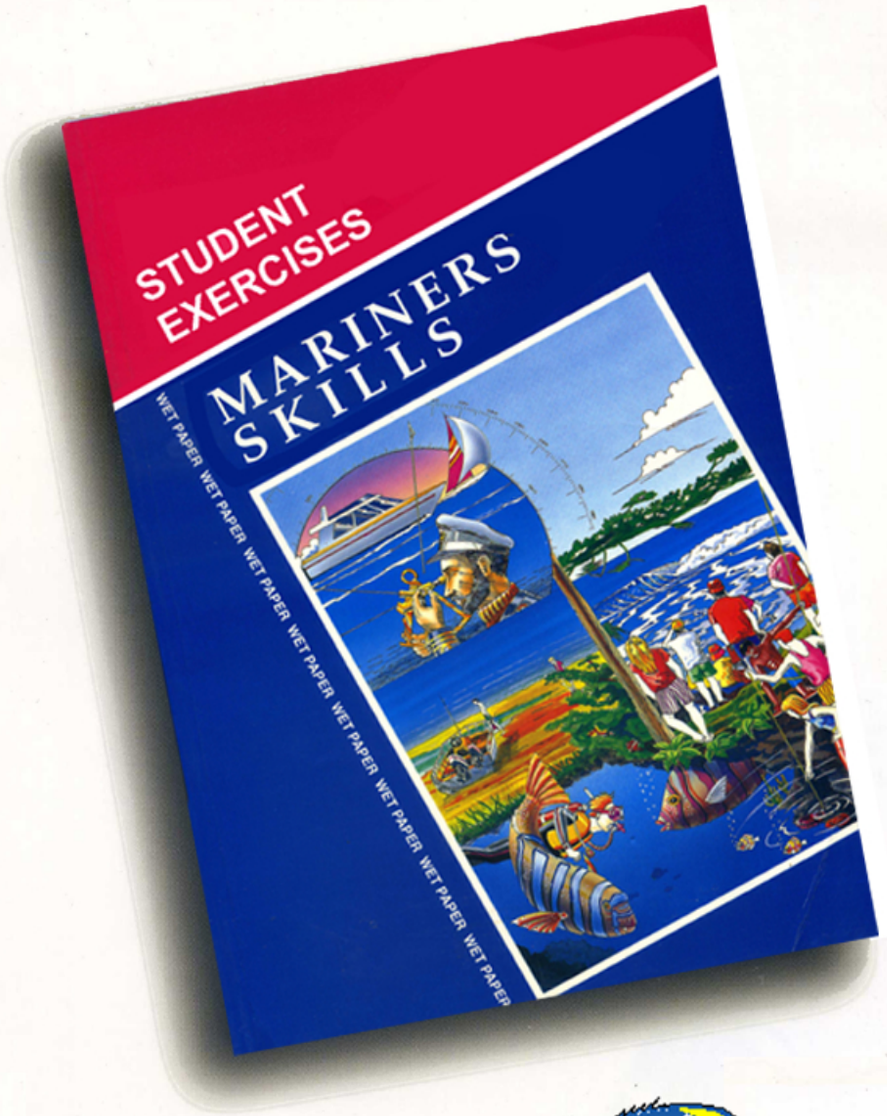
Mariners Skills

Suggested answers



Pamela Davis

Wet Paper

Publisher

Wet Paper Publications
PO Box 540 Coolangatta Qld 4225
www.wetpaper.com.au

ISBN
978-1-86283-160-5

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Contents

Foreward

This set of suggested answers is a guide only and is the work of a few teachers who have developed this booklet. The answers are designed to help new teachers of marine studies and have been prepared on a shoe-string budget so we welcome improvements which can be made to further editions of this booklet.

We welcome your comments

Should you have any new ideas or suggested improvements to these answers, we would welcome your comments.

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Thanks

My thanks to Pamela Davis, Kim Osmond, Mark Rickard and Graham Rogers for working to make our subject a better one.

Bob Moffatt

Project Manager

31 October 1996

E version still good as gold August 2014

Australian Marine Teachers Associations in 1996

Additional help can be obtained by networking. At time of publication here is the current state contacts.

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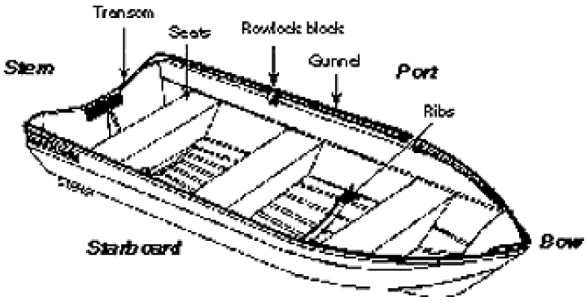
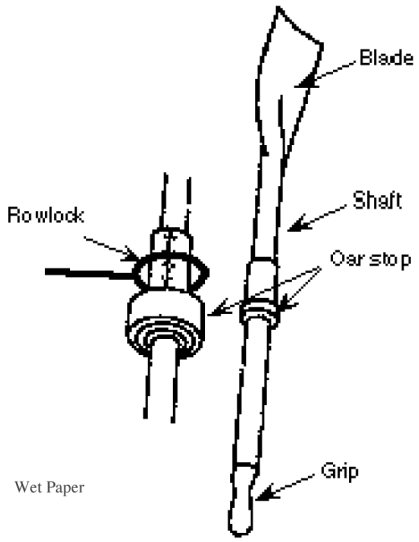
Exercise 1 Boat parts

Q1. See diagrams below





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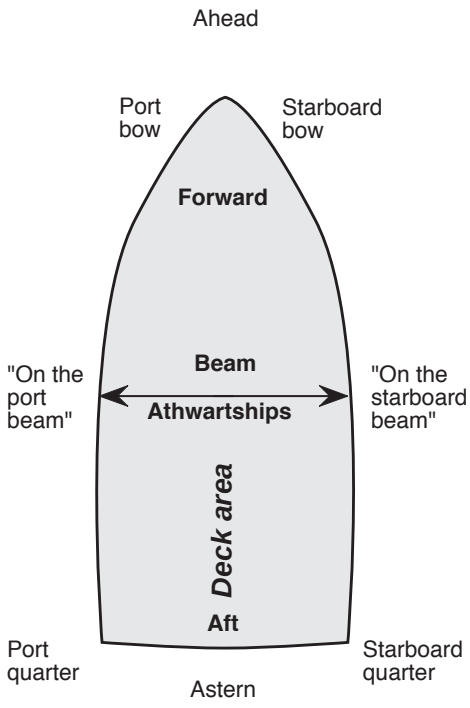
Q2. See diagram below



Q 3. Answers

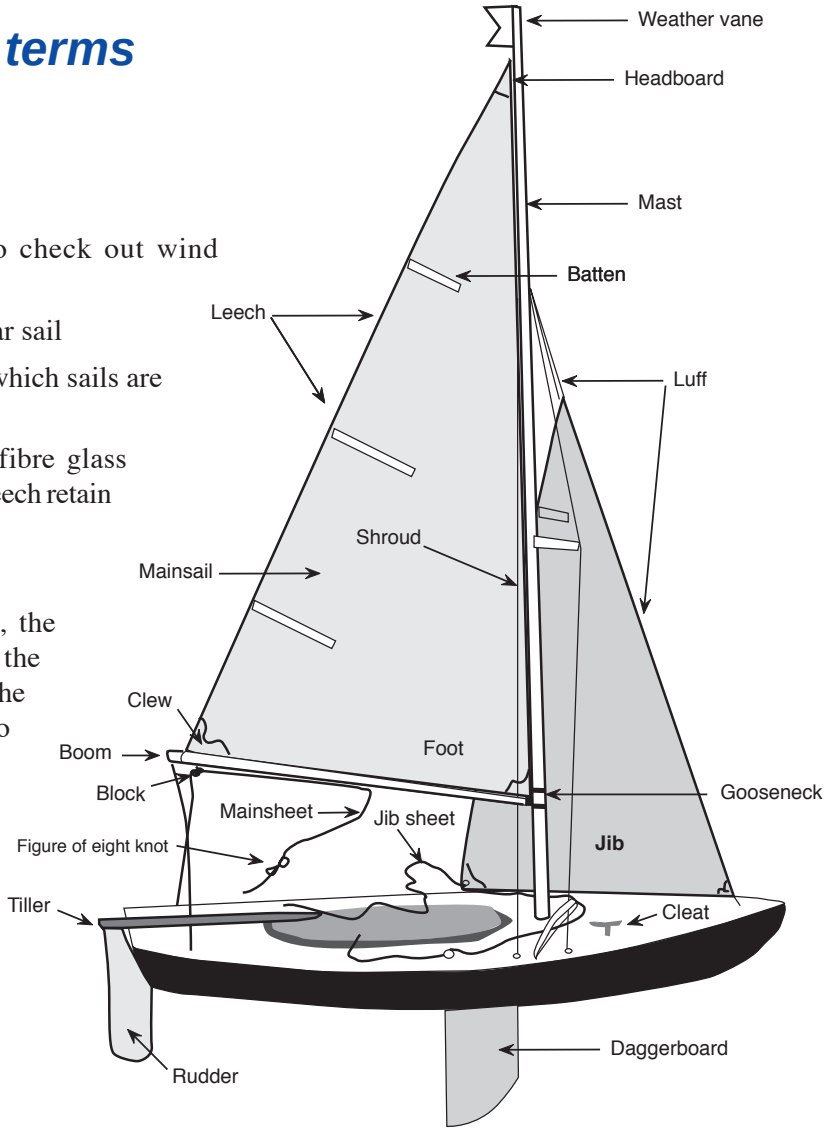
Term	Definition
deck	the deck is the part on a boat which occupies the entire floor space such as the area inside a dinghy under the seats
stern	the stern is the area of the boat at the rear
bow	the bow is the area of the boat at the front
transom	the transom is the part of the boat at the stern which is strengthened for the motor to be attached
keel	the keel is the part of the boat at the bottom on the outside which makes up the fore and aft centre line
ribs	the ribs are the part of the boat which run from side to side across the keel to give the keel strength
gunwale	the gunwale (gunnel) is the top edge of the boats sides which prevents objects from rubbing directly onto the sides such as the rubber strips around the sides of a dinghy
oarlock sockets	(same as rowlock block) is the place on the gunwale into which the rowlock on the oar is placed
seats	the seats are the part of the boat which are built across the boat and used for sitting
keelson	the keelson is the part of the boat at the bottom on the inside which makes up the fore and aft centre line
rowlock	the rowlock is the metal stopper placed over the oar and inserted into the rowlock block to prevent the oar from slipping when being used
shaft	the shaft is the part of the oar between the blade and the oar stop
oar stop	the oar stop is the rubber stopper placed about half way along the oar which the rowlock fits onto
grip	the grip is the area at the end of the oar which is held when rowing
blade	the blade is the part of the oar which is flattened and dipped into the water when rowing
ahead	ahead is the direction the boat is travelling when it is moving forward
astern	astern is the direction the boat is travelling when it is moving backward
port bow	port bow is the area at the front of the boat on the left side
starboard bow	starboard bow is the area at the front of the boat on the right side
forward	forward is the area at the front of the boat
aft	aft is the area at the back of the boat
beam	the beam is the greatest width of the boat
port quarter	port quarter is the direction used on a boat to indicate something lying between dead ahead and the port beam
starboard quarter	starboard quarter is the direction used on a boat to indicate something lying between dead ahead and the starboard beam
deck area	the deck area is the part of the boat which makes up the entire floor space
on the port bow	on the port bow is the direction used on a boat to indicate something lying on the port side of dead ahead
on the starboard bow	on the starboard bow is the direction used on a boat to indicate something lying on the starboard side of dead ahead
athwartships	athwartships is the area of the boat which occupies the centre from port to starboard sides

Exercise 2 Sailing terms

Q1. Answers (see right)

Q2. Answers (see right)

Q3. Answers



weather vane	flag on top of the mast to check out wind direction
headboard	The top corner of a triangular sail
mast	Timber or metal pole from which sails are set
batten	flexible strips of wood or fibre glass placed in the sail to help the leech retain its proper shape
leech	The after edge of a sail
luff	The leading edge of a sail, the fluttering of the sail when the boat is placed too close to the wind or the sail is let out too far
shroud	Ropes or wires lead from the mast to chain plates at deck level on either side of the mast and which hold the mast from falling or bending sideways
mainsail	The largest sail attached to the main mast
clew	The lower after corner of a sail where the foot meets the leech
foot	The bottom edge of the sail
boom	Attached to mast. Place for foot of mainsails to be attached
block	Common abbreviation for a pulley block, which can be wood, metal or plastic
mainsheet	Sheet (rope) which controls the mailsail
jib sheet	Sail that is in front of mainsail. Different types. Genoa is a sail that catches very light winds. Jib and heavy weather jib are for medium to strong winds. Storm jib, very heavy small sail used in storms
figure of 8	Knot used to stop rope passing through a cleat. A stopper knot that can be undone easily
tiller	A bar connected to the rudder to steer the vessel
rudder	flat vertical surface at the stern which is turned by the tiller or wheel to alter the course of the vessel
daggerboard	wooden board or centre plate lowered through a slot in the bottom to reduce leeway (the lateral movement of the ship caused by the force of the wind (also called the centreboard)
cleat	A wood or metal fitting with two projecting horns fastened to some part of the boat, to which a line is secured
jib	The forward most sail
gooseneck	Universal joint which connects the boom to the mast
stays	A rope or wire running from the mast to support it. The headstay is the foremost stay on which the jib is set.

Exercise 3 EPIRBs

1. Search and rescue for all merchant vessels, and coordinates search and rescue for fishing and pleasure vessels when requested
2. 2500
3. satellite pick-up of transmission
4 Alice Springs
5. 406 MHz beacon
6. EPIRB can't transmit speech
7. 121.5 MHz beacon: Time to relay signal accurately - 1.5 - 3 hours

   406 MHz beacon: Time to relay signal accurately - 1 hour
8. a. Emergency Position Indicating Radio Beacon
   b. Once activated they transmit a radio signal which is detected by either aircraft or satellite, and then relayed to the Maritime Rescue Coordination Centre in Canberra. EPIRBs transmit on the following frequencies: 121.5 and 243 MHz, and 406.025 MHz.
   c. up to 900km
9. a. radio signal detected by satellite, signal relayed to Alice Springs, and then to Canberra which is the Coordination Centre, a Search and Rescue helicopter is sent out from the closest practical airport from the distressed vessel
   b. the length of time taken for Canberra to coordinate rescue operations in other parts of the country, availability and preparedness of Search and Rescue aircraft in the rescue area, the communication links are long and rely on satellite and computer technology which may crash
   c. SAR - search and rescue

      LUT - local user terminal

      ELT - emergency locator transmitter

      MRCC - maritime rescue coordination centre
   d. EPIRB would be ineffective once north-west of New Guinea, and out of the satellite detection area

Exercise 4 Safety of boat and crew

1. Inspected, leaks, cracks broken
2. Seaworthiness
3. Skipper, working order, fuel, freshwater
4. Stable, capsize
5. Condition of engine, sufficient fuel
6. Freshwater and Basic food supply, dried biscuits
7. Radio/condition of batteries. Radio check
8. Life saving and fire appliances. Fire extinguishers
9. a. Boarding a life raft
   b. life raft
   c. in an emergency, when their vessel is in danger or has capsized
   d. to ensure crew are familiar with procedures in the event of an emergency
   e. exposure, heat exhaustion, low water supply, cramped conditions, sunburn

Exercise 5 PFD's

1. a. type 2
   b. type 1 to be worn over the bar and in offshore conditions, and a safety harness for the toddler
   c. possibly all types to cover all sailing situations
2. a. new version of the Australian standards symbol
   b. older version of the Australian standards symbol

Exercise 6 Flares

1. Depends on pack.

2. Type of flares	Description of use	When to use	Colour of flare
Red	1. hold flare upright 2. remove cap 3. remove base from flare 4. insert base into top of flare 5. ignite flare 6. hold flare upright	at night	red smoke with white light
Orange	As above	during the day	orange smoke
Parachute	1. remove cap from flare 2. remove base from flare 3. pull string in base of flare 4. push base upwards 5. launch flare upwards 6. flare parachutes in sky	offshore use	white smoke

Exercise 7 Rules and regulations

1. Any of registration, insurance, local port regulations, safe boating gear, areas of boating activities, licencing of boats
2. Local speed limits, skiing, hours of operation
3. Details factors to check before boating, using common sense on the water
4. Lists of boat ramps, facilities of each, local camping regulations; to inform the public on the regulations
5. Use of land toilets
6.
   - rendering assistance to other vessels in the event of collision
   - accidents and damage aboard ships
   - local whistle signals
   - flag, storm warning or diving signals
   - flags for unloading dangerous goods
   - lights exhibited by local ferries and associated precautions
   - liferaft procedure to ensure safe use of ports by all users
7. a. General Use A: all activities
   b. Scientific research: no activities permitted except research with a permit
   c. Marine Park B: no activities except diving, boating, photography
8. In a Marine Park A zone, bait netting and fishing are allowed, but not in a B zone
9. Consult zoning map - class discussion
10. a. To avoid collision at sea
    b. As per box
    c. On how they conform to the rules
    d. Give way

Exercise 8 The Skipper

1. The skipper should ask questions to ensure crew are capable of help and comfortable
2. Accidents have to be reported to relevant authorities for insurance and salvage claims
3. For hypothermia the skipper should ensure that all people on board have adequate clothing to prevent getting too cold
4. For safety and comfort all guests need to be aware of the boats safety and stability limits, and the skipper should check the weather forecast to prepare for the trip
5. With alcohol and boating the same laws apply as with driving a car, offenders can be fined
6. The skipper is responsible for guests on board and any problems are dealt with by the skipper and guests should be kept busy helping
7. If salvage becomes an issue and if on a commercial vessel and you stopped to help someone, a salvage claim can be made to compensate for lost time and money
8. Seasickness - the skipper needs to monitor guests who are seasick and keep them busy and on deck. Administering seasick pills or wristbands can help

Exercise 9 Fires and fire extinguishers

1. oxygen, heat, fuel
2. Types of fires:

   Class A - fuelled by wood, cardboard, paper, plastic bags or fabrics

   Class B - fuelled by petrol, diesel, kerosene, other flammable fluids

   Class E - are electrical fires
3. May contain hydrocarbons which are harmful to the ozone layer
4. Use colours and diagram from Page 81

