
mainsail



Jib sheet
Angle of attack of jib
Fullness of Jib
Jib sheet car
Foot fullness
(forward-full, aft-flat)
Leech / slot shape
forward-closed, aft-
open



Halyards
Tension the leading edges
of sails
Flattens the sail's entry
Cunningham flattens mid
mainsail and adds twist to
upper
Use in conjunction with
backstay



Backstay
Bends mast forward until
checked by
lower rear shrouds
Tightens forestay
Flattens mainsail, mid-top
Opens leech, adds twist
Looser backstay makes
sails fuller
Tighter backstay makes

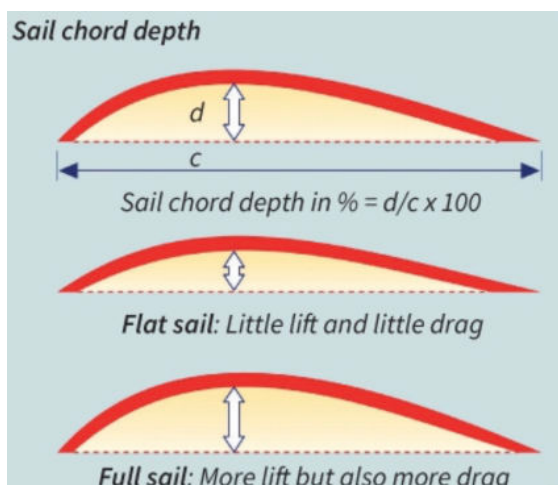
Illustrations Andrew Lesslie

Lesson 2 —

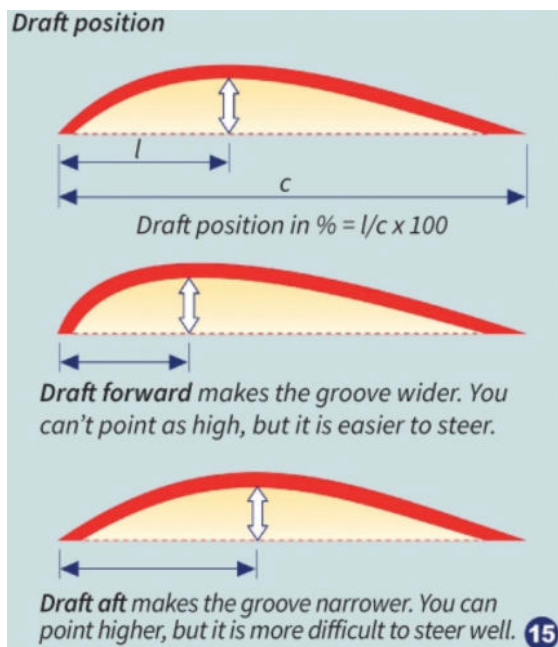
Each of the following topics are important to effective and efficient control of a sailing vessel. See *Sail and Rig Tuning*, Ivar Dedekam pp 12 - 37 for more details.

Sail shape

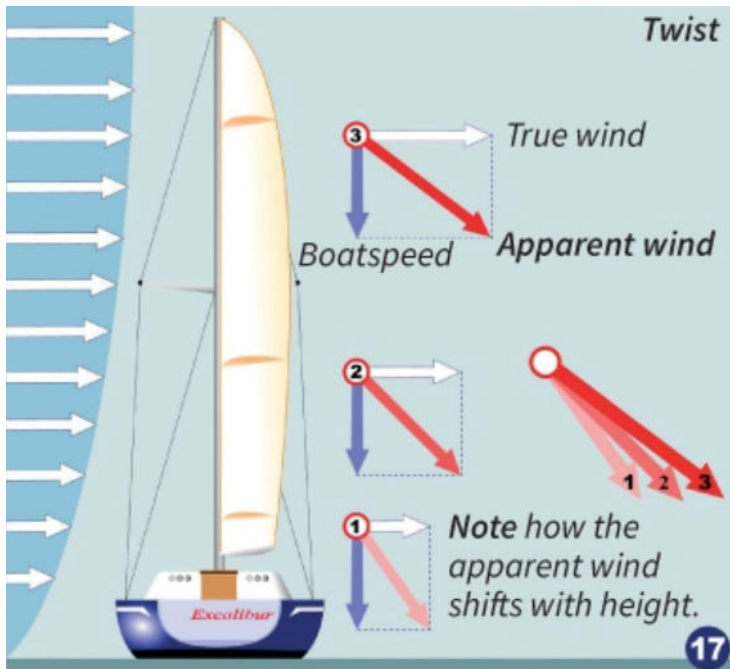
- Draft depth (Dedekam illustration 14)