Exercise 10 Water Ski signals

1. A 2 open palm facing upwards
2. B 9 point with downwards swing of arm
3. C 1 nod the head
4. D 4 use the fingers to indicate speed
5. E 8 hand up with fingers outstretched
6. F 1 point skis up to indicate ready to start
7. G 6 palm vertical, curving motion of hand
8. H 7 point to direction then give circular motion with hands
9. I 3 open palm facing down
10. J 5 OK signal
11. K 10 finger across throat in cutting motion

Exercise 11 Rope

1. a. laid
   b. nylon, terylene, polyprop, silver
   c. allow the spool to revolve and never take it from over the flanged ends
   d. prevent the ends from fraying by applying a sailmakers whipping
   e. coil the rope and hang in light airy place away from heat and not in the sun
2. a. melting with heat to prevent the ends from fraying
   b. binding the ends with whipping twine
3. a. fibre
   b. yarn
   c. strand
   d. rope
   e. cable

Exercise 12 Bowlines

1. mooring, attaching warps to boats, tying equipment in a boat, making a loop at the end of a rope
2. used in many situations, will not slip
3. usually students find it most difficult to begin the knot
4. security, so knot will not slip

Exercise 13 Round turn and two half hitches

1. Practice on a spar
2. An easy knot for students to learn

Exercise 14 Other knots to learn

1. a. rolling hitch - for towing two or more boats
   b. round turn and two half hitches -to tie boat fast to a post or ring
   c. figure of 8 - to make a knot to act as a stopper when passed through a ring
   d. reef knot -to tie ropes of equal thickness together
   e. double sheet bend -to tie two ropes of unequal thickness together
   f. sheet bend -attaching a rope to a loop
   g. bowline -making a loop for mooring, tying equipment in a boat
2. when the knot is placed under strain it becomes difficult to undo
3. because it can be used in many situations

Exercise 15 Coiling and throwing rope

1. the direction of coil
2. braided rope is plaited together and it does have a lay, usually clockwise
4. so it is caught easily
5. falling into the water

Exercise 16 Avoiding collisions

1. keep as far to the right of the channel as possible
2. right side
3. move to starboard and pass on port side
4. vessel A give way to vessel B
5. the vessel with the wind on its port side keeps out of the way of the other
6. white
7. overtake on either side of vessel A**.** Keep out of the way of B
8. B can pass A because A is the windward vessel and must keep out of the way of B
9. Fishing vessel. Answer in debate
10. Vessel A needs to show two white masthead lights in line, sidelights, stern light and yellow towing light; Vessel B doesn't show any lights

Answers to table

Term	Page	Meaning as given in text	Students example
sailboard	66	driven by sails	
vessel engaged in fishing	66	boat has fishing gear that restricts its ability to manoeuvre	
power driven	66	driven by motor	
vessel not under command	66	vessel is unable to abide by rules and cannot get out of the way	
air cushioned vessel	70		
vessel restrained by her draft	66	has to stick to the centre of the channel or it will run aground	
vessel underway	66	not at anchor, aground or tied up at dock	
in sight of one another	66	can be seen with the naked eye	
restricted visibility	66	cannot see other vessels because of fog, mist, snow sand or heavy rain	
narrow channel	66	sides of the channel are close together	
traffic separation schemes	66	aim to prevent accidents at sea by keeping vessels apart	
stand on	68	maintain speed and course	
towing light	69	yellow light displayed at the stern	
side light	69	green or red light showing an unbroken arc of 112.5 degrees	
masthead light	69	white light placed over the fore and aft centreline showing an unbroken arc of 225 degrees	
stern light	69	white light placed at the stern showing an unbroken arc over 135 degrees	
all round light	69	can be seen all around the vessel	
sound signal	74	any noise, whistle	
at anchor	n/a		
not at anchor	n/a		
vessel restricted by her ability to manoeuvre	66	working on a difficult task such as laying submarine cables, etc	

Exercise 17 Where to tie knots

Knot to Use	Reason for using knot
1 bowline	can make a loop to fit over the bollard
2 clove hitch	only need short rope, will not slip
3 round turn and two halves	secure vessel to mooring
4 rolling hitch tow rope	tow a number of boats on another line or
5 bowline	makes a loop that will not slip
6 sheetbend	can join two ropes of unequal thickness
7 figure of 8	the knot acts as a stopper
8 sheetbend	joins ropes of unequal thickness
9 rolling hitch	used for towing, secure
10 clove hitch	won't slip, for use with small its on board
11 bowline	won't slip under great strain - all purpose knot, can be used for towing boats
12 clove hitch	don't need a loop and this knot won't slip

Exercise 18 Parts of a larger yacht

1. See Figure 18.1
2. **ventilation points** - place where air can enter the cabin

   anchor well - place where anchor gear is stowed

   cabin - where you sleep and keep person gear - also navigation, radio, safety gear stowed

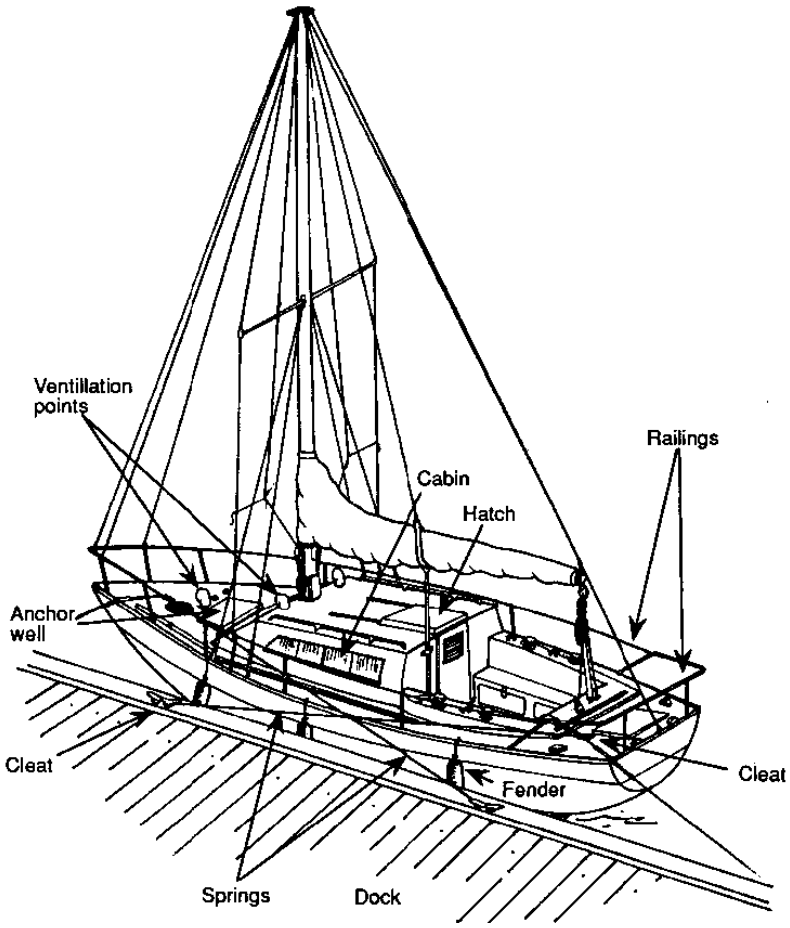
   cleat - A wood or metal fitting with two projecting horns fastened to some part of the boat, to which a line is secured

   fender - rubber cushion to stop boat from scratching or being damaged while moored

   railings - wire or rope used to assist movement around a vessel

   hatch - between inside and outside of vessel. Fastened to stop water entering boat

   dock - jetty or structure of wood, steel to moor boats



Exercise 19 Glossary of sailing terms

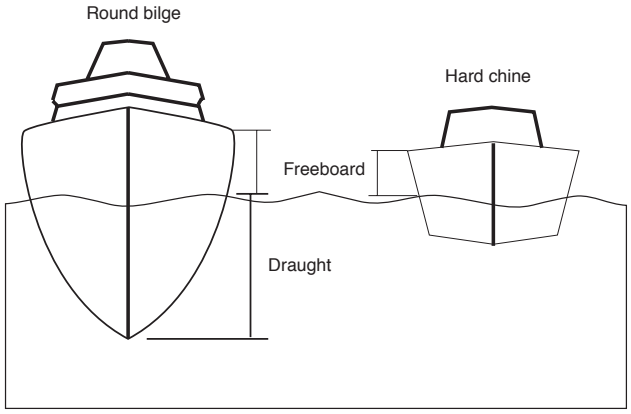
See answers on Pages 31 - 32 of lab manual

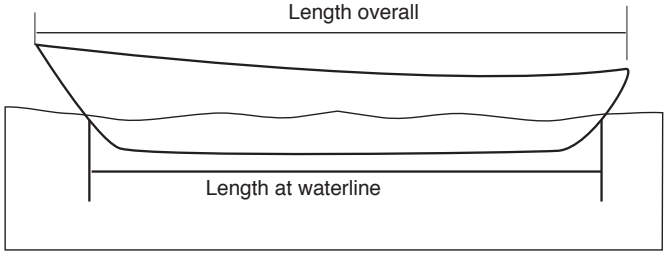
Exercise 20 Materials used in boats

Answers depend on prac results

Exercise 21 Hull details

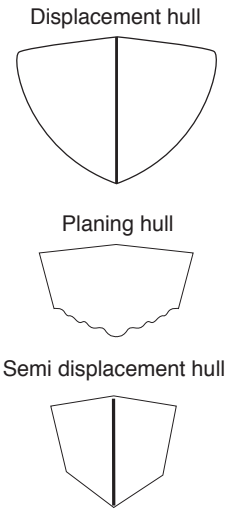
1. See diagrams to right
2. See diagrams to right
3. a. planing hull
   b. displacement hull
4. C round bilge
   D freeboard
   E draught
   F hard chine
   G freeboard
   H length overall
   I length at waterline
5. a. flat bottom - high stability, high load capacity, high buoyancy
   b. v bottom - soft ride, fairly stable
   c. deep v bottom - good directional stability, soft ride
   d. cathedral - very stable, good directional stability
   e. catamaran - as above
   f. trimaran - as above
   g. keel - stability





Exercise 22 At the dock

1. the boat should have a bow line tied to the post allowing enough rope to move with the tide, and a long stern line tied to the bollard. Person A could catch the bow line thrown by Person B and fix it to the post while the Skipper manoeuvred the boat alongside the jetty, then attach the stern line to the bollard.
2. As described
3. the jetty could be designed so that it floats on the water and therefore moves up and down with the tides



Exercise 23 Marine insurance and registration

1. a premium is the amount of money paid to the insurance company to maintain a policy
2. yearly
3. third party protection applies even on someone else's uninsured boat; family members are included as third parties on your boat; your boat is covered if it sinks, breaks adrift or is stranded, even if unattended cover includes fire and theft, swamping, sinking, malicious or accidental damage, explosion
4. third party property damage refers to the damage or liability to another person or his property in a boating accident
5. a warranty is the assurance given by the manufacturer that he will be answerable for the quality of his goods for a certain period of time if they are used in the recommended manner, a premium is the amount paid to the insurance company to maintain an insurance policy
6. when the warranty runs out, the owner is responsible for repairing any faults
7. insurance is a contract undertaken by two parties, where one party receives payments (premium) to secure the other against pecuniary loss, by payment of a sum of money in the event of destruction of or damage to property
8. yes
9. for student to research
10. for student to research
11. for student to research

Exercise 24 Beat the buzzer

Classroom exercise

Exercise 25 Trailers

1. etiquette, bungs, painter, footwear, brakes
2. winch, winched, greased, winch, launched, winch cable
3. metal rod, leg, tail lights, safety chain

Exercise 26 Trailer maintenance

1. the transom is directly over the rear rollers
2. contours of the hull
3. the safety chain connects the trailer to the tow vehicle and its minimum breaking strain should be one and a half times the gross weight of the trailer
4. tiedowns tie the boat to the trailer and are needed at the bow and on each side of the transom
5. lights should be placed on a board across the transom
6. check - hitch and safety chain, tyres, wheel bearings are not too hot, tie downs, lights are working, gear in boat is secure
7. because the weight of the boat fully loaded with fuel, gear, etc, is much higher than the weight of the boat alone
8. the boat hangs off the back of the trailer and the hull can develop a sag because it is not supported
9. handling of the tow vehicle becomes difficult
10. rollers seize and don't roll freely, rust on trailer

Exercise 27 Buying a boat

Students own opinions for answers

Exercise 28 Boat show assignment and hull project

Students own opinions for answers

Exercise 29 Boat building assignment

Students own opinions for answers

Exercise 30 Navigation lights on a boat

Students own opinions for answers

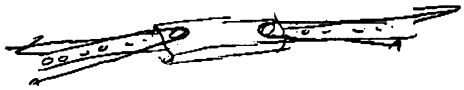
1.
   - masthead
   - unbroken light
   - side lights
   - green light
   - starboard
   - abaft the beam
   - stern light
   - towing
   - flashing
2. Students own opinions for answers

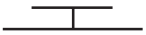
Exercise 31 Marine batteries

1.
   1. cell caps
   2. positive terminal
   3. negative terminal
   4. case
   5. cell walls
   6. partition
   7. electrolyte reservoir
2. connect positive to positive and negative to negative
3. not to spill it
4. 12 Volts
5. positive to positive, negative to negative
6. that the circuitry isn't damaged
7. the anode corrodes instead of the battery
8. wiring, starter motor
9.
   - no smoking or naked lights
   - connect correct leads when charging
   - keep all connections clean and tight
   - keep tops clean and dry
   - keep electrolyte levels up
   - never allow batteries to stand for long periods of time
   - when tightening connections keep the other terminals covered to prevent shorting out
   - keep the battery well charged
10. a hydrometer measures the specific gravity of the electrolyte, if the reading is low the battery is flat

Exercise 32 Larger deckwork

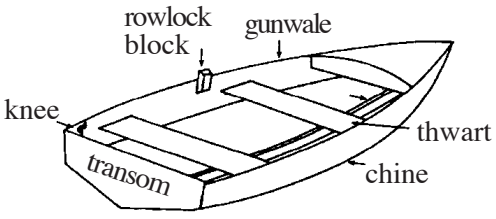
1. A winch is a mechanical device that provides either 1, 2 or 3 different degrees of mechanical advantage. The rope to which the pull is required is wrapped around the winch drum (cylinder) generally 2 or 3 times ensuring no override. The entry rope to the bottom, and exit to the top. The exit rope is trailed (pressure kept on it) while the winch operator fits a handle to the top of the drum and turns it. There is a ratchet mechanism in the system so the handle will work only in one direction and does not require a full turn.
2. Main sail, head sail
3. The text is wrong in this question. The arrow should be off the bow. The traveller would need to be moved up, to the right on the track. A block system on each side of the traveller car.



4. Aft of the cockpit. It's an I section. 
5. The traveller allows the position of the bottom main sheet block to be altered across the boat. This creates different sheeting angles.
6. L winches in the diagram, one on the side of the cockpit and one on the back of the cabin. Winches allow great pull to be achieved on the sheets.
7. The heal is created by the pressure of the wind against the sails.
8. The weight of the keel.
9. Support the bottom edge of the sail.
10. Cleats (a device to temporarily hold rope) that are shaped like clams.

Exercise 33 Answers to test

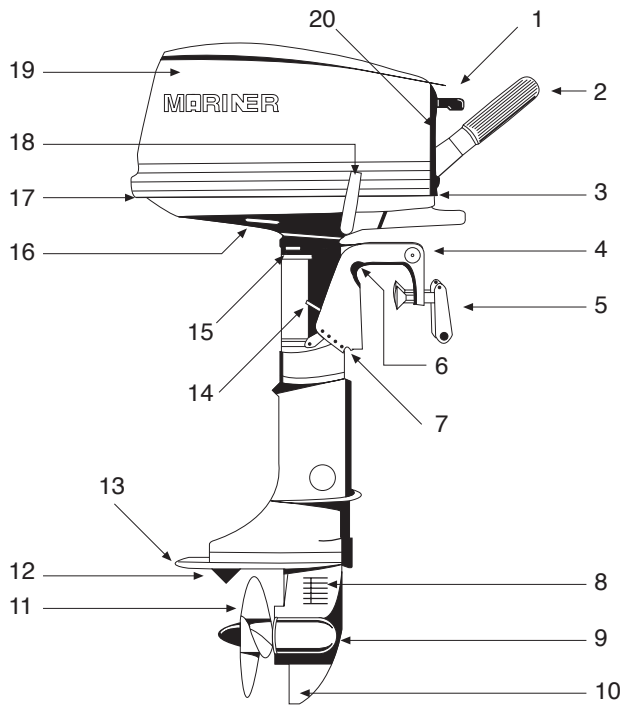
1. a
2. d
3. a
4. a
5. c
6. d
7. c
8. diagram:



9. a. T
   b. T
   c. F
   d. F
10. a. round turn and two half hitches
    b sheet bend
    c bowline
    d clove hitch
11. nylon; don't leave knots in it, wash, dry coil and stow
12. a. mast
    b. luff
    c. leach
    d. mainsail
    e. clew
    f. dagger board
    g. jib
13. c
14. c
15. a
16. c. because there is risk of collision
17. b
18. c
19. c
20. a

Exercise 34 Outboard motors

1. See diagram below (Courtesy Mariner Outboards)



1. Starter Handle
2. Steering Handle
3. Engine Controls
4. Clamp Brackets
5. Clamp Handles
6. Attachment point to transom
7. Tilt Pin
8. Water Intake
9. Lower Unit
10. Fin
11. Propeller
12. Exhaust housing
13. Anti-Cavitation
14. Tilt Stop Lever
15. Steering Adjustment Wing Nut (Port)
16. Water Outlet
17. Cowl Clamp Lever (Port)
18. Shift Lever
19. Top Cowl
20. Throttle Friction Screw

2. There is no question 2
3. a. 40 hp
   b. bolted onto the transom
   c. 4 -5 m
   d. Motor has to be tied down so it doesn't move whilst driving
   e. yes
   f. the controls that move the motor up and down
   g. located on the console and operated by hydraulics
   h. key start; located on the console and works like a car engine
   i. at the stern of the boat at the bottom
   j. rubber
   k. aluminium boats are light and the rubber rollers let the boat bounce as it travels on the trailer
   l. No. Lights are taken off before the boat is launched to prvent the wires, bulbs, etc . . . being placed underwater
   m. under the wheel in the console
   n. under the radio in the console
   o. centre console boats have the controls in the console at the front of the boat, not on the motor

Exercise 35 Tools and their use

1. Students own experiences
2. Students own experiences
3. screwdriver ..... undo screws at oil filling points
   spark plug socket set ..... undo spark plugs
   spare pull cord ..... replace broken pull cord
   pliers ..... remove pins
   spark plug ..... replace old spark plug
   small socket ..... remove spark plug
   bench vice ..... to hold spark plug while cleaning it
   wire brush ..... to clean carbon build up from spark plug
   water repellent fluid ..... to spray around spark plug and carburetter
   feeler gauges ..... to check how wide gaps are in the distributor

Exercise 36 Starting the motor

- fuelled,
- two-stroke
- fuel line
- fuel
- squeeze pump
- ball
- oil and petrol
- naked flames
- ignition system
- combustion
- electrical spark
- spark plug
- electrode
- ignite
- explode
- bilge

Exercise 37 Reading the manual

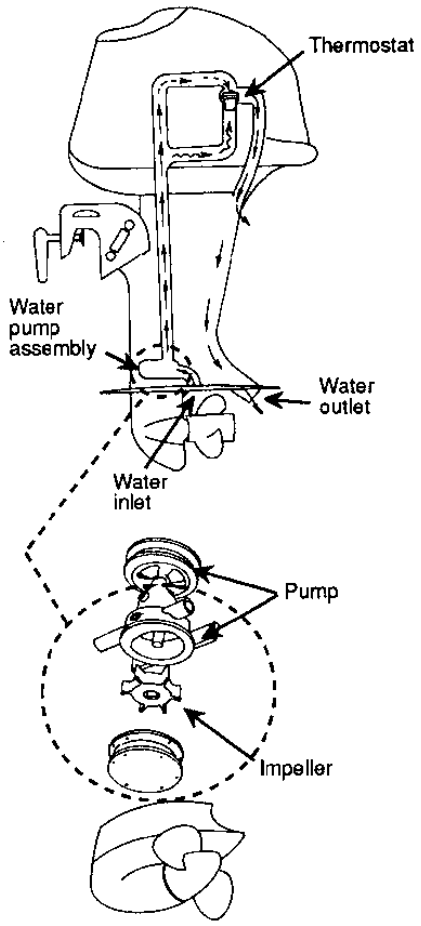
1. 50 mLs of oil to 1 litre of petrol
2. mix 250mls of oil into the 5 litre of petrol
3. a. 300mls
   b. 100mls
   c. 450mls
   d. 750mls
4. make sure that there are no naked flames around where the fuels are being mixed

Exercise 38 Diagnosis and repair

1. gap, electrodes, seat, plug, sockets, high tension lead, plug, spanner, emery paper, spark gap
2. to start the motor if the pull cord breaks
3. because they are used in different types of engines
4. diesel doesn't use a spark, because ignition of the fuel relies on compression
5. in case the plug is damaged

Exercise 39 The cooling system

1. Students colour in
2. See diagram below
3. See diagram below
4. draws water into the cooling system of the motor
5. to regulate the temperature of the motor so it doesn't overheat
6. to indicate that water is being pumped around the cooling system
7. it may prevent water being taken in and the motor can then overheat
8.
   - outboard
   - water cooled
   - intake point
   - main exhaust outlet
   - water pump
   - gearcase
   - driveshaft
   - impeller
   - driveshaft
   - pump housings
   - aluminium housings
   - impeller blades
   - bleed hole
   - thermostat



Exercise 40 Lubrication and maintenance

1. grease acts as a physical barrier to water and water resistant fluid repels any water that it contacts
2. A water resistant grease every 100 hrs
   B water resistant grease every 100 hrs
   C replace after 20 hrs, check level and fill every 50 hrs, replace every 100 hrs
   D water resistant grease every 30 hrs
3. 1. remove from water and wash thoroughly to remove all salt, sand and mud, remove spark plugs and drain water from cylinders
   2. feed oil into each cylinder and crank engine to spread to cylinder walls
   3. turn engine over and pour oil through carburettor
   4. have motor overhauled by dealer
4.
   - stored on trolley
   - store inside garage or workshop
   - lie motor on cowling
5. lift with the legs and not the back, lay on front end of cowling

Exercise 41 Fuel systems

1-10 Students own research answers

11. a. 2.5 L
    b. 1.25 L
    c. 500 mLs
    d. 250 mLs
12. so that oil and petrol are transferred together to the engine
13. to prevent dirt, sand, water, etc, from getting into the hose
14. in case of an explosion the boat is not damaged
15. to prevent ignition of the fuel
16. foam, dry chemical and CO_2

Exercise 42 Power units

1. Students read and locate
2. Students own poster
3. Students presentation

Exercise 43 Revision test

1. d
2. a
3. a
4. 800 mLs
5. d
6. a
7. a
8. c
9. Label diagram (see diagram in this booklet - Exercise 34 page 22
10. 1 thermostat
    2 water pump assembly
    3 water outlet
    4 water inlet

Information Processing and Reasoning

1. a.
   - fuel tank empty
   - motor is cold
   - fuel line not connected
   - fuel line pinched
   - fuel filter needs cleaning
   - air leak in fuel system
   - low speed mixture screws maladjusted
   - motor flooded
   - spark plugs fouled
   - no spark
   - weak or intermittent spark

   b.
   - fuel line pinched
   - fuel filters need cleaning
   - air leak in fuel system

   c.
   - motor speed faster than normal
   - motor speed slower than normal
   - does not develop normal boat speed

2. a. 3:4
   b. 13.5cm
   c. 13.5cm x 250
   = 3375.0 cm per minute
   = 33.75 m per minute
   =0.5625 m per sec

Exercise 44 What to wear

1. for warmth against the spray and wind and in case of an accident you don't have to look for it
2. to prevent wind and sunburn
3. to protect against sunburn
4. because of the wind
5. hat; fits the head tighter than a bushwalking hat
6. for warmth -jeans, woollen jumpers, socks, spray jackets with hoods, thermals, long sleeved t-shirts, boots

   for northern areas - shorts, t shirts, hat, sandshoes, socks, spray jacket
7. spray jacket, hat, light jumper, shorts or jeans, t-shirt
8. white soled sandshoes so they don't mark the deck
9. shorts, t-shirts, light jumper; should be packed in plastic bags so they don't get wet
10. a. old t-shirt, jeans and apron
    b. jeans, long sleeved shirt, gloves
    c. long trousers, long sleeved shirt
    d. long trousers, shirt, depends on the weather
    e. speedos, sunscreen, hat, sunglasses, t-shirt
    f. lightweight long trousers or shorts, long t-shirt, hat, sunglasses, rubber soled shoes
    g. overalls, steel capped boots
11. on a sailing boat clothes are worn for warmth and for protection against water;

    clothes worn for a day trip to an island are to protect against the sun

Exercise 45 Working together

Class discuss results

Exercise 46 Getting into and out of a boat

1. a. water - the person entering the boat slipped, fell over into the water and drowned
   b. moving engine parts -the boat capsized and the driver fell out and cut his head open on the propeller
   c. dangerous marine creatures - the person not wearing shoes stepped on a stonefish (dangerous marine creature) at the waters edge
   d. extremes of temperature - in the afternoon the wind became very cold and the person without the jacket froze to death
   e. solar radiation - the person boating without the hat suffered severe sunburn by the end of the day
   f. heavy equipment - the heavy equipment on board the dinghy wasn't loaded evenly and the boat capsized in the creek
2. rearrange items to make room for the crew
3. • handle
   • loaded
   • dinghy
   • plane
   • stern
   • skipper
   • crew
   • stern
   • centre
   • gravity
   • low
   • gunnels
   • passenger
   • sideways
   • weight
   • equally

Exercise 47 Safety equipment

1. so they can be fixed before the boat goes into the water
2. in case the motor doesn't start you can get back to shore
3. to moor the boat at a jetty or buoy
4. buckets are used to bail out any water that gets into the boat and a rope is tied to each so that in the event of the bucket going overboard it can be hauled back in again
5. for warmth, for protection against injury to ribs in case of an accident, and to keep you afloat in case you fall out
6. to prevent overloading which makes the boat difficult to handle
7. all boats must carry an anchor, chain and anchorline so if they break down they can remain in one place and not drift with the currents
8. rope, compass, first aid kit, barometer, fire extinguishers, flares, PFD's, EPIRB, weather alert fax

Exercise 48 Rowing a boat

1. so they can see where you are going
2. the stern
3. select your landing site and row towards it, check the beach for rocks and general conditions, warn crew not to get up until the boat touches the bottom, raise the oars and stow in the boat
4. the oar may break or may slip out of your hand, causing you to be thrown off balance, and possibly fall backwards
5. port, horizon, landing site, hull, stow, disembark, slippery surfaces

Exercise 49 Safety instructions

1. a. rafting up - two whistles (or whatever decided by the group)
   b. return to shore - to be decided by the group
   c. I am in trouble and need assistance - moving arms from side to side
2. a. before the boat is launched
   b. after crew have boarded the boat
   c. before launching the boat or before getting out of the vehicle
   d. before leaving the ramp and before leaving home
   e. before leaving home
   f. before leaving the ramp
   g. before leaving home and before leaving the ramp for home
   h. before leaving home
   i. before leaving home
   j. before leaving home
   k. before leaving home
   l. before asking them to come along
   m. before leaving home

Exercise 50 Going out

1. • can you swim?
   • can you row?
   • can you tie a knot that won't slip?
   • do you know the signals for help, come and rescue me?
2. • fuel line connected, oars are in the boat, buckets have rope attached and there are enough PFD's for the crew
3. • is the bung in? The oars are secured, all safety equipment is in the boat, PFD's are on the crew, motor is mounted correctly, safety chain is on the motor
4. pull the boat back gently, and push off while hopping into the boat
5. crew? safety equipment?
6. to starboard
7. No. The stern will swing to starboard and the boat will turn to port. The observer is facing the wrong direction
8. strong current, gear not engaged properly
9. painter, to tie the boat at mooring and for the crew to hold onto

Exercise 51 Underway

1. yes
2. soft
3. starboard
4. up
5. depends on the direction of the other boat and if it is moving at all or at anchor
6. a. that it is a green port marker which is to be passed on the port side of the boat when entering port
   b. lateral
7. • yes.
   • yes, sitting astride the seat is suitable for slow water speeds
8. face the front of the boat
9. signal that she needs help and row into shore
10. a. how much fuel is left, to put on his PFD, all safety equipment is in the boat, to keep others in sight, to tell someone where he is going
    b. no
    c. a licenced driver is in the boat

Exercise 52 Coming back to shore

1. beach landing
2. she should be about to turn off the engine and pull it up as she glides into the beach
3. neutral
4. less than 4
5. to stay seated until the boat comes to a complete stop
6. turn the motor off, pull the motor up and watch out for wash or waves which may hit the boat
7. not to approach the shore too quickly, not to run the boat up onto the shore with the motor going, turn the motor off before reaching the shore, watch out for swimmers and rocks, engage neutral about 10m out from the shore
8. about 10m out from the shore
9. over the bow
10. no tide or wind because it is in a creek with very smooth water and the people in the boats don't appear to be wind blown
11. she should approach the shore as the others did above, but possibly more slowly because the wind will be blowing her onto the beach. She should take care not to let the boat swing sideways to the shore as the wind may cause the boat to rock violently.
12. take care to hold the boats securely so the wind doesn't catch them and flip them over
13. make sure the boats are tied down securely and the bungs are taken out to let the water drain
14. not to sleep under trees, all possessions, boats and tents are secured properly, boats are above high water mark

Exercise 53 Mooring at a jetty

1. no because the water is very calm
2. less than 4 knots because there is no white water wash behind the boat
3. to approach slowly, to line up with the point where she wants to moor, take note of any wind and current
4. towards
5. port
6. bowline
7. approach the pylon lining up where she wants to moor, slow the motor, when the bow has nearly reached the required position, reverse the motor and pull the tiller towards her to swing the stern in towards the pylon and bring the boat alongside
8. keep hands in the boat, remain seated, watch out for wash and waves
9. load and unload luggage one piece at a time, don't throw luggage, lift luggage straight up and pass from one person to another, remain in the centre of the boat

Exercise 54 Mooring at other places

1. have fenders ready to prevent damage to the boats, check with the skipper that they do not mind you boarding their boat
2. to prevent anchor damage to corals from the boats using the reef
3. mooring to a buoy is more difficult than mooring to a jetty, because the buoy is not stationery, and it is easy to approach too fast and overshoot it
4. the driver can't see the buoy at the stern of the boat
5. if you approach the buoy into the wind and current, engage reverse when about 2m from the buoy so that the boat approaches closely to the buoy but not touching it
6. no
7. he has checked to see that the bottom is suitable to anchor, approached the rocky shore slowly, engaged reverse when about 2m out to stop the boat
8. load the gear one piece at a time, and stand in the centre of the boat to avoid toppling over
9. don't know the direction of the wind, possibly lee shore
10. he would have stopped the boat out from the shore and rowed in

Exercise 55 Leaving a jetty

1. low, you can see the high water mark on the sand on the shore
2. depends on the direction he wishes to go: to go forwards; motor in reverse until clear of the jetty, engage the motor in forwards and proceed ahead. To go in the opposite direction, motor in reverse pushing the tiller away from him and continue until facing ahead, engage motor in forwards and proceed.
3. approach from the leeward side of the boat, have fenders ready, line up with the boat, approach slowly and when about 1-2m away, engage reverse to slow the dinghy and move slowly up to the boat
4. class discussion with local examiner
5. leave the jetty by going forwards: let go of the bow mooring and allow the bow to swing out towards the channel, let go of the stern mooring when clear to do so
6. more than 6 knots
7. towards the driver because the boat is going in the opposite direction to the direction of the tiller
8. approach the beach for a beach landing, judging speed to disengage the gears and turn off the motor so the boat can glide into the beach. The instructor can then disembark from the bow.

Exercise 56 Preventing collisions at close quarters

1. to manoeuvre into and out of a small space
2. you can turn either way with motors
3. students redraw figure (see textbook)
4. ahead, the propeller rotates clockwise to propel the craft ahead
5. starboard
6. check all traffic to starboard
7. students redraw figure and include arrow
8. astern, the propeller is rotating anticlockwise
9. port
10. to look over your shoulder

11. students redraw figure and include arrow
12. a. I intend to overtake you on your starboard side
    b. I intend to overtake you on your port side
    c. I agree to be overtaken
    d. I'm altering course to starboard
    e. I am going astern
    f. A pilot vessel when engaged on pilotage duty may use four short blasts in addition to the rules
    g. I am in doubt as to your intention
    h. I am altering course to port
13. I am in doubt as to your intentions
14. one, flash, 10, all round white
15. Students own answer
16. areas of restricted visibility, power driven, prolonged, 2 prolonged blasts

Exercise 57 Planing your boat

1. the bow is out of the water and the boat is sitting on its keel
2. warn the crew you are about to plane, keep a look out for objects ahead and different wave types, look over your shoulder to make sure it is safe to turn, don't have the throttle flat out, engage brain
3. slow to a speed he can safely accelerate and decelerate at, approach the wake at an angle and accelerate and decelerate so that he goes up and over the waves in the wake
4. a. 0.75-1.0 m waves
   b. 0.75 m
5. a. with the throttle right back
   b. 0.5m

Exercise 58 Crossing a wash and figure of eight

As performed by students under instruction

Exercise 59 Recovery of object from water

As performed by students under instruction

1. swing the stern of the boat away from the person in the water and slow the boat, watch the person in the water at all times, turn the boat around as quickly as possible, and head back towards the person, approach into the wind or current, slow and stop the motor when close to allow the boat to move forward but not under motor, retrieve the person
2. to prevent the propeller hitting the person in the water
3. when there is doubt whether the motor can be restarted
4. a. approach the object facing into the rip if it is stronger than the wind
   b. approach as per diagram

Exercise 60 Person overboard

As performed by students under instruction

Exercise 61 Anchoring

1. a. A fluke
   B shank
   C shackle
   D chain
   Ebolt and shackel
   F shackel
   G bolt
   H rope
   b. eye splice
   c. bight, bowline
2. • don’t get hands or limbs tangled in the anchor rope - rope burns, can't throw out anchor, get pulled overboard with the anchor
   • allow chains to run through blocks and not over gunnels - to prevent damage to the side of the boat
   • allow the boat to dislodge the anchor - to prevent injury to back, to prevent being thrown off balance if the anchor gives way suddenly
3. to allow the anchor chain to drag on the bottom which enables the anchor to grip properly and not be pulled up
4. D ring used to connect the shank with the anchor chain
5. a. coral or rock pick
   b. on reefs or rocky bottoms
   c. D ring then a chain, to allow for the chain to pivot about the shank
   d. bend back into shape by hand

Exercise 62 The sailboard

1. near the shore and protected from strong winds
2. stinger suit, PFD, nonslip deck shoes
3. students to contact local council to find out about local regulations
4. students to contact local Department of Transport (water division) for information
5. the sailboard with the wind on its port side has to keep out of the way of the other
6. maintain course and direction, the power boat should give it right of way
7. no, because surfboards travel very fast and waves and boardriders are unpredictable
8. centreboard, rudder, mast, sail, universal joint, wishbone boom

Exercise 63 The corsair

1. Drawing in notebook
2. The hull of the Corsair is made of fibreglass because it is a durable material that is easily shaped. The hull is designed to float on water and move through it easily. The mast is held in position by the forestay and side stays. The purpose of the mast is to support the sails. The mast is made of aluminium. The Corsair has two sails which are the mainsail and the jib. The mast and boom are connected by the gooseneck. The position of the boom is controlled by the mainsheet
3. a. unpack the trailer by untying the mast and removing the equipment in the cockpit
   b. untie the light board
   c. stand the mast
   d. attach forestay to the bowplate
   e. check that the bung is in the hull and the bailers are closed
   f. fit the rudder system ensuring the securing pin is through the pintle
   g. attach the mainsail to the halyard and raise the top of the mast
   h. take the hull off the trailer
4. A shackle is used to hold the wire to the sails and chainplates. Parts of a shackle- U and pin
5. Drawing
6. Forestay and side stays or shrouds
7. Front - bow or stem: Back-stern
8. Bolt rope: A rope sewn into the luff and foot of a mainsail to hold it in the track on the mast and boom.
   Header: A wind shift is towards the bow or head of the boat
   Stay: A wire support for a mast
   Stern: The back of a boat

Exercise 64 Tacking and gybing

1. Tacking or lee-ho
2. The jib so that the boat wants to turn towards the wind
3. The boom and boom vang
4. The jib sheet
5. Foreward, towards the bow
6. Drawing to be supplied
7. Before the gybe
8. Must be controlled for the crews safety and to minimise the chance of capsize.
9. When gybing up.
10. Student to draw
11. The jib will not stay on one side but tend to move from side to side when going straight down wind.
12. When there is least pressure in the sails. When the wind drops and / or surfing down a wave.
13. RIGHT Starboard tack
    SAIL Power gives way to sail
    RIGHT Starboard tack
    LARGER VESSEL Unable to move outside the channel due to draught
    RIGHT Overtaking vessel must keep clear
    BOTTOM Windward vessel must keep clear

Exercise 65 The points of sail

1. a. From the bottom mark (leeward) sails in, centreboard down, weight forward and the boat flat on the water.