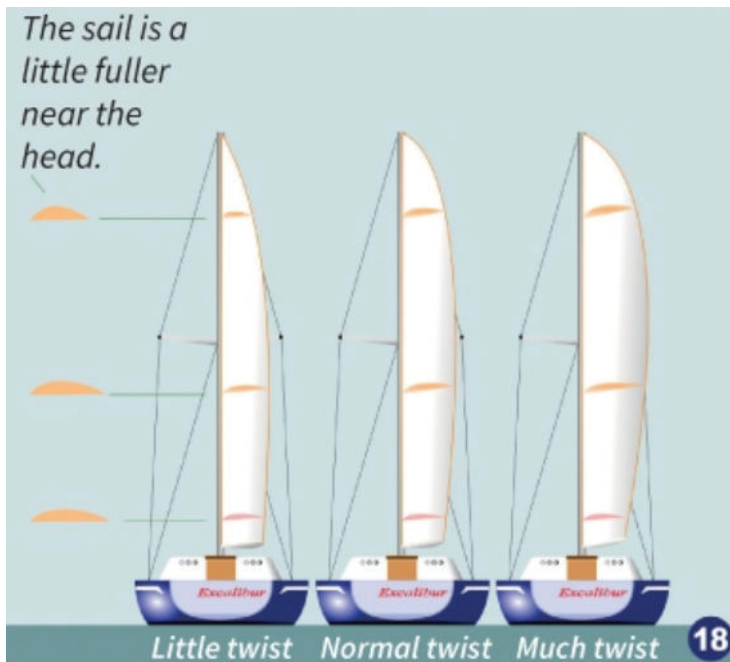
- Draft position (Dedekam illustrations 15, 16)



- Wind gradient (Dedekam illustration 17)

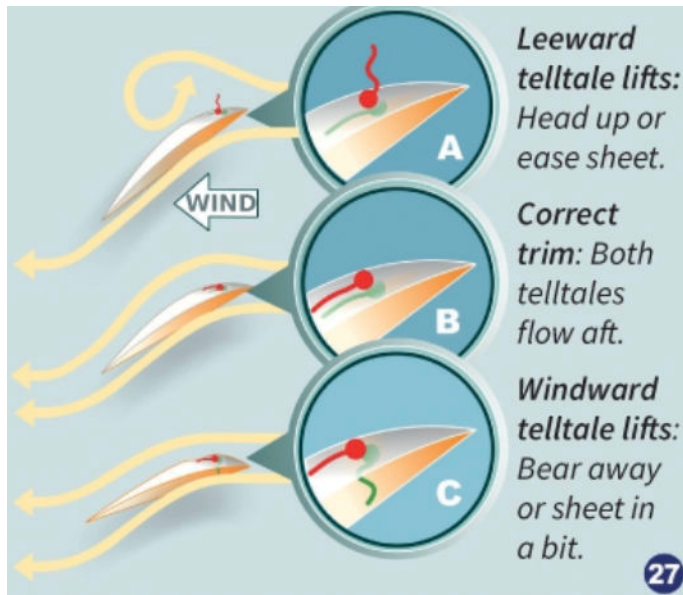


- Sail twist (Dedekam illustrations 17, 18)