   Sail a close haul to the first mark.

   Tack on the mark, tell the crew to look, say 'tacking', helm away from you turning the boat through 90 degrees with the crew changing the jib over.

   Then sail on a close haul on the other tack to the next mark.

   On rounding the windward mark let the mainsail out first and 1/2 out, the same with the jib.

   Centreboard 3/4 up and weight a little back.

   Sail a broad reach to the next mark to gybe around it.

   To gybe look, tell crew 'turn' to a run (the wind over the stern of the vessel and the jib will not sit on one side) helmsperson changes side, move boom over, steer to a new course.

   b. Broad reach, starboard tack

2. No.	Point	Your explanation
9	Close	Sailing as close to the wind as possible. Sails in, c/b down, weight foreward and boat flat
5	Running	Sailing with the wind on the starboard tack. Sails out, c/b up, weight back a little and boat flat
1	Head to	Boat pointing into the wind, sails flapping
7	Beam	Sailing across the wind on the starboard tack. Sails 1/2 out, c/b 1/2 up, weight foreward boat flat
8	Close R	Sailing between a close haul and a beam reach. Sails slightly out, c/b down, weight foreward and boat flat
2	Beam	Sailing across the wind on port tack
10	Tacking	Changing the tacks by turning through the eye of the wind
6	Broad	Sailing at approximately 45 degrees to the wind downward. Sails almost out, centreboard 1/4 down, weight slightly foreward and boat flat
4	Running	Sailing with the wind on port tack

Exercise 66 Capsize drill

1.
   - Watch the person or have a crew watch and point at the person.
   - Sail on a beam reach slowing the boat down by releasing the jib.
   - Once the boat is stable, turn to a broad reach so that the boat is below abeam of the person in the water.
   - Tack to head back to a point a couple of boat lengths downwind of the person.
   - Turn towards the person so that you approach from downwind on a close reach stopping the boat beside the person in the water.
   - Retrieve
2. Check everyone is alright.
3.
   - Swim around the stern of the boat checking the rudder and closing the bailers.
   - Climb onto the centreboard over the trailing edge.
   - Hold either the gunnel or the jib sheet and lean back so that the mast left out of the water.
   - Allow the boat to go head to wing and roll into the boat.
   - Bail out and sail on.

Exercise 67 Launching a sailing boat

1. a. Head to wind
   b. Check the mast step is clear
   c. Checking the rudder is attached securely
   d. Place the boat in the water head to wind, leave on a port tack (to the right of the photo) lowering centreboard as quickly as possible
2. On a port tack the crew uses the starboard sheet
3. Yes
4. By back winding the mainsail
5. Depends on the situation
6. A fixed keel is generally associated with a yacht. It carries ballast (weight) and is the foil that reduces leeward helping to produce forward drive. A swing keel is also weighted but swings around a pivot point so as to reduce draft. These are often associated with trailer sailers. A retractable centreboard carries no ballast or pulling up in a vertical motion.
7. Depends on the student

Exercise 68 Reefing the sails and motoring

1. The sail is reduced
2. Slab reefing or roller reefing
3. There is no wind or the rudder is damaged
4. To provide auxiliary power
5. a) Gunter rigged, Swan river Perth
   b) Complete
6. To be completed

Exercise 69 Towing

1. because they do not slip
2. Students to complete
3. line, strain, cleat, bowline, speed

Exercise 70 Factors affecting handling

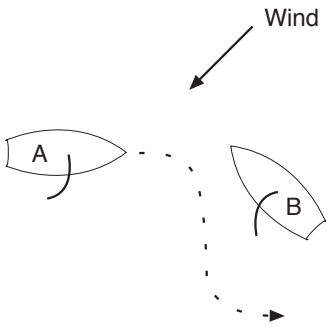
1. warn the crew to hang on, drop the throttle to zero while pushing the tiller in the safest direction, put the motor into neutral as the boat stops broadside with the stern wash passing the transom
2. a. trim the bow up a little and steer a weaving course, taking each wave at an angle
   b. reduce throttle and allow the waves to pass
   c. position crew towards the stern to reduce the water coming in over the bow
3. a. power unit, drive, propeller type and number, hull design and superstructure, conditions of loading, weather, tide, current, waves and swell
   b. shallow - better stability and buoyancy deep - better directional stability with better ride
   c. very portable, high stability, high buoyancy and high load capacity
   d. not a good ride, and affected by wind
   e. semi- rigged inflatables have a v-shaped hull, so they have a better ride than flat bottomed inflatables
   f. very stable
   g. students to draw diagram to answer question
   h. if there are too many crew the boat will not get on the plane and handling will be difficult
   i.

fuel tank - stern	handbags - bow
oars - along sides	lunch - bow
water - bow	snorkelling gear - bow
anchor rope and chain - bow	buckets - bow
signalling gear - bow	PFD - bow or under seats
fishing rods - sides	radio - bow

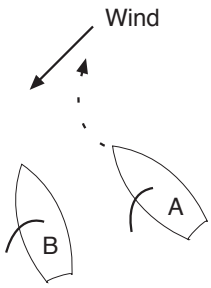
Exercise 71 Safe boating

1. a marine radio and an EPIRB
2. 999
3. newspaper, radio, T.V., Coast Radio Stations, Marine Volunteer Groups
4. change in atmospheric pressure, cloud formations, visibility, wind and water surface
5. a right hand propeller will torque a stern to starboard so can be used to swing the stern of a vessel towards a wharf
6. one engine in forward and one in reverse can turn the vessel on its own axis
7. international rules for prevention of collisions at sea (sometimes called collision regulations)
8. vessel A gives way to B

a.



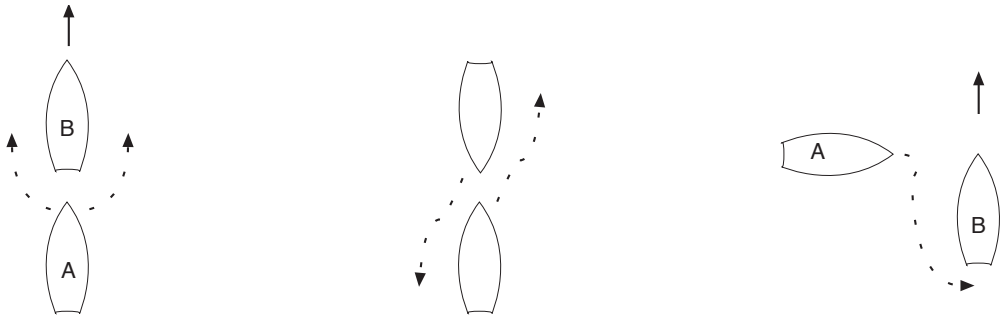
b.



Exercise 71 Safe Boating (Cont'd)

c. Vessel unable to determine the situation should keep away from the other vessel

d. e. f.



9. the primary obligation of all skippers is to avoid collision
10. the Whitsunday group of islands are located in Queensland coastal waters east of Mackay
11. large tidal ranges and coral "bombie" outcrops
12. in boating you need to "expect the unexpected"
13. tides of large tidal range cause most problems
14. rope would not provide a safe warp with the sharp coral bottom
15. C.Q.R. anchors have good "holding power" and if jagged in coral are easier to pull free
16. chain (or extra chain) keeps the anchor on the sea bed and stops it skating across the bottom
17. the general ratio is 5 to 8 times the depth
18. the more chain/rope should be released
19. wind and tide opposed creates a short chop of stand - up waves. This is often associated with strong tides and shallow water
20 a flood tide would provide the best surface conditions
21. 1. c; 2. d; 3.a; 4.e; 5.b
22. 3•; 4•; 1•; 5•; 2•
23 polarizing sunglasses make it easier to see coral outcrops under the surface of the water
24. a. plan your course prior to the voyage
    b. wear polarizing sunglasses
    c. select anchorages carefully
    d. anchor by 4.00 pm, don't depart before 8.00 am
25. hard corals show the greatest damage
26. class discussion
27. class discussion

Exercise 72 Revision test

1. c
2. a
3. Students to redraw diagrams and make suggestions depending on weather
4. a
5. b
6. don't try to row too fast, pull on the oars with equal strength, dip the oars just under the water
7. advantages - portable, lightweight, high buoyancy

   disadvantages - little directional stability, short life span,
8. starboard, because the blades at the bottom of the propeller are more effective and it pushes against the water propelling the stern to starboard
9. Students to draw diagram to illustrate answer
10. keep the boat on the plane, alter speed so the chine of the boat doesn't slip out
11. A danforth
    B grapnel bruce
    C sea anchor
    D drogue reef anchor
    E admiralty pattern
    F coral hook
12. Students to select one anchor and give advantages / disadvantages
13. • swing the stern of the boat away from the person in the water and slow the boat
    • tell someone to watch the person all the time until rescue is complete,
    • turn the boat into the wind or current and when near the person
    • turn off the motor and drift up towards them
    • retrieve the person over the stern
14. more than 5 times, i.e., more than 20m
15. see Fig 1
16. see Fig 1
17. see Fig 2
18. see Fig 3
19. reefing. When overpowered in strong winds
20. c
21. b
22. d
23. a
24. b

Figure 1

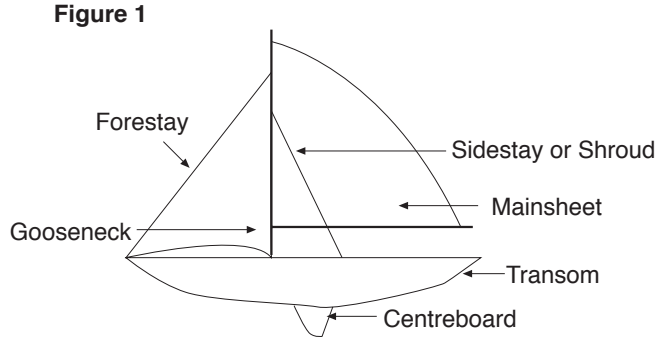


Figure 2

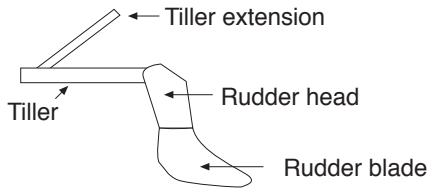
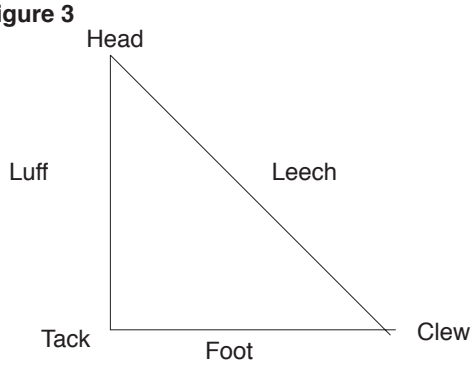


Figure 3



Exercise 72 Revision Test (Cont'd)

25. **boom vang** controls the vertical movement of the boom and the shape of the top part of the mainsail
    cleat - mechanical device to hold the rope temporarily
    bolt rope - a rope sewn into the luff and foot of a mainsail to hold the mast and boom
26. Students answer depends on own experience
27. e.g. Gear in good repair, Hull not damaged, Sails in good repair, All safety gear stowed on board
28. Mayday on Radio, Flares, E.P.I.R.B's, Gunshot, Morse Code, Mirrors
29. Long pants, rubber soled shoes, woolen vest, spray jacket.
30. • B has the wind on its starboard
    • B power boats must keep out of the way of sailing boats
    • B has the wind on its starboard side

Exercise 73 Tide types

1. a. Perth <2m
   b. Brisbane <2m
   c. Adelaide <2m
   d. Burnie 2-4 m
   e. Mackay 4-6m
   f. Broome 4-6m
2. a northern W.A.
   b. when the tide is out, the water is often kilometers away from the shore. It is difficult to launch boats and easy to become caught in the incoming tide as the water rushes in.
3. diurnal tides happen twice a day. Southern W.A.
4. a. mixed
   b. mixed
   c. mixed
   d. mixed
   e. mixed
   f. semidiurnal
   g. semidiurnal
   h. mixed
5. the shape of the coastline may vary the range of the tide. The season and whether it's day or night.
6. a. the area between high tide and low tide on the shore
   b. is the current caused by the tide when the Earth spins out of the tidal bulge
   c. the difference in height between high tide and low tide

Exercise 74 Tides

1. a. declination - the angle between the moon and the earth's equitorial plane
   b. perigee - the position of the moon in it's orbit when its closest to the Earth
   c. apogee - the position of the moon in it's orbit when its furthest from the Earth
   d. periphelion - the position of the Earth in it's orbit when its closest the to Sun
   e. aphelion - the position of the Earth in it's orbit when its furthest from the Sun
2. Torres Strait
3. Because the moon and sun are in line with the Earth and the tidal bulges caused by each combine to produce a Spring tide
4. The seas on either side of the Torres Strait operate under different tidal influences and are rarely in phase with each other. The Torres Strait connects the two seas and can experience large changes in tidal heights and strong currents as the water rushes through.
5. The Broad Sound area experiences very large tidal ranges. This is because of the pattern of tidal waves in the Pacific Ocean. Two counter- rotating basins, one centred in the Coral Sea and the other near New Zealand combine to push a tidal crest towards the Qld coast. The crest splits into two parts which approach the coast from the south and north-east simultaneously. The two crests converge in the coast at the Broad Sound area.
6. a. 11ft
   b. 8ft
   c. 5 ft
   d. 9-10 ft
   e. 10-12 ft
   f. 14 ft
7. Bowen, GBR east of Mackay
8. a. 18 ft
   b. not as large a range in Weipa as in Mackay and less tides per 24 hours in Weipa
   c. no; one tide is much higher than the other
   d. the tidal variation in Cairns doesn't seem to be as extreme as in Mackay and is more of an average variation
9. Because there are a lot of variables to consider, e.g, the Sun, Moon, depth of oceans, shape of coastline, time of day, etc.

Exercise 75 Tide cycles

1.

Connelltown			Waterhouse		
0221h	0.99m		0438h	1.15m	
0815	2.32		1025	4.89	
1424	0.51		1641	0.75	
2101	2.55		2253	5.44	

2. Students to draw graph on information from Question 1
3. yes
4. every 6 hours
5. different tidal ranges depend on the location on the coast and the shape of the coastline in the area
6. yes; 2-3m
7. a. 2nd May
   b. last quarter on 9th May; first quarter on 24th May
   c. yes

Exercise 76 A model for daily tides

1. high
2. low; the water level is lower
3. 18 hrs
4. 6
5. yes
   a. yes
   b. yes because the highest tide is on the side with the moon and the lowest high tide is on the side opposite the moon

6. a. 8 pm
   b. the nest high tide which was at approx. 2am, was higher than the 2pm tide and the boat floated away

Exercise 77 Rule of twelfths

1. 0.99m
2. 3.54 m
3. between 10 am - 12 pm because of that time has the least tidal flow
4. 12:40 pm - 2:40 am and 13:11 - 15:11
5. 8:00 am to 12:00 pm
6. not always practical to draw a graph, it's a useful rule of thumb which doesn't need to rely on accuracy

Exercise 78 Bay of Fundy

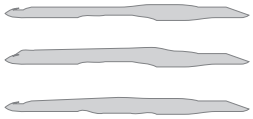
1. Students locate Bay of Fundy
2. Canada
3. A tidal bore is the wave produced as a result of an outgoing low tide and an incoming high tide
4. b
5. >16m
6. Students use ceiling height of their own room to answer question
7. the large tidal range has produced unusual shaped rocks and caves, a whirlpool and a tidal bore
8. 320m; 5.3m/hr (check answer)
9. harness the tide to produce electricity; slowing the flow of water may cause problems with some of the natural attractions

Exercise 79 Tidal heights at secondary places

Students work through exercise. As an extension they could apply the table to their local port.

Exercise 80 Cloud types

1. Students locate clouds in text
2. See table below
3. Students make drawings as per text

Cloud type	Symbol	Description	Effect on the weather
Cumulonimbus		High, vertical extent; fluffy clouds with thunderheads	Storms, hail
altocumulus		high, vertical extent; fluffy clouds with thunderheads	Varies depending on other clouds they combine with
cumulus		cream tops and grey bottoms	fine weather clouds
cirrus		fine feathery streaks often hooked	fine weather

Exercise 81 Synoptic chart interpretations

1. highs - southwest W.A., west N.Z.
   lows - south W.A., southeast Tasmania
2. highest - 1032
   lowest - 1008
3. Hobart 1026
   Darwin 1011
   Brisbane 1022
   Townsville 1015
   Alice Springs 1018
   Perth 1024
4. south W.A.
5. 4
6. east
7. Hobart S.E
   Darwin N.E
   Brisbane S.E
   Townsville N.E
   Alice Springs E
   Perth N.E.
8. Melbourne
9. students own answer
10. calm
11. students own answer, but along the lines of cloudy and windy in N.Z. then calm across the ocean and rainy and windy in Perth.

Exercise 82 Weather record

Students fill in record as per table

Exercise 83 Your weather map

Students fill in record as per table

Exercise 84 Weather map

1. Weather satellites can observe large sections of the earth and its oceans and obtain data on clouds, temperature, humidity, wind speed, sea surface temperature and ocean currents, atmospheric instability and rainfall
2. polar satellites orbit the earth at altitudes of between 800-1500 km, and survey a narrow portion of the earth; geostationary satellites orbit above the equator at an altitude of 35, 700 km and remain in a fixed position over the earth's surface
3. in 1960 in the U.S.A.
4. a data made up of visible and infrared photos of the earth's surface
   b the same speed as the earth rotation
5. a. cloud
   b. rain
6. high over central Australia, low over north Qld
7. rain
8. summer, because most low pressure systems develop over Qld in summer
9. rain and windy; there are clouds to the west of Perth which is probably a frontal system moving across
10. students make drawing
11. students make drawing
12. air traffic controllers, fishermen, sport players, gardeners, geologists

Exercise 85 Records and extremes

1. 0.00 in August 1991
2. January; 803.6
3. September
4. October
5. Students to draw graph from information given in manual
6. a. 202 kt
   b. 90 kt
   c. 247 kt
7. 100kt
8. 247 kt, May 1955
9. no because the table doesn't show trends, it just shows extremes
10. 1974,1967

Exercise 86 Wind speed and direction

1. a. 48 kt, 88.896 km
   b. 3:00 pm
2. ENE, S
3. paragraph should include that the wind was increasing in speed from under 20 knots to almost 30 knts with gusts of over 40 kts and was changing direction from ENE to SW and then to southerly after the storm
4. very calm with occasional gusts
5. perhaps a frontal system or low pressure system

Exercise 87 Rainfall

1. 24 hrs
2. rainfall
3. rainfall intensity and amount of rain
4. yes; a pluviograph measures intensity and cumulative amount of rain and a rain gauge only measures cumulative amount
5. 25 mm
6. 5.2 mm
7. about 0.4 mm; mostly between 4 -5pm, about 17.4mm
8. 35mm
9. 9:00pm and 4:00pm
10. long periods of heavy rain during 30 September to 1 October and gradual rain with one large downpour during 3-4 October
11. 51 mm
12. a pluviograph tells the intensity of rainfall, that is, it shows when the rain fell and over what time period whereas a rain gauge just shows the total rainfall for the period

Exercise 88 Revision test

1. a
2. a
3. d
4. c
5. a
6. b
7. c
8. b
9. a
10. c
11. b
12. d
13. b
14. Students to use local tide book to answer question
15. a. flood tide - tide created as the earth spins into the tidal bulge
    b. tidal stream -flow of water created by change of tide
    c. tidal bulge - bulge of water on the earth's surface created by the gravitational pull of the moon and/or the sun
    d. dew point - temperature at which air reaches saturation point and condenses into vapour
16. Students own answers
17. Students own answers
18. a. 4m
    b. 1m
    c. 470 km

Exercise 89 Making a compass rose

Students make own rose and mark it accordingly

Exercise 90 Hypothetical bay

1. approx. 80°S to 49°S
2. 112°E to 153°E
3. England; 0°E
4. Galapagos Islands, Borneo, Colombia.
5. Consult your friendly Geography teacher
6. a. Southern
   b. East Australian
   c. approx. 30km
7. beacons, reefs, set and drift of tide, lateral markers, cardinal markers, direction of tidal flow
8. Students to draw symbols. Reproduce figure in Exercise 101, Page 188 Mariners Skills
9. deepest is south of Rogers Reef, shallowest is Wolfe Inlet and Lynch River
10. 1_2
11. pilotage is the term used to describe the means by which skippers use a series of buoys beacons and markers to enter and leave ports; buoyage is the system of marking these buoys, beacons, and markers.
12. 2_6
13. A pilot is a person who knows the local channel very well and operates a pilot boat which is located in a harbour and whose job is to navigate large vessels safely into the harbour.
14. 162°5'N, 23°54'S
15. mangroves
16. sand spit, bar
17. Halpin, Abbey, Mt James
18. Sumpter, Wiley
19. 4 knots
20. sand, coral
21. 6 knots
22. coral, rock
23. sand

Exercise 91 Latitude, Longitude and Nautical Miles

1. a. 161°56'E, 23°52'S
   b. 161°59'E, 23°51'S
   c. 162° 06.4'E, 24°03.4'S
   d. 162°E, 24°. 07.8'S
   e. 161°53'E, 24°13.6'S
   f. 161°52.4'E, 23°53.4'S
   g. 161°59'E, 23°51.2'S
   h. 162°02'E, 23°51'S
   i. 161°56'E, 24°05.6'S
   j. 161°55'E, 24°10.2'S
   k. 161°54'E, 24°12.8'S
2. a. airfield
   b. Gregory Light
   c. McLean Reef light
   d. Bundy Point
   e. Pamela's Light
   f. Mark's Light
   g. Holthouse flats
3. Rickard's and Pamela's light
4. Fairway beacon and O'Connor Reef
5. a. 2-3 nautical miles
   b. 4-5 nautical miles
   c. approx. 9 nautical miles
   d. approx 19 nautical miles
   e. approx 8 nautical miles
   f. approx 20 nautical miles
6. a. 4.5 nautical miles^2
   b. 0.5 nautical miles^2
   c. 0.5 nautical miles^2
   d. 13.5 nautical miles^2
   e. >1 nautical miles^2

Exercise 92 Distance, speed and time

1. 90 nautical miles
2. 24 nautical miles
3. 35 nautical miles
4. 5 knot
5. not very; 1.6 knot
6. 10 knot
7. 4 hrs
8. 8 hrs
9. 11.5 nm; anytime after low tide at 0221 hrs; 1 hr 54 min
10. 6 Nm
11. a. 40 min
    b. yes, she'll be there at 9:25 am
12. 3 hrs 24 min

Exercise 93 Parallel rules, set squares and the compass rose

1. 251°E
2. 358°E
3. 21°E
4. 280°E
5. 18°E
6. 277°E
7. 320°E
8. 58°E
9. 151°E
10. 195°E

Exercise 94 Taking compass bearings

Students take own bearings

Exercise 95 Doing compass conversions

1. a. 352°E
    b. 63°E
    c. 94°E
    d. 353°E
    e. 267°E
2. a. cocked hat on the 11.2 m depth east of Perry Shoal
    b. cocked hat on the 14.7 depth inside the compass rose
    c. v. small cocked hat south of Thelma's Point, just east of the cardinal mark

Exercise 96 Position fixing

1. 24°E 11'S, 162°E 02'E
2. 24°E 11'S, 162°E 02'E
3. 24°E 10'S, 161°E 54'E
4. 23°E 55'S, 162°E 07'E
5. 24°E 07'S, 162°E 06'E
6. 24°E 14'S, 161°E 55'E
7. 24°E 02'S, 162°E 01'E

Exercise 97 Laying off and plotting

1. a. A to B: 1.2 Nm
   B to C: 5 Nm
   C to D: 1.5 Nm
   b. 001°E T, 340°E T
   c. 283°E C, 012°E C
   d. 0940hrs
   e. 075°E C
   f. 012°E C
2. depends on the course plotted

Exercise 98 Buoyage systems

Students learn to make their own using the materials in the exercise

Exercise 99 Your local chart

Students use their local chart

Exercise 100 Chart your school oval

Students use their local oval to learn navigation

Exercise 101 Your own chart

Students use their own chart

Exercise 102 A3 Chartwork

1. a. 20°E 44.2'S, 149°E 13.7'E
   b. 20°E 36'S, 149°E 7.0'E
   c. 20°E 46.3'S, 149°E 24.1'E
2. a. 9°E
   b. 335°E T = 326°E C
   c. 4.2 Nm
   d. 42 min
   e. 10 fathoms line
   f.

	TB	CB
Allonby Island Hill	282°	273°
Brampton Island	140°	131°
Tinsmith Hill	349°	340°

   g. Finger and Thumb rock
   h. tide and current, deviation influences, steered wrong course
   i. 3 knot current, SW direction
3. a. See answer chart
   b. 20°E 38.6'S 149°E 15.2'E
   c. 1.4 nm
   d. 250°E C = 259°E T
   e. 15 min
   f. 8 m

Exercise 103 Chart 103

1. a. 1 mile ENE of Green Island NE, bearing 074°
   b. 20°E 51.3'S 149°E 20.5'E
   c. depth sounder 28.5m
   d. starboard beam: St Bees Island Hills 938 and 1237 in line with NE tip of Keswick Island
   port bow: Cockermouth Island, Island hill 173 and 160 in line
   port beam: gap between Brampton and Carlisle, see Finger and Thumb rock 123, and end of Goldsmith Island in background
2. a. 1018hrs
   b. 315.5°E C (325°E T - 9.5°E)
   c. Students to fix positions on chart
   d. Students to fix positions on chart
   e. 308°E C (317.5°E T - 9.5°E); 5.6 nm, 0.7 hr = 42 min, ETA 1212hrs
   f. Linne S and Bullion; Linne N and Goldsmith 627; Locksmith S and Ladysmith S hill; Blacksmith E and Shaw peak
3. a. Students to describe Coppersmith Light
   b. 20°E 33.4'S 149°E 15.0'E
   c. to stay away from Blackcombe Island and to give you enough distance to do a running fix
   d. 254°E C
   e. Students to fix position on chart
   f. alter course to 277.5 °E C for 1 mile or 10 min, and then resume your original course of 254°E C
   g. 7.5 min
4. a. 304°E C
   b. less than 124°E C
   c. turn to port
   d. about 50 min
   e. might be looking through the shallow gap between Burning Pt island Shaw Island. Also, want to clear the tide race at Burning Pt.
5. a. Students to fix positions on chart
   b. 001°E C

Exercise 104 Planning a trip

1. a. no, as the Repulse Islands are 27.5 nm away and for their height the geographic range is 20.8 miles. They will be over the horizon.

   b. yes, just the top. Geographic range 28.8 miles, and island is only 17 miles away.

2. a. 20°E 50.3'S 149°E 5.6'E; 14.4 mile range by interpolation

   b. 311°E C

   c. NE 32°E T at 0.8 knots

   d. 299°E C

   e. 5.1 kn

3. a. 57°E C, VMG 4.6

   b. 110°EC, VMG 6.2

   c. 322°E C, VMG 3.4

Exercise 105 Revision test

Knowledge and understanding

1. d
2. a
3. a
4. b
5. b
6. b
7. a
8. c
9. c
10. a
11. b
12. a. reefs, bommies, submerged objects, etc.

    b. yellow light with any rhythm, other than those used for the white lights or the cardinal, isolated danger and safe water marks

13. 1284 nm (check) (60nm x21 + 24 nm)
14. the line created when landmarks are in line with each other and the observer on the boat
15. a reciprocal course is the opposite compass direction to the course the ship is heading; 153° E
16. d
17. b
18. a
19. b
20. c
21. c
22. a
23. c
24. 65.19nm

Exercise 106 Latitude, longitude and bearings

Answers in book

Exercise 107 Compass error

Answers in book

Exercise 108 Position

Answers in book

Exercise 109 Coastal navigation

Answers in book

Exercise 110 Set and drift

Answers in book

Exercise 111 Running fix including set and drift

Answers in book

Exercise 112 Combined exercise

Answers in book

Exercise 113 Making a reference card

Students design and make their own reference card

Exercise 114 Parts of a radio

1.

No.	Name	Function
1	front speaker	enables message to be heard
2	squelch	removes background noise from the receiver
3	dual watch LED	
4	channel LED	displays the channel selected
5	receive LED	
6	suppression circuit LED	
7	suppression switch	
8	local switch	
9	dual watch switch	
10	microphone socket	point where microphone plugs in
11	channel switch	enables channels to be selected
12	on/off knob	turns the set on and off
13	volume	turns the set on and off and controls the volume of messages received

2. Improves the signal
3. If changes to the new channel number
4. Clarifies the signal
5. Helps receive the signal

Exercise 115 Tuning a marine transceiver

Students follow the instruction to tune the marine radio

Exercise 116 Connecting a 27 MHz marine transceiver to a battery

1. wiring harness, fuses, antennas
2. black lead, earth lead, red positive lead
3. A fuse is a piece of wire which represents an electrical weak spot in the wiring harness, so in the event of a fault, the fuse will blow first and prevent damage to the circuitry within the transceiver.
4. the degree of weakness of the fuse
5. held in place with a spring, and is found holding the fuse in
6. central and outer core
7. pushed in gently and pulled into place by tightening a threaded sleeve over the cable and onto the socket
8. can receive a severe electrical shock if a message is received at the time the battery is plugged in but not the aerial; the person acts as the aerial
9. red to red and black to black
10. +ve
11. -ve
12. after all connections have been made

Exercise 117 Principles of transmission

1. transmitter - in which a generator charged an aerial about 50 million times per second
   receiver - the aerial which received the transmission
2. see page 187 of textbook
3. see page 188 of textbook
4. see page 188 of textbook
5. ***carrier wave*** - is the radio wave since it carries information
   amplitude modulated wave - a carrier wave which has its wave height altered
   frequency modulated wave - a carrier wave which has its frequency altered
6. that radio waves don't pass through land, they are line of sight only
7. increase the height of the sender and the receiver
8. a switch in the microphone changes the radio from a transmitter to a receiver and can only be one of those at one time; a telephone can receive and transmit simultaneously

Exercise 118 Sending a message

1.

Phrase	Meaning
affirmative	yes
negative	no
ETA	estimated time of arrival
ETD	estimated time of departure
over	my transmission is ended and I expect a response from you
out	my transmission is ended and I don't expect a response
stand by	wait and listen till I re-transmit
romeo	message received and understood
copy	let me know that you have received and understood my message
go ahead	proceed with your message
I say again	I repeat
say again	repeat your message
that is correct	that is correct
verify	check your information and get back to me
standing by	I am waiting for you to call me again

2. a. the first alerts you, the second and third confirm the call
   b. other vessels name (3 times)
      your vessels name (3 times)
      over
      change to an agreed frequency
      give message
      out
3. class to investigate
4. distress and calling channels 27.88, VHF 16, HF 2182
5. investigate local traffic channels eg. 27.94 or VHF Ch.73
6. • two wun
   • three wun decimal three four dollars
   • six decimel three four
   • wun four
   • 0600 hours
   • 1200 hours
   • 1535 hours
   • 2225 hours

   * Note the two wun September, wun two January, wun six March and two five December should not be phonetic. Correction to next edition.
7. a. following identification calls by both stations and switching to a working channel:
      "Air sea rescue, this is tubby. I'm heading to St. Bees Island with 5 people on board. My ETA at St. Bees is 1030 hours, would you please place me in your log book. Over."
   b. on VHF, some sets are equipped with a key pad and auto seaphone. Provided an appropriate fee has been paid, you can simply dial direct.

Otherwise:

Select the local seaphone channel and call, "hello seaphone, hello seaphone, hello seaphone, this is tubby tubby tubby" You call will activate a voice activated computer which will eventually contact a manual operator. Once this person has verified your ships station licence (call sign) they will put through the call. Callers are verified so that the call can be billed.

c. Following identification calls by both parties and switching to a working channel

"Coast guard this is tubby

I was logged in today but wish to extend my log time for another two days. I would also like to relay this message to a shore party over"

13. Following identification calls by both parties and switching to ship to ship channel

"reef seaker this is tubby, what is your position and are you catching any fish? Over?

(Would you tell them if you were catching fish? Editor)

Exercise 119 Securite

1.
   - SECURITE SECURITE SECURITE
   - HELLO ALL STATIONS HELLO ALL STATIONS HELLO ALL STATIONS
   - THIS IS SEAWITCH VICTOR LIMA 1234 SEAWITCH VICTOR LIMA 1234 SEAWITCH VICTOR LIMA 1234
   - SAFETY MESSAGE FOLLOWS ON CHANNEL 86
   - HELLO ALL STATIONS HELLO ALL STATIONS HELLO ALL STATIONS
   - THIS IS SEAWITCH VICTOR LIMA 1234
   - SIGHTED LARGE SUBMERGED LOG 10 MILES EAST OF LYNCH RIVER
   - OUT
2. defective light, buoy adrift
3. to warn any vessels in the area of safety issues
4. safety

Exercise 120 Pan Pan

1.
   - PAN PAN PAN PAN PAN PAN
   - HELLO ALL STATIONS HELLO ALL STATIONS HELLO ALL STATIONS
   - THIS IS SEAWITCH VICTOR LIMA 1234 THIS IS SEAWITCH VICTOR LIMA 1234 THIS IS SEAWITCH VICTOR LIMA 1234
   - 10 MILES NORTH OF MACLEAN REEF, LOST PROPELLOR
   - REQUIRE ASSISTANCE, NO IMMEDIATE DANGER
   - OUT
2. person sick, broken steering gear
3. they are a call for help that isn't a life or death situation
4. urgency, ship, aircraft, safety

Exercise 121 Mayday

1. • MAYDAY MAYDAY MAYDAY
   • THIS IS SEAWITCH VICTOR LIMA 1234 THIS IS SEAWITCH VICTOR LIMA 1234 THIS IS SEAWITCH VICTOR LIMA 1234
   • MAYDAY
   • THIS IS SEAWITCH VICTOR LIMA 1234
   • WE ARE ON MACLEAN REEF
   • HULL HOLED AND TAKING ON WATER
   • FOUR ADULTS ON BOARD
   • OVER
2. put up antenna, attach EPIRB to life raft and turn on
3. • MAYDAY
   • SEAWITCH SEAWITCH SEAWITCH
   • THIS IS WET PAPER I THIS IS WET PAPER I THIS IS WET PAPER I
   • RECEIVED MAYDAY
   • I AM 10 NM OFF MACLEAN REEF
   • WILL REACH YOUR POSITION SHORTLY
   • OVER
4. • MAYDAY
   • HELLO ALL STATIONS HELLO ALL STATIONS HELLO ALL STATIONS
   • THIS IS WET PAPER I THIS IS WET PAPER I THIS IS WET PAPER I
   • MAYDAY MESSAGE FROM SEAWITCH VICTOR LIMA 1234
   • SEELONCE FINI
   • OUT

Exercise 122 Mayday video

1. pfd, wet weather gear and safety harnesses, man over board retrieval gear, emergency steering and storm gear
2. small craft, fishing clubs
3. to search and rescue centres
4. tie to boat, in water
5. in case no one hears the radio message, for extra safety because they can pinpoint a position with a high degree of accuracy
6. noises with a gun, foghorn, flares, mirrors, flags, v sheets, morse code
7. Pan Pan
8. difficult to get into a liferaft, very uncomfortable and much more difficult to find than a boat
9. EPIRB, rations, water, drogue, knife, pump, seasick tablets, flares, sponges, mirror
10. take a grab bag, allocate tasks to the people there
11. picks up distress calls from EPIRBS and sends them to Canberra control centre
12. search
13. civilian and military aircraft, merchant vessels, fishing vessels, police or warships