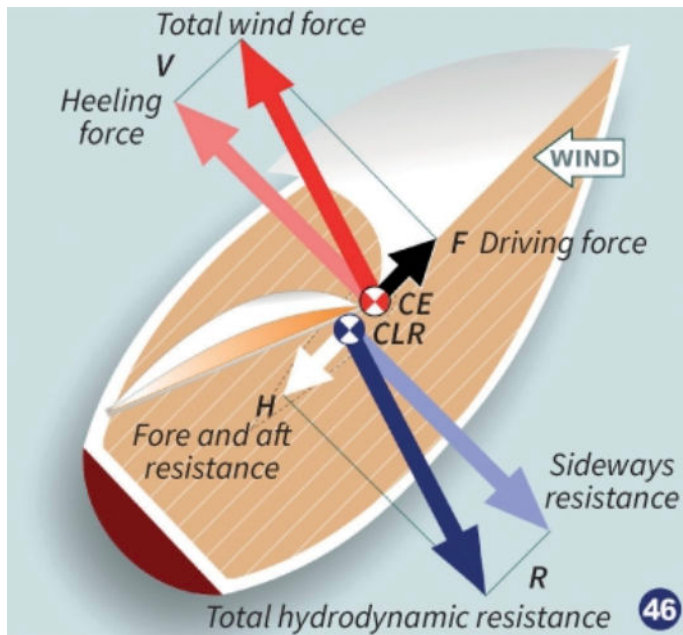


Directional effects

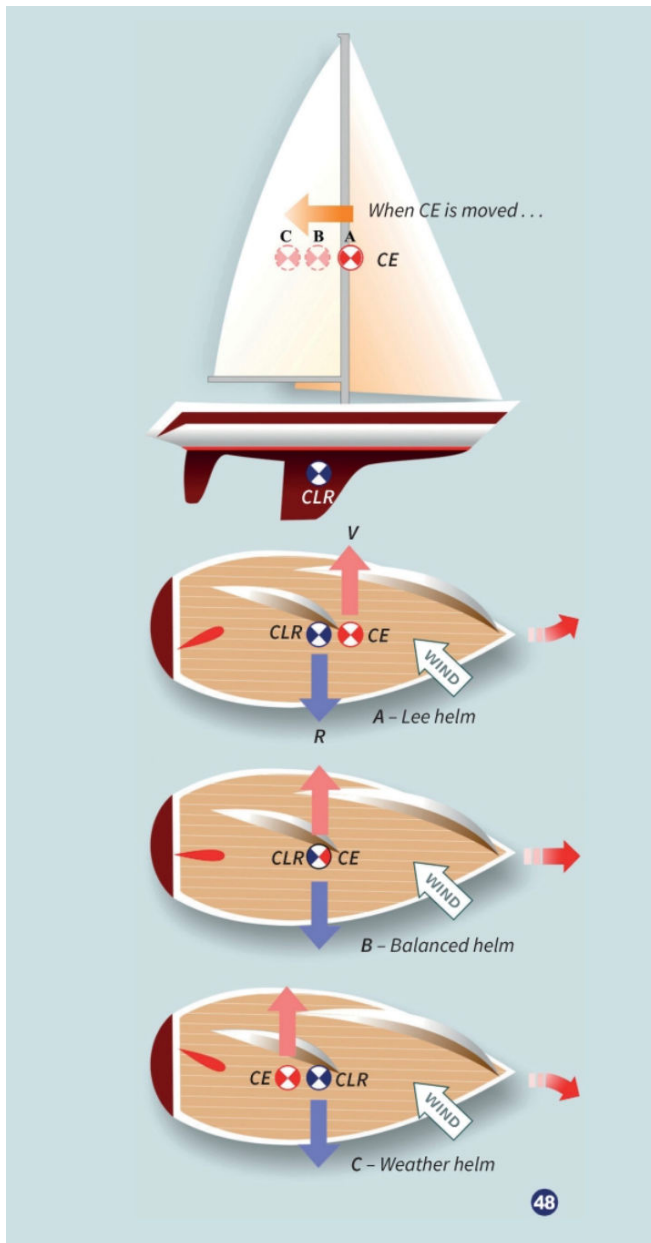
- Sails as foils. Angle of attack. Laminar flow. Stalls. Telltales. (Dedekam illustration 27)



- Center of effort (Dedekam illustration 46)