Exercise 123 Student radio log

Students complete log

Exercise 123 Simulated Mayday

Students own messages

Exercise 125 Checking and cleaning radio components

Component	*Where located*	*Care to be taken*
aerial and fittings	externally; on top of boat	wipe clean periodically; have it tuned
microphone	attached to the radio	keep clean and dry
radio earth	connecting radio to the water	must not become faulty or can receive shocks from radio
fuse box	in battery	replace fuse if blown
battery acid level	inside battery	use distilled water to top up
battery terminals	on battery	keep clean
battery charging	-	don't recharge for long periods; short periods of discharge followed by total recharge

Exercise 126 Phonetic alphabet

1. it is difficult to understand words when the reception is not clear; words are spelt out using the phonetic alphabet rather than the normal alphabet because many letters sound the same when spoken and the phonetic alphabet makes communication clearer
2. for clear communication
3. so they are pronounced the same by all users and prevent misunderstanding
4. prep-ar-a-tion
   com-mun-i-ca-tion
   ra-di-o
   sta-tion
5. sierra
   echo
   alpha
   whisky
   india
   tango
   charlie
   hotel
   bissotwo
6. Own name
7. Students own message
8. yes because the words chosen for the phonetic alphabet don't rhyme with many other words which makes misunderstanding them difficult; boat rhymes with many other words and could easily be mistaken for another word
9. estimated time of arrival and estimated time of departure
10. see answer to Q8

Exercise 127 Revision sheet

Answers in manual

Exercise 128 Revision test

1. c
2. a
3. b
4. d
5. a
6. c
7. b
8. c
9. b
10. b
11. d
12. c
13. b
14. b
15. c
16. a-crest
    b-wavelength
    c-waveheight
    d-trough

17.
- MAYDAY
- HELLO ALL STATIONS HELLO ALL STATIONS HELLO ALL STATIONS
- THIS IS (CALLSIGN OF STATION SENDING MESSAGE)
- TIME OF MESSAGE
- NAME OF VESSEL IN DISTRESS
- SEELONCE FEENEE
- AN ANNOUNCEMENT THAT NORMAL WORKING TRAFFIC CAN BE RESUMED

18.
- CALL MAYDAY THREE TIMES
- SAY CALL SIGN THREE TIMES THEN MAYDAY AND THE CALL SIGN AGAIN
- STATE POSITION AS ACCURATELY AS YOU CAN
- DESCRIBE THE PROBLEM
- SAY HOW MANY PEOPLE ARE ON BOARD AND TIME AFLOAT

Information processing and reasoning

1.
- PAN PAN PAN PAN PAN PAN
- HELLO ALL STATIONS HELLO ALL STATIONS HELLO ALL STATIONS
- THIS IS SEASCAPE THIS IS SEASCAPE THIS IS SEASCAPE
- 5 MILES SOUTH-WEST OF DOUBLE ISLAND POINT. REQUIRE TOW URGENTLY
- OUT

2. $f = 27.00MHz = 27 \times 10^6$ Hz
   $v = 340$ m/sec
   $v = f8$
   $8 = v/f$
   $= 340 / 27 \times 10^6$
   $= 1.26 \times 10^{-5}$

3. a. 70 db
   b. 130 - 3000 Hz
   c. 60 Hz
   d. 140 db
   e. 100 000 times more energy
   f. 10 000 Hz; <130 db
   g. <50 db; yes

Exercise 129 Risk assessment

1. great barrier reef, pool, local beaches, etc
2. (a).-(g). depends on locations chosen; include effects like being stranded by incoming tides, rips and under currents, waves crashing onto rocks, injury or death from marine organisms such as sharks and marine stingers, infection from coral cuts.
3. depends on local area.
4. to be decided within group: include always skindiving with a buddy, emotional and physical support where needed, remaining close to boat or shore, safety officer or medic in attendance.
5. to be decided within group.
6. equipment needs to be disinfected between use; always wear the same equipment where possible
7. depends on group and location of dive -

Item	*Where used*	*What situation*
float	open water, pool	when group contains beginners or non-competent skindivers
lifebuoy	open water	as above
pole with looped rope or tube	open water, pool	as above
safety boat	open water	always in open water
float rope	open water	always in open water

8. to be decided within group
9. in case of injury or death
10. discuss signals to noise to be made, and regular checking for such by divers
11. to be decided within group
12. to be decided within group

Exercise 130 Safety

1. ABC = airway, breathing, circulation
   EAR = expired air resuscitation
   ECC = external cardiac compression
2. inform other users of the area that divers are below, Eg, boat users
3. • equivalent size
   • equivalent experience/confidence
   • trustworthy, reliable
   • both understand safety hand signals
   • aware of each others limitations
4. a ok
   b. up
   c danger
   d. help at surface
   e. pick me up
   f. ok at surface
   g. stop
   h. down
   i. ok at surface.
5. a buoyancy vest is a low volume vest usually worn when open water skindiving. It enables the diver to stay afloat with little effort by giving positive buoyancy, which is useful if tired or cramped.
6. a snorkelling/skindiving plan is a description of the intended outing, telling where and when you will be snorkelling, for how long and your intended time of arrival home. It is important that it is given to someone who is not attending, so in the event of an emergency, they can give the details to the relevant authorities.
7. fatigue is tiredness or exhaustion. Examples include finding it difficult to kick, shortness of breath and taking a long time to recover after holding breath during a dive.
8. wearing t-shirt or wetsuit; not skindiving during hottest part of day; not skindiving immediately after long exposure to sun.
9. precautions include not skindiving in the first place. If an epileptic fit occurs during a dive, it is important to keep the head above water until help can be reached.
10. the dive may be continued if your buddy rests for a period of time and continues to stretch the cramped muscle, until the pain eases. If the cramp does not ease but continues to worsen, then the dive may have to be cancelled.
11. small lung capacity, exertion after exercise, cramping are indicators of lack of physical fitness and can cause a safety problem when the diver cannot continue with the dive or panics during the dive.
12. it is important to begin to equalise as you start to dive to prevent any squeezing or bruising of the eardrum. If the pressure difference is too great when you do equalise the eardrum may rupture.
13. may be out of range and useless to call for help during an emergency
14. poor visibility, a lot of predators active at dawn and dusk
15. fish scraps attract sharks and other predators
16. so as not to be taken by surprise by a wave
17. algae
18. water is a better conductor of heat than air, and the cool water on the skin cools the underlying blood vessels which lowers the temperature of the blood.
19. This refers to one snorkeller swimming on the surface watching the second snorkeller
20. a. heavy pressure on chest with discomfort, spreading to shoulder, arm, neck or jaw, and sweating
    b. loss of consciousness, spasmodic muscle movement, blue face and neck
    c. cold, clammy skin, rapid breathing, irregular heart rate, loss of consciousness
    d nausea, sweating, pallor, vomiting
    e. pale, clammy skin, inability to move or speak coherently, rapid heart rate.

Exercise 131 Video - Snorkelling for kids

Students watch video

Exercise 132 Equipment

1.

Snorkelling piece	*Materials used*	*How it helps skindive*	*How to look after it / storage*
mask	silicon,tempered glass	puts air pocket between eyes and water to aid visibility	rinse in fresh water after use, air dry and store out of sun
snorkel	silicon	enables breathing	as above
fins	silicon, rubber	aids movement through water	as above
wetsuits	neoprene	reduces heat loss and cramping, some positive buoyancy	wash inside and out with fresh water and dry away from sun
stingersuits	lightweight polyester	some reduction of heat loss, prevents sunburn and protects against jellyfish stings	rinse in fresh water and hang to dry out of sun
weightbelts	lead weights	allows neutral buoyancy	wash with fresh water and dry out of sun
buoyancy vests	any durable fabric equipped with inflators and valves	allows neutral buoyancy	wash inside and out with fresh water and dry out of sun
knives, etc	stainless steel with noncorrosive handle;	knives used as a tool speargun used to catch fish gloves offer protection against rocks, coral and fish	wash in fresh water and dry out of sun

2 mask is an incorrect size if after placing it on face and breathing in through nose, it falls off.

3. feel uncomfortable on feet, cause cramping when in water.

4. so they can blow all water out of snorkel with one breath.

Exercise 133 Getting into and out of the water

1. in a pool or quiet water
2. students own words
3. a wet suit if cold, swimmers if hot. Bring sunscreen and vinegar if in the tropics
4. swim test - to practise swimming with your buddy and establish swim plan; treading water test - to ensure you can stay on the surface for at least five minutes
5. floating in the water with all gear on
6. safety jump - press mask firmly against face
   forward roll - take care not to hit head against side of the pool
   pushoff entry - take care not to injure back
7. to familiarize oneself with the fit of the gear and having face in water while breathingthrough snorkel
8. a. any small boat, usually enter and leave the boat from the back or over the side
   b. take care not to slip on any algae growing around the sides
   c. yes
      yes
      take off weight belt, it makes getting out of the water easier

Exercise 134 Pool entries

Students practice own skills

Exercise 135 Clearing your snorkel

1. a. blast method
   b. 1. head underwater until snorkel is full of water
      2. head is raised until ears are level with the surface
      3. blow water out of snorkel.
   c. need to have lungs full of air to clear snorkel completely
2. a. displacement method
   b. • inhale so lungs are full of air
      • blow small amount of air into the snorkel
      • keep snorkel tilted toward bottom
      • swim towards surface with head tilted back
      • air displaces any water in the snorkel at the surface
      • blow out any remaining water.
3. always look up to check for boats, swimmers, jellyfish, etc.

Exercise 136 Duckdiving and hyperventillating

1. a. duckdive
   b. submerging or safety dive
   c. • snorkel along surface to dive position
      • bend at the waist into a pike dive
      • swim downwards keeping legs together while submerging
      • using fins to swim downwards, turn to be parallel with bottom
      • swim along bottom or at required depth
      • turn upwards towards the surface keeping one arm outstretched while surfacing
      • use displacement or blast methods of clearing snorkel at the surface.
   d. problems may include not bending at the waist to achieve any depth in the dive, not taking a big enough breath while still at the surface to last the whole dive, not having enough air left in lungs at the end to clear the snorkel when surfacing.
2. stop ascending, do another duckdive and swim along the bottom until it is clear to surface out of the school of jellyfish
3. continue with dive and keep out of its way
4. surface with mask and snorkel full of water and empty at surface
5. looking around under the water to check the water for any dangers such as snags, obstacles or animals
6. hyperventilating is when deep breaths are taken in quick succession to reduce the desire to breathe by decreasing the amount of carbon dioxide in the lungs. It should not be done because the body does not then get enough oxygen and blackouts can occur

Exercise 137 Clearing your mask

1. so that the air rises upwards and is trapped in the top of the mask.
2. air rises to the highest point, and if trapped in the mask will displace the water.
3. a one-way valve that lets water out but not into the mask.
4. don't need to tilt head back as much because the valve is kept at the lowest point to purge the water.
5. she is tilting her head forward first to displace the water at the bottom of the mask, and then by holding the top of the mask tightly against her forehead and breathing out through her nose, is displacing all the water in the mask
6. not holding mask against forehead tightly enough to trap air, not tilting head back far enough so that the rising air is trapped in the mask, not exhaling when tilting head back so that nose fills up with water

Exercise 138 Equalising or clearing your ears

1. equalising is making the pressure on the inside of the eardrum the same as on the outside of the eardrum to prevent barotrauma, by changing the amount of air in the eustachian tube.
2. Students drawings
3. throat
4. should begin equalising immediately after beginning to dive

Exercise 139 Finning and planing

1. kicking from the knees, using the calf muscles to raise and lower the legs.
2. would result in tiredness and possibly cramping.
3. a. to conserve energy
   b. to achieve neutral buoyancy
   c. short sleeved wet suit; warm waters
4. Students to redraw figure 139.1 and colour it in
5. Students to redraw figure 139.4 and mark in position of flags
6. The tide rises or falls the greatest amount during the third and fourth hours of the tide. This means that currents will be strongest then, and skindiving should be avoided.

Exercise 140 Rescue and first aid

Students follow instructions in manuals and perform skills

Exercise 141 The diving bell

1. Sir Edmund Halley: 1600's
2. as the diver breathed out he filled the goat skin bag with his own breath which was high in carbon dioxide, and divers often blacked out underwater.
3. large rocks
4. air was brought to the bell in barrels and fed into the bell through a hose
5. divers could stay down for over an hour. Restrictions included not being able to leave the bell to move around underwater.
6. Siebe invented the hard hat diving suit. It was significant because it enabled divers to move around underwater, and scientists to study the effects of pressure on the body with depth.
7. • lead boots - for negative buoyancy, to stay submerged
   • weight belts - for negative buoyancy
   • air hose to surface - fresh air to breathe
   • hard helmet with glass plates - water proof to breathe in, to protect head from water, increase visibility under the water
   • leather suit - to attach helmet to, protection from water
8. Boyle discovered that the pressure on a body increased as the diver descended. The principle explains the relationship between the pressure of gas compressed and the volume the gas occupies.
9. the regulator. It enabled divers to place air in portable tanks, leaving them able to move freely underwater.

Exercise 142 Buoyancy

1. Archimedes Principle - an object immersed in water will displace volume of water whose mass is equal to the upthrust.
2. Students to write a sentence with own interpretation
3. density = mass/volume
4. 80L of seawater
5. upthrust = 1 kg/L x 80L
   = 80 kg
6. an object will float when its mass is less than the upthrust
7. Question not correct. The volume of the diver is not given.
8. you should sink in the water because there is less air in the lungs which changes the upthrust by changing the volume of your body.
9. a. apparent mass = mass in air - upthrust
   = 250 kg - (1 kg/L x 100 kg)
   = 250 kg - 100 kg
   = 150 kg
   b. mass of barrel is 250 kg
   upthrust is equal to 150 kg
   The barrel will sink.
10. With positive buoyancy, the diver floats at the surface of the water. With negative buoyancy, the diver is able to float at the bottom of the water column. To achieve positive buoyancy, the diver usually wears a wetsuit, and he wears a weight belt to achieve negative buoyancy.

Exercise 143 Light and sound

1. as per text page 227
2. as per text 227
3. as per text 227
4 a. closer to
   b. refraction
5. a. sound travels greater distances and four times faster in water than in air. Problems arise for skindivers because it is difficult to tell where a sound is coming from.
   b. almost no sound is transmitted between air and water. Problems arise for skindivers because it is difficult to hear boats above the water.
   c. divers need to check for boats and other objects above the water before surfacing.

Exercise 144 Snail research

Students research project

Exercise 145 Reef projects

Students research project

Exercise 146 Mapping a bommie

Students research project

Exercise 147 School project clubs

Students project

Exercise 148 Underwater hockey

AUF has an underwater hockey video

Exercise 149 Revision test

1. a
2. b
3. d
4. b
5. a
6. c
7. a
8. b
9. a
10. d

11. - wash in fresh water after use
    - dry thoroughly
    - store out of sun
    - check all equipment after use for signs of damage
12. purge valves are a oneway valve that let water out but not into the mask. Their advantage is they make it easier to clear the mask underwater because the diver doesn't have to tilt his head back as far to displace the water.
13. An object immersed in water will displace a volume of water whose mass is equal to the upthrust.
14. a. blind spot
    b. optic nerve
    c. sclera
    d. choroid
    e. retina
    f. ciliary muscle
    g. muscle attachment
    h. iris
    i. aqueous humour
    j. lens
    k. cornea
15. The greatest pressure change on the body is in the first 10 meters of water because the pressure doubles from one atmosphere to two atmospheres.

    Precautions to take include a lung capacity test by a doctor prior to diving, always equalising during ascent and descent, never holding breath during ascent.

Information processing and reasoning

1. a. $P_1 = 1$ atm $V_1 = 8$ L $P_2 = 3$ atm $V_2 = ?$

   $P_1V_1 = P_2V_2$

   $P_1V_1 / P_2 = V_2$

   1 atm x 8 L / 3 atm = 2.66L

   b. If breath is held while ascending, the air in the lungs expands due to the decreasing pressure, and can cause serious tissue damage.
2. timber vol = 200cm x 5cm x 10cm = 10 000cm^3
   - 1 cm^3 = 1 ml
   - 10 000cm^3 = 10 000 ml = 10 L
   - timber displaces 10 L of water; density of water = 1 kg/L; upthrust = 10 kg
   - weight of timber in air = 75 kg
   - timber will sink.

Exercise 150 The basics

1. length, width, weight
2. long and thin. No, excess weight will increase buoyancy
3. the waves
4. waist to chest height water
5. at a patrolled beach or a shorebreak with small waves
6. behind the area where the waves are crashing
7. 1 m of water
8. to avoid getting out of your depth in deeper water.

Exercise 151 Beaches

1. water depth
2. reflected, refracted, diffracted
3. a rip is a channel of fast-moving sand and water , flowing from the beach to offshore
4. try to swim across the rip into calmer water. Don't swim into the rip towards the shore
5. Sea floor is sandy with a gradual slope. The waves are constructive.
6. students own paragraph
7. because the depth of water over the sea bottom changes
8. A wind that blows in from the sea. It stuffs the surf.
9. A wind that blows into the waves from the land. Makes sick barrels.
10. a. Offshore
    b. Sandy
    c. Yes. Offshore, good swell, sandy beach, should be pumping
    d. Yes but on a big swell and you would need to be very experienced
    e. Rocks
    f. Light offshore winds, 1-2 metre swell. Strong winds, big 2 - 3 m swell

Exercise 152 Getting out

1. rips and sweeps
2. you pick a best way to get as many waves as possible. You use it effectively by lining up an object on the shore and using it as a point of reference
3. so as not to use up too much energy swimming out into deeper water
4. dive to the bottom and grip the sand until the wave passes, then surface by pushing up from the bottom
5. students to draw diagram to illustrate answer
6. stay under the water until both waves have passed
7. A dumper or barrel is a wave that breaks hard in shallow water. Take a good deep breath and dive as deep as you can expecting the worst. These waves could harm or kill if you were driven into rocks or sand.
8. reassess your location and situation to check you are not being carried out too far or towards any rocks.
9. reading the waves is being able to anticipate which way the wave will break and if it is suitable for surfing
10. the right wave is the one that presents itself at the right time and place to be caught
11. back pedal or run towards it to catch it
12. run out to meet it
13. move in towards the shore a bit

Exercise 153 Catching waves

1. student drawing
2. yes, but not as important as locking into the curve of the wave
3. locking together your body and the curve of the wave
4. build up a smooth, strong kicking action with your flippers, and place your left arm straight out in front of you, stroking quickly with the right
5. straighten arms, placing hands on hips and shoulders down will put body in the most streamline shape and lift head out of the water to breathe
6. a. a green wave is a force moving through the water with little displacement of water particles or objects; white water is the foam formed after the green wave has broken
   b. see Q 5
   c. put head down, begin kicking the feet, point your left arm out to streamline the body and make quick shallow strokes with the right hand.
   d. in a sidekick start, the surfer uses the bottom to pushoff into the wave and in a scissor kick start, he uses a strong scissor kick against the wave
   e. possibly thrown out in front of the wave into mid-air and fall to the bottom
   f. use flippers, build up a strong kicking action, place your left arm straight out in front of you and stroke quickly with the right

Exercise 154 Handling marine creatures

Class project

Exercise 155 Boating

1. inshore. calm, flat water
2. 1 -2
3. collision, large wake causing passengers or equipment to fall overboard, failure to give way
4. collision with boat, hit by propellor, drowning
5. collision with boat, hit by propellor
6. struck by boat or equipment, hit by propellor, unable to right boat

Exercise 156 Weather and coastlines

1. sharks and crocodiles attracted to area by blood and offal; high level of bacteria in water due to high nutrient levels, causing sickness to divers if water is drank; poor visibility due to blood, bacteria and algae in water means poor diving; smell may be offensive.
2. most favourable: 5 - 10 knots, offshore, smooth, 0.5m

   least favourable: 20 - 25 knots, onshore, very rough, 3.0m
3. strong currents through the channels, changing tides causing rips, all pose dangers to skindivers.
4. first aid kit for any injuries, marine radio or mobile phone in case of emergency, extra water and food if trip is prolonged, boat with a floating Jesus line for tired divers to rest and some shade onboard in case of excessive exposure to the sun.
5. getting hit by speed boats using the harbour, struck by propellers, oil and diesel from boats and any other discharges may be toxic or cause excessive algal or bacterial growth which may cause sickness to divers.
6. Shark Bay, W.A. - calm, slight winds, suitable for diving

   Victor Harbour - calm, cool weather possibly suitable for fishing

   Perth - possible strong winds increasing in strength as the front moves across

   Coffs Harbour - possibly rainy unstable weather due to the Low pressure system off the Qld coast

   Adelaide - calm, stable conditions suitable for sailing

   Mackay - calm conditions suitable for skindiving

Exercise 157 Surfing

Students join a club and learn to surf

Exercise 158 Sunsense

1. Answers on page 247 of textbook
2. Answers on page 247 of textbook
3. Answers on page 247 of textbook, Figure 7, last line
4. a. in childhood
   b. 95 % can be cured; because they can be diagnosed early
   c. gradually by making exposure to the sun early in the morning and increasing the time by a small amount daily
   d. between 10am and 2:30pm because it is the hottest part of the day when the uv rays are most intense.
   e. wear a hat, use sunscreen and long sleeve clothes
5. a. body boarding
   b. wearing a shirt with sleeves and a hat
   c. rub sunscreen onto the backs of his legs
6. a. sun protection clothing
   b. lightweight lycra
   c. to make clothes for sun protection, is thick enough to stop the suns rays penetrating the fabric to the skin
   d. should indicate what number sun protection factor the fabric is

Exercise 159 Managing skindiving accidents

1. a. heat exhaustion causes headaches, cramps, rapid pulse and feeling faint
   b. wear appropriate clothes or wetsuit when skindiving and dont skindive after a sleepless night
   c. fatigue
   d. lie down in the boat, breathe fresh air
   e. colds, infected sinuses, blocked ears, heart weakness, tuberculosis, emphysema
   f. fear of water or submerging, inability to meet crises, susceptibility to panic
   g. wear long sleeve shirts, sunscreen
2. Answers on page 248 of textbook
3. Answers on page 249 of textbook, top paragraph
4. if the ear pressure is not equal on both sides of the eardrum; by equalising during descent
5. seasickness is caused when the otiliths in the ears stimulate the brain excessively when the body is pitched and rolled.
6. answers on page 248 of textbook
7. answers on page 248 of textbook
8. a. injuries due to pressure
   b. by affecting the air pressure on either side of the eardrum
   c. first aid involves lying the patient down, covering the ears and seeking medical help; prevention involves avoiding damage by equalising
   d. ruptured eardrum
9. outer ear infections occur when the ear canal remains moist, making the area suitable for bacterial growth; first aid is to give aspirin to relieve any pain
10. pressure can cause pain in teeth when bacteria eat away under fillings causing air spaces
11. sinus pain can by managed by not diving and staying on the surface of the water

Exercise 160 Physiology for marine studies students

1. 1 nasal cavity
   2 mouth cavity
   3 trachea
   4 bronchi
   5 diaphragm
   6 bronchioles
2. 1 superior vena cava
   2 right pulmonary vein
   3 right pulmonary artery
   4 left pulmonary artery
   5 aorta
   6 left atrium
   7 left pulmonary vein
   8 left ventricle
   9 right atrium
   10 right ventricle
   11 inferior vena cava
3. a. oxygen and carbon dioxide
   b. molecules will move from areas of high concentration to areas of low concentration
   c. in the pulmonary artery
   d. the two layers of thin membrane that surround the lungs
   e. air can enter the lung cavity and the lungs may collapse
   f. in the middle of the chest slightly to the left
   g. receive the blood from the lungs and body
   h. valves
   i. the blood goes back to the lungs to remove the carbon dioxide and absorb more oxygen
   j. arteries
   k. veins
   l. the arteries harden and can't pump blood as effectively
   m. you would be simulating the hearts pumping action by allowing the blood to flow into the atria from the body and lungs and then into the ventricles to be pumped to the body.

Exercise 161 DRABC

1. Danger, Response, Airways, Breathing, Circulation
2. a - remove danger
   b - check for response
   c - check airway is clear
   d - clear mouth
   e - carry out EAR
   f - check for breathing
   g - carry out CPR
      1 - remove danger
      2 - ring for help
      3 - clear and check airways
      4 - check for pulse
3. Airway, Breathing, Circulation
   Expired Air Resuscitation
   External Cardiac Compression
4. roll into coma position
   clear airways
   carry out EAR
   check for breathing
   keep head tilted back to maintain airways
5. feel for pulse at carotid artery; carry out CPR at 2 inflations and 15 compressions each 15 seconds; continue until help arrives
6. for two operators the rate of CPR is 1 inflations and 5 compressions each 5 seconds
7. check airway, breathing, circulation, etc. The CPR rate for babies is 1 inflation and 5 compressions in 3 seconds for two operators
8. treat the baby, the student and you in that order. The most important aspect to deal with first is to regain breathing in the child to ensure oxygen is reaching the brain
9. lay the student down and elevate the feet
10. pale, cold, clammy skin; rapid breathing; irregular heart beat

Exercise 162 Cuts

1. corals
2. a slime that can cause infection
3. once the bacteria enters the skin they quickly multiply every 15 minutes
4. wash to remove any foreign materials and clean the cut with hydrogen peroxide which dries out the cut
5. Students to draw diagram to show how bacteria multiply
6. wash and remove all foreign material, apply antibiotic powder and a dressing to keep the wound dry
7. a. if the glass is no longer in the foot you should apply pressure to the wound and elevate it to decrease bleeding
   b. apply pressure, and a firm bandage with antibiotic powder to prevent infection

Exercise 163 Puncture wounds

1 a. A stingray
B sea urchin

b. Stingray - step on it or provoke it into slashing with its tail
Sea urchin - stepping on it when reef walking

c. immerse the area in hot water and apply a general anaesthetic. Be prepared for CPR

d. remove spine with tweezers, and apply local anaesthetic cream to relieve pain

e. wear sandshoes and shuffle feet through the sand when walking

f. not at all

2 a. A stonefish
B butterfly cod
C coneshell

b. when the spine is stood on the venom gland bursts

c. the coneshell stings with its proboscis

d. the hot water immobilises the venom. First aid for all puncture wounds: remove the victim from the water as soon as possible, apply local anaesthetic after immersing the area in hot water, seek medical help and apply a pressure bandage to stop the spread of the venom.

e. always wear shoes, take care when handling fish

3. hold the fish by putting your foot (with shoe on) on it.

4. Table - puncture wounds management table

Fish:

- usually hands or feet, anywhere on body
- pressure bandage, immerse area in hot water, apply local anaesthetic
- wear protective footwear, take care when handling fish

Stonefish:

- feet
- apply pressure bandage, immerse area in hot water
- wear protective footwear

Stingrays:

- feet, legs
- immerse area in hot water, apply general anaesthetic, CPR if necessary
- shuffle feet in the water on a sandy beach

Cone shells:

- hands
- pressure bandage, CPR
- don't touch

Sea urchins:

- hands, feet
- remove spine with tweezers, clean wound, cover with dressing
- don't handle, take care when walking on the reef

Fish hooks:

- fingers
- push hook through skin until it comes out again, cut hook off, pull out
- take care when handling hooks

Local animals:

- consult with local doctor or ambulance service

Exercise 164 Stings

1. a. stinging hydroid
   b. on the reef
   c. by brushing against it
   d. use ice or cold water to sooth stings
2. a. box jellyfish
   b. calm waters near the coastline in tropical areas
   c. by swimming into or brushing against the tentacles
   d. remove swimmer from water; douse with vinegar; apply pressure bandages; monitor breathing and heart rate
   e. B - nematocyst not fired
      C - nematocyst fired

   When the trigger brushes against something, the long thread fires out and the toxin seeps out
3. a. A - bristle worm
      B - polychaete
      on the underside of coral boulders
   b. by touching or stepping on them when reef walking. Apply sticky tape over the affected area and pull the tape off, removing the bristles.
4. **Sting management table:**

   Box jellyfish
   - anywhere
   - apply vinegar to affected area, pressure bandage
   - wear stinger suit, dont go in the water in summer

   Sea jelly
   - anywhere
   - apply ice to affected area
   - avoid them

   Fire weed
   - anywhere on body
   - apply ice to affected area
   - avoid them

   Ants
   - feet, legs, anywhere
   - use insect repellent, stay away from nests

   Spider
   - Consult with local ambulance

   Bee
   - Consult with local ambulance

   Local animals
   - Consult with local ambulance

Exercise 165 Bites

1. from the mouth of the animal
2. a. small, spans about 20cm
   b. crawl over his arms and shoulders and the back of his neck
   c. back of his neck
   d. bit him
   e. dryness in his mouth and difficulty in swallowing
   f. began to vomit, lost muscle control, respiratory failure and eventually died
   g. don't touch a blue ringed octopus
3. a. on a barrier reef island in the marine park
   b. speared a moray eel
   c. no, because the island was in the marine park
   d. it bit a girl on the leg and inflicted a severe wound which required 60 stitches
   e. the press sensationalised the story and made out that the eel attacked the girl when she was snorkelling
4. should swim in well used area that are not remote or near fish cleaning or meat discharge areas
5. a. bite from a moray eel, contacting a box jellyfish, boat hook in the arm
   b. class discussion

Table:

White pointer shark

- when swimming in areas where sharks are attracted
- never swim or snorkel alone, avoid areas where sharks are present, do not provoke sharks
- remove victim from the water, apply pressure to wound

Grey nurse shark

- as above
- as above
- as above

Moray eel

- skindiving on the reef around coral crevasses
- do not provoke
- direct pressure on wound to stop blood loss

Blue ringed octopus

- searching in rock pools
- do not touch
- pressure bandage to immobilise limb, CPR

Sea snake

- skindiving around coral
- do not provoke
- pressure bandage to immobilise limb, CPR if necessary

Sea gull

- class discuss

Local animals

- class discuss

Exercise 166 Hypothermia

1. a and b - see page 250 of text
2. hypothermia is internal cooling of the body and it affects the organs because the blood flowing to them is lower than the correct temperature. It can result in death.
3. b. brain, intestines
   c. brain
4. See brochure
5. a. Wear a life jacket or PFD or some other means of personal floatation device which enables you to remain still
   b. don't swim unless the shore is within sight. Activity increases circulation which increases heat loss
   c. assume the HELP (heat escape lessening posture) position. If others are in the water with you, assume a huddle position making body contact if possible
6. Seven points of useful advice:
   1. wear a life jacket
   2. have safety lines rigged and wear a harness whenever possible
   3. let someone know if you go on deck
   4. be alert on deck, watch for coils of rope and deck hamper
   5. keep your hands out of your pockets - free to grab the rail if you fall
   6. if possible work on deck in pairs
   7. selective woollen garments with a waterproof outer layer will greatly increase your chances of survival should you go over the side
7. some ways for re-warming a hypothermic person are:
   1. place the survivor next to other people for warmth
   2. put on extra clothing
   3. protect from further exposure by sheltering in canopies
   4. place in a warm bath
   5. place a thermal blanket
8. a wet suit keeps a layer of water against the skin which is warmed by the body; a dry suit keeps water out altogether

   See brochure for more answers

Exercise 167 Dangerous marine creatures

Student assignment

Exercise 168 Cold water safety

1. No they have zips down the front
2. Rubber
3. Yes. In very cold water or polluted waters
4. No. They would be too hot.
5. A hood and booties
6. Its bloody cold i.e. Victoria, Tasmania
7. Slips, sea urchins, coral cuts.
8. Where the rips are. Water temperature, what's on the bottom, any sharks, tides, weather forecast
9. White and light coloured suits

Exercise 169 Revision test

1. c
2. a,c
3. b
4. a
5. d
6. b
7. d
8. c
9. a
10. a
11. b
12. b
13. a
14. b
15. c
16. d
17. d
18. b
19. b
20. c
21. a. T
    b. T
    c. T
    d. F
    e. F
    f. F
    g. F
    h. T
    i. T
    j. T

Information processing and reasoning

1. a. January; 0^0 C
   b. 1625
   c. 1675
   d. as external temperature increases, metabolic rate decreases
   e. by changing the external temperature
2. a. Rescue organisations have very little time to coordinate a rescue and retrieve a person from the water because of the short time taken for hypothermia to set in. Agencies may need to remind skippers to ensure their passengers have adequate clothing in case of a boating mishap.
   b. through the skin, because it has the largest area exposed to the water
   c. ensure adequate clothing is worn
3. a. 32 -35 ^{0} C
   b. early adynamic stage
   c. 5 - 8 hours; if the water temperature is 20^0 C, he has less than 12 hours survival time. If he is early adynamic stage, then he probably has been exposed for at least 5 -8 hours already.
   d. alcohol makes the blood vessels nearest the skin dilate. Survival rate off Mackay might be less than 40 hours in Summer and less than 12 hours in Winter.
   e. the survival time would decrease, because exercise increases the blood flow to the muscles
   f. so as not to remove any surface heat from the body
   g. care must be taken not to heat the patient up too quickly because this may lead to the surface blood vessels opening more widely, taking blood from deeper tissue, which leads to shock.
   h. remove to a warm dry place, give sips of warm drinks if conscious and share body heat by lying next to patient in a sleeping bag.

Appendix 1 General corrections

General corrections 1st edition*

These errata sheets were inserted into the first edition.

An errata sheet is available from the publisher to stick inside the book.

143 Milbong Tce

Ashmore 4214

Errata to be inserted into front cover - Mariners Skills ISBN 1 8623 040

Remove all references to the Queensland Department of Education or their DOEM Safety Manual

Page (ix) Change spelling of Retleidge to Rutledge

Page 168 Deletion of River in Question 1a

Page 182 Deletion of River in Method Point 3

Page 187 Deletion of River in Question 1a

Page 246 Deletion of the box titled safety

Exercise 96 Position fixing

Hint

- Don't take bearings on a 180° line.

Errata

Q2. bearing to Reid Light, not Keid Light. The Answer becomes 24°7'S, 162.04°E

Q5. Change Mark's Light to Pamela's Light

Q6. Add to the answer - you are on the beach.

Exercise 102 Chartwork

Hints

- 1 fathom = 1.83 metres
- Pages 190 - 191 on the bottom should not be read as degrees of longitude.
  The longitude is 148°E

General corrections 2nd edition*

Page	Exercise	Correction
16	Ex 11.	*Laid rope* is... Three strands are then twisted together (again reversing direction) to form *rope*. (word missing in sentence)
22	Ex 14.	Heading should read: KNOTS TO BE CAREFUL OF
26	Ex 16.	Q 9. need to indicate the colours of the lights on the boat to be able to answer the question
		Box of Terms for vocab exercise has *Restricted Visibility* listed twice
52	Ex 33.	Q16 answer is c; Q17 answer is b
57	Ex 34.	Q1 and Q2 not numbered, ie, Q1. Redraw..., Q2. Use the following...
72	Ex 43.	Q4 has no correct answer listed in the options. The correct answer is 800mls.
74	Ex 43.	Q2 needs to be divided into (a),(b) and (c)
82	Ex 47.	Incorrectly numbered.
111	Ex 61.	Fig.61.4 C not labelled; should point to shackle.
174	Ex 94.	Q5 thought = through
197	Ex 105.	Q 18 and Q19 are the same; Q9 and Q20 are the same
220	Ex 117.	Q13 should be Q8
222	Ex 118.	Q6. the two wun September, wun two January, wun six March and two five December should not be phonetic.
237	Ex 127.	There are 2 Q33's in the text, the answers are done to match the text
246	Ex 130.	Q17 What covering on rocks make*s* them slippery when wet?
		Q18 Why does the body lose heat faster ...
252	Ex 133.	Q6 Look at figure 133.2A...
		Q7 Figure 133.2B...
		Q8 Look at figure 133.2C.. and label each point in Q8 as (a), (b) and (c)
256	Ex 135.	Q1(b)...points 1-3.
268	Ex 142.	Q2: *displacement* in the textbook index only refers to displacement of water by boats and the displacement method of clearing a snorkel, both are irrelevant to Archimedes Principle.
		Q7 Can't do because not given information on the volume of the diver therefore can't find upthrust.
270	Ex 143.	Numbering should read Q 1-5
279	Ex 149.	Q12: wording: What are purge valves and what are their advantages and disadvantages?
280		Q3(b). f = 1/T
281	Ex 150.	Numbering should read Q 1 - 8
317	Ex 165.	Figure 165.2
324	Ex 169.	Q2 has two answers (a) and (c).
326	Ex 169.	Q3(g) contradicts Q2 because a casualty can be placed between blankets according to the St John First Aid manual

* Any others gratefully acknowledged

Appendix 2 Improvements to some exercises

Exercise 2 Improvements
Parts of a Boat

QUESTIONS

1. Select a new page in your notebook and redraw the illustration on this page.

   Draw in pencil first and then ink in the drawing.

2. Use the textbook to mark in the following parts.
   - Mast
   - Batten
   - Leech
   - Luff
   - Shroud
   - Mainsail
   - Clew
   - Foot
   - Boom
   - Mainsheet
   - Jib sheet
   - Tiller
   - Rudder
   - Centreboard
   - Jib
   - Gooseneck
3. Complete Figure 2.1 with the aid of your textbook.

Term	Connects to	Your explanation
e.g. Cleat	The deck or lines	Small metal structure to which lines (ropes) are tied
Weather vane		
Headboard		
Mast		
Batten		
Leech		
Luff		
Shroud		
Mainsail		
Clew		
Foot		
Boom		
Block		
Mainsheet		
Jib sheet		
Figure of eight knot		
Tiller		
Rudder		
Centreboard		
Cleat		
Jib		
Gooseneck		
Stays		

Adapted from an original layout by Geoff Jensen, Innisfail State High School

Figure 2.1 ***Students may make one copy of this page so that they can attach their answers before handing in for marking. Teachers do not have permission to make class sets of this page for inclusion in a booklet.***

Exercise 63 Improvements
The Corsair

Based on original work by Graham Rogers, Clontarf Beach State High School, Queensland. Reproduced with permission.

The diagram in Figure 63.1 is of a Corsair which is the type of sailing craft you will do your training in. The boat is an Australian design, by Alan Payne. It is basically a family-orientated racing/cruising dayboat that is sloop rigged with spinnaker. The hull is made of fibreglass and it tends to be a stable, forgiving type of boat.

QUESTIONS

1. Redraw Figure 63.1 in your notebook.
2. Fill in the missing words in the following passage.

   The hull of the Corsair is made of _____ because it is a durable material that is easily shaped. The hull is designed to _____ on water and move through it easily. The mast is held in position by _____ and _____ . The purpose of the mast is to support the sails. The mast is made of _____ . The Corsair has two sails which are _____ and _____ . The mast and boom are connected by the _____ . The position of the boom is controlled by the _____ .

You have been shown the procedure for the rigging a sailing dinghy and the procedure to pack up the vessel ready for trailing.

3. Fill in the gaps in the description of the steps during rigging.

   a. Unpack the trailer by untying all the __equipment__ and removing the light board.

   b. Stand ___the mast___

   c. Step the mast onto the __mast stop__

   d. Attach__forestay and side stays__ to the __jib plate and chain plates__

   e. Check that the __bung__ is in the hull and the __self bailers__ are closed.

   f. Fit the rudder system ensuring the __pintle__ is through the sudgon.

   g. Attach the __mainsail__ to the __halyard__ and raise in the top of the mast.

4. A _____ is used to hold the wire to the sails.

   Draw one in your notebook and name the parts of a shackle.

5. Draw a rudder system. Indicate the following parts:
   - Rudder blade
   - Rudder head
   - Tiller
   - Tiller extension
   - Gudgeon
   - Pintle
6. What are the three wires that hold the mast up called?
7. What are the front and back of the boat called?
8. Describe where you would use the following terms and what each of them means.
   - Bolt rope
   - Header
   - Stay
   - Stern

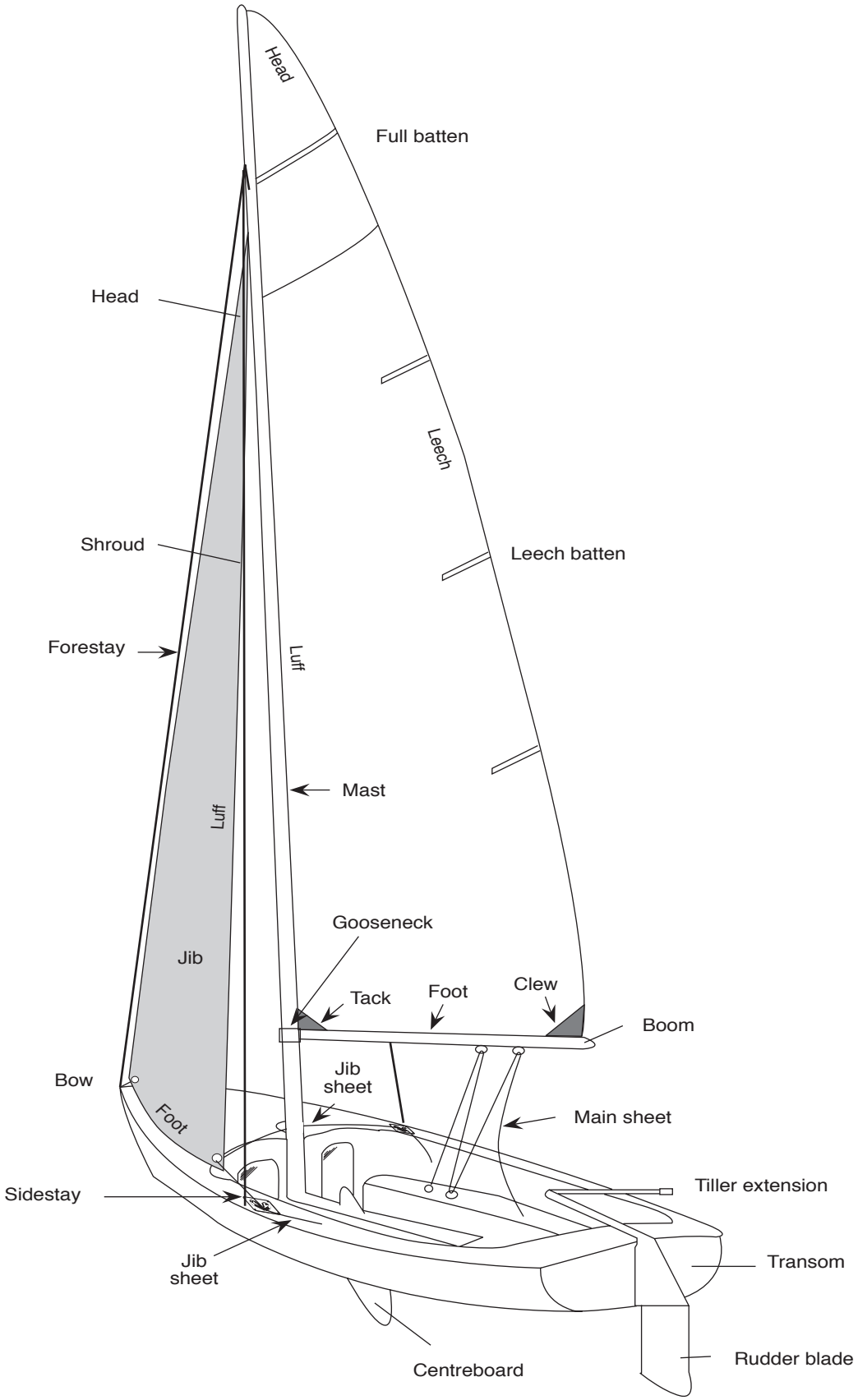


Figure 63.1 The Corsair

Exercise 64 Improvements Tacking and gybing

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Tacking

Tacking is the turning of a sailing boat so that the bow (front) of the boat passes through the wind. At some stage of the turn therefore the bow is pointing directly into the wind. If the turn is stopped at this point then the vessel is said to be caught in irons. In this situation it is impossible for the vessel to sail in a normal manner.

How will it sail and how do you get out of it?

Study Figure 64.2 which shows a sailing boat going through a tack.

The tack shown is called a roll tack. It is the ideal tack as the vessel does not lose any speed during the tack.

Gybing

Gybing is when you turn the boat so that the wind blows over the stern. It is a turn that can be very dangerous because at some time the boom must travel from being right out one side of the boat to right out on the other side.

Note: Tie a knot to the mainsheet so that the boom will not hit the sidestay.

This allows it to travel at high speed and with a lot of force over the cockpit in which the crew must avoid injury.

The secret to a good gybe is control. Gybing skills should be learnt in calm conditions so that few problems will occur.

Always gybe with the least pressure in the sail. When will this occur?

Questions

1. What does a helmsperson say to the crew before tacking?
2. Which sail is released first and why?
3. What must the crew avoid while changing tacks?
4. Which sheet does a crew need to use during a tack?
5. Which way must the helmsperson face during the tack?
6. Do a series of drawings looking down on the top of the boat in each of the positions through the tack. Show the position of the crew, sails and tiller in each drawing.
7. When does the helmsperson change hands on the tiller when gybing?
8. Do you let the mainsail cross by itself or do you control it during gybing? Give reasons for your answer.
9. How should the centre board be trimmed?
10. Do a series of drawings to show the position of the crew, and sails during a gybe. Indicate the wind direction.

Safety

1. Call to others in the boat that you are about to tack or gybe.
2. Keep a good look out during the manoeuvre.
3. The crew should assist and control the passage of the mainsail.

11. What do you look for in the jib when preparing for a gybe?
12. When is the best time to gybe?

    Review the rules on page ??? and remember:

    • Power boats are more manoeuvrable than sailing boats as they are not restricted by wind.

    • Large sailing vessels (yachts) generally have a deep draught, therefore in channels, are limited to the channel and manoeuvrability
13. Redraw the illustrations in Figure 64.1 to indicate who has the right of way in the following situations?

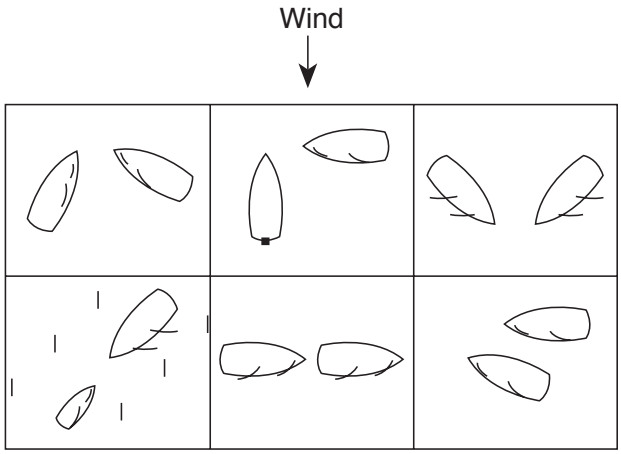

Figure 64.1 Diagram for question 12

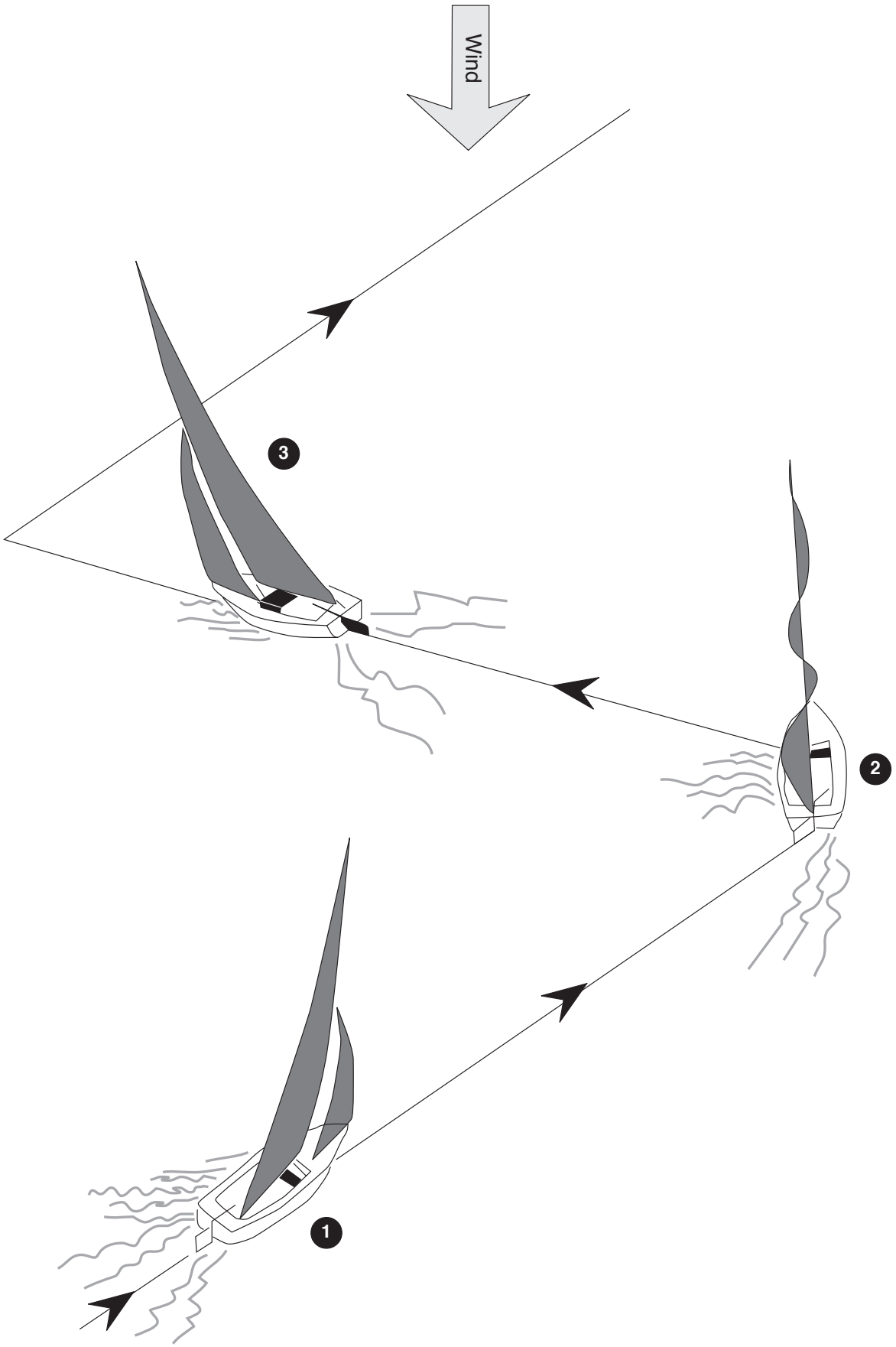

Figure 64.2 A sailing boat going through a tack

Exercise 65 Improvements
The points of sail

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QUESTIONS

1. You are on the beach and about to go for a sail. The wind is blowing onshore and you wish to set the sails for a course. Study Figure 65.1 and answer these questions.
   a. Select a boat of your choice and write a paragraph explaining how you would sail a basic triangle and what sails you would use.
   b. If the wind is coming over your left shoulder and you are sitting on the starboard side facing towards the bow, what type of tack are you on?
2. When discussing sailing it is important to know how sails are set and how the boat is using the wind. Study Figure 65.2 and make up a table like the one shown at the bottom of the next page. Match the number of each drawing to its appropriate point of sail (listed below), sketch it, and give a brief description of the situation.

   Points of sail are given below.

   - Close-hauled starboard tack
   - Running port tack
   - Head to wind
   - Beam reach
   - Close reach
   - Beam reach
   - Close-hauled tack
   - Broad reach
   - Running starboard tack

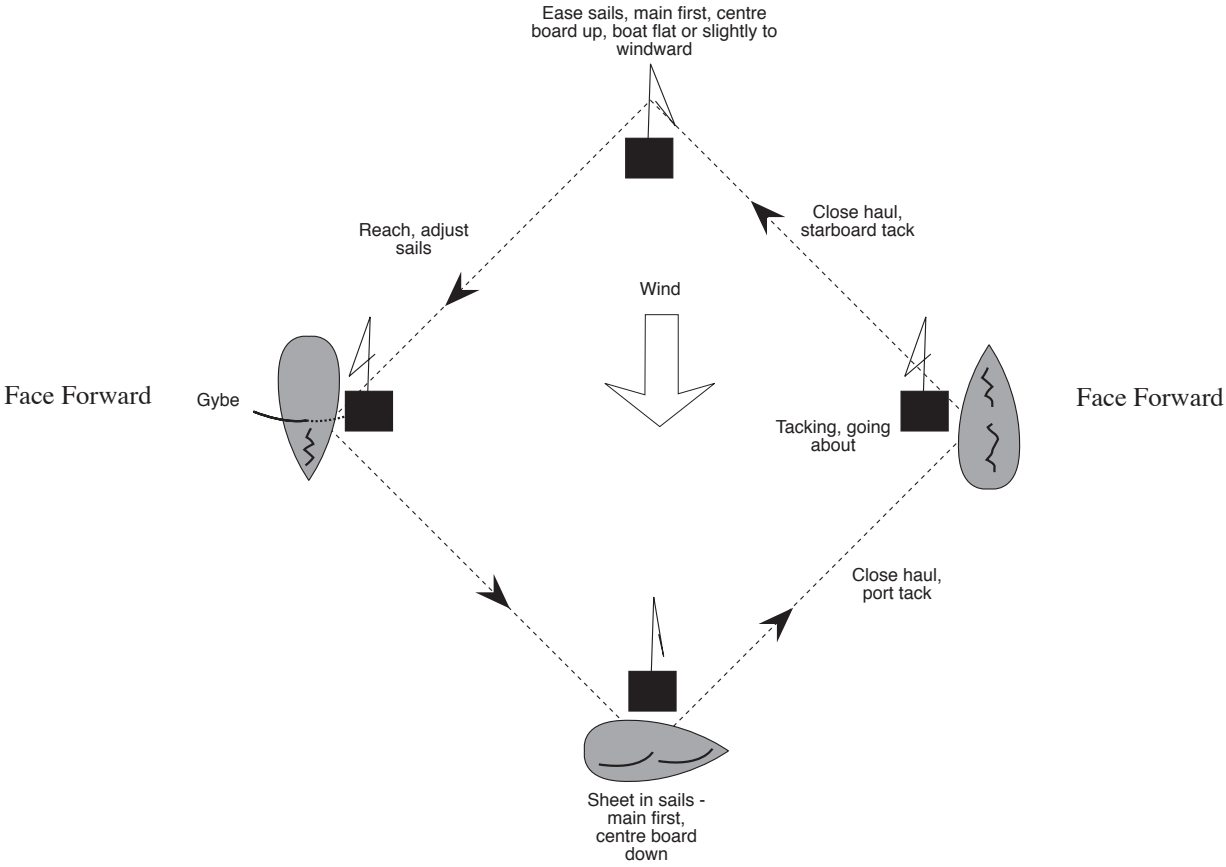