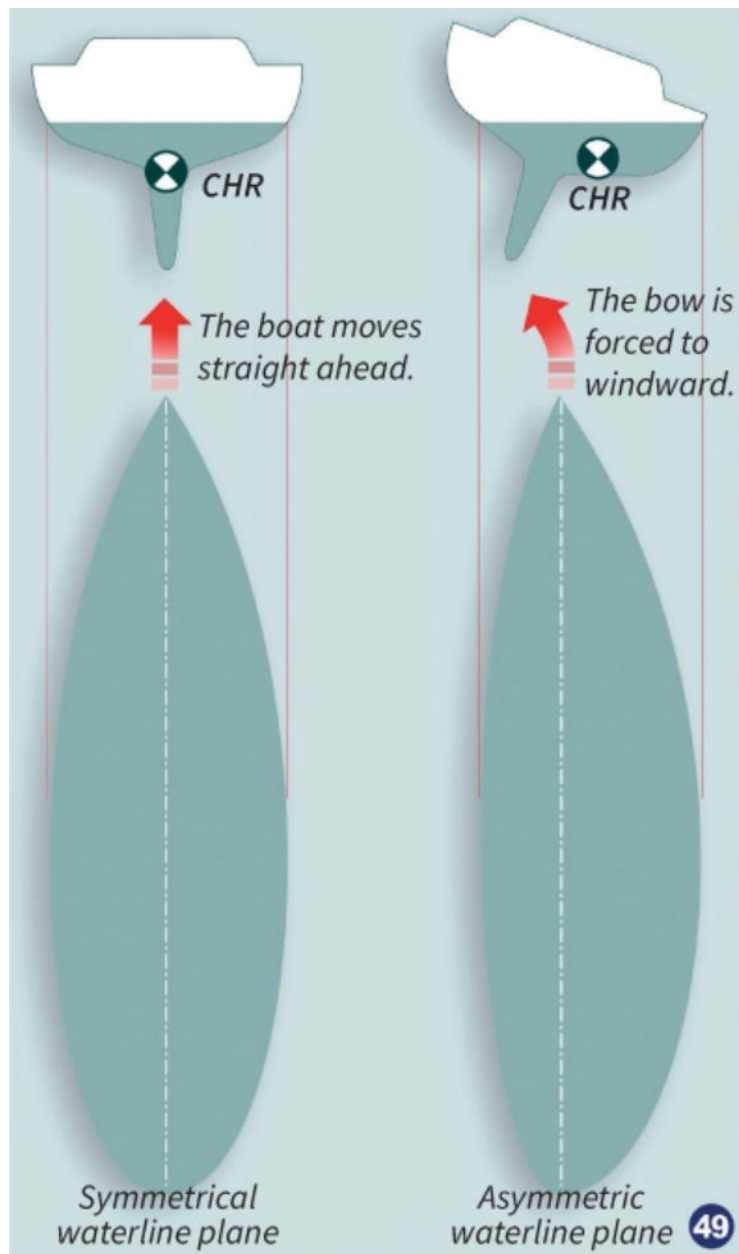


- Center of lateral resistance (Dedekam illustration 48)



- Keel/rudder as foils. Optimal angles of attack. Optimal heel angle
- Fore-and-aft weight distribution
- Heeling moment

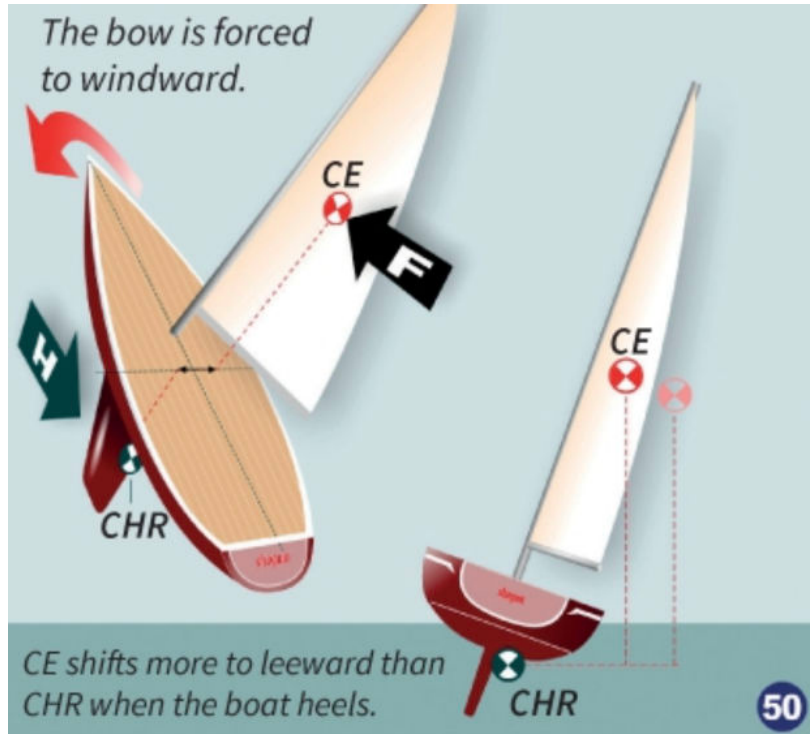
- Hull shape (Dedekam illustration 49)



- Weather helm as summary case
 - Caused by heel; sail trim
 - Controlled by sail trim; sail position; crew weight distribution

Sailing “rudderless”

- Steer using sail trim and crew weight position — tiller tied off on centerline.
- To head up: Mainsail trimmed in; Jib trimmed out; Crew weight to leeward and forward (Dedekam illustration 50)



- To bear away: Jib trimmed in; Main trimmed out; Crew weight to windward and aft

Review Questions

1. Identify the Leech.
2. Identify the Chord.
3. Identify the Luff.
4. Identify the Draft.
5. Describe the True Wind.
6. Describe the Apparent Wind.
7. On which side of the sail is the airflow faster in popular theory?
8. What happens to the air flow when a sail stalls?
9. Do we trim to the apparent or the true wind?
10. Which two components make up the apparent wind?
11. Describe how the force of lift affects the boat.
12. How does changing the boat's direction affect the angle of attack?
13. What is wind gradient?
14. What is angle of attack?
15. How can an impending jibe be stopped?
16. Name the parts of the standing rig.
17. Describe the function of the forestay.
18. How can headstay (forestay) tension be adjusted while sailing?
19. How does moving the jib fairlead position forward affect power of the jib?
20. How does moving the jib fairlead position forward affect the shape of the jib?
21. When close hauled what is the effect of tightening the mainsheet on mainsail shape?
22. Which control affects the twist in the main when sailing off the wind?
23. Which control affects the twist in the main when sailing close hauled?
24. Which control affects the depth in the main at the lower portion of the sail?
25. Which control component controls course and angle of attack?
26. What control changes the depth at the lower portion of the jib?
27. What control changes the depth at the middle portion of the mainsail?
28. What controls the luff tension and draft position?
29. What is the primary responsibility of the skipper?
30. What is the relationship of Center of Effort to Center of Resistance for a balanced helm?
31. What happens to power when you reduce the angle of attack?
32. What does the mainsheet control when sailing close hauled?
33. How is a quick stop recovery MOB accomplished?
34. How is "dipping" accomplished when an obstacle in the water?
35. What are the steps for heaving to?
36. What elements are required for efficient tacking?

37. What shape in the mainsail is required for optimal power in light wind?
38. What are the ways adjustment of the jib sheet change the shape of the jib?
39. How should the mainsail be trimmed for Wing on Wing sailing?
40. What can be done to stop an accidental jibe that is just starting to happen?
41. How does a boat react to being overpowered in heavy air?
42. What is the effect on the rudder and tiller when sailing backward?
43. What does Feathering Up mean?
44. What is the result of pinching during an Up-and Over maneuver?
45. What does the traveler do to mainsail trim?
46. What is the effect of easing the outhaul?
47. What is the ideal setting for the jib halyard in moderate air ?
48. What can be done to the mainsail to reduce heeling without sacrificing power?
49. Most boats are designed to have what kind of helm balance?
50. How can backstay tension be adjusted to reduce weather helm?
51. How can pumping the sails be used allow the boat to Slow & Go?
52. How can the main be used as an Air Brake to slow the boat?
53. What can you do to prioritize keeping the victim sight when doing a MOB recovery?
54. What are some reasons for the helmsman not to rush changing sides when tacking?
55. When is apparent wind weaker than the true wind?
56. How does twist affect power?
57. What the effect of backstay tension on mainsail power?
58. Increased backstay tension has what effect on twist and depth of the mainsail?
59. How does moving the jib leads affect the jib?
60. In which conditions will you want more depth in the mainsail?
61. How can you decide if the weather will be appropriate to sail on a particular day?
62. Describe how to use the ducking maneuver to avoid an obstacle ahead?
63. What is jibing?
64. What is the purpose of tacking?
65. What are purposes of the tiller extension?
66. Sailing in which direction depends on lift of a sail?
67. What is apparent wind?
68. What are the major goals for efficient sailing close hauled?
69. What are the three sources of sail power?
70. What is the relationship between a sail's flatness and the amount of power it produces?
71. In regard to jib power what does Telltale Break mean?
72. What is the effect of boom vang tension on a mainsail when sailing on a reach?
73. What is the effect of Outhaul Tension on mainsail shape and power?

74. What are the steps to initiate a figure-8 MOB rescue?
75. What should be done immediately regardless of the kind of MOB recovery technique?
76. What is the function of the winch handle?
77. What is the function of the boom vang?
78. What does increased jib sheet tension do to shape and power?
79. How can the traveler and the outhaul be used to depower the mainsail in heavy air?
80. Where does draft move when easing main halyard tension?
81. What should the helmsman keep an eye on to maintain maximum power sailing upwind?
82. What main sail adjustment can be made to increase power in light air?
83. While sailing upwind name two responses when hit by a puff in moderate air sailing?
84. How can a sailor depower in heavy air while sailing upwind?
85. What does it mean to be sailing in the groove when sailing upwind?
86. What information is needed to make an effective day-sail plan?
87. What are crucial considerations for crew and skipper preparedness for a day sail?
88. Name some ways the boom, lines, sheets, and decks can become safety issues.
89. What are the steps for tacking as the helmsman?
90. What is weather helm?
91. When surfing waves on a broad reach what actions will enhance safety?
92. What is the benefit of practicing coasting upwind?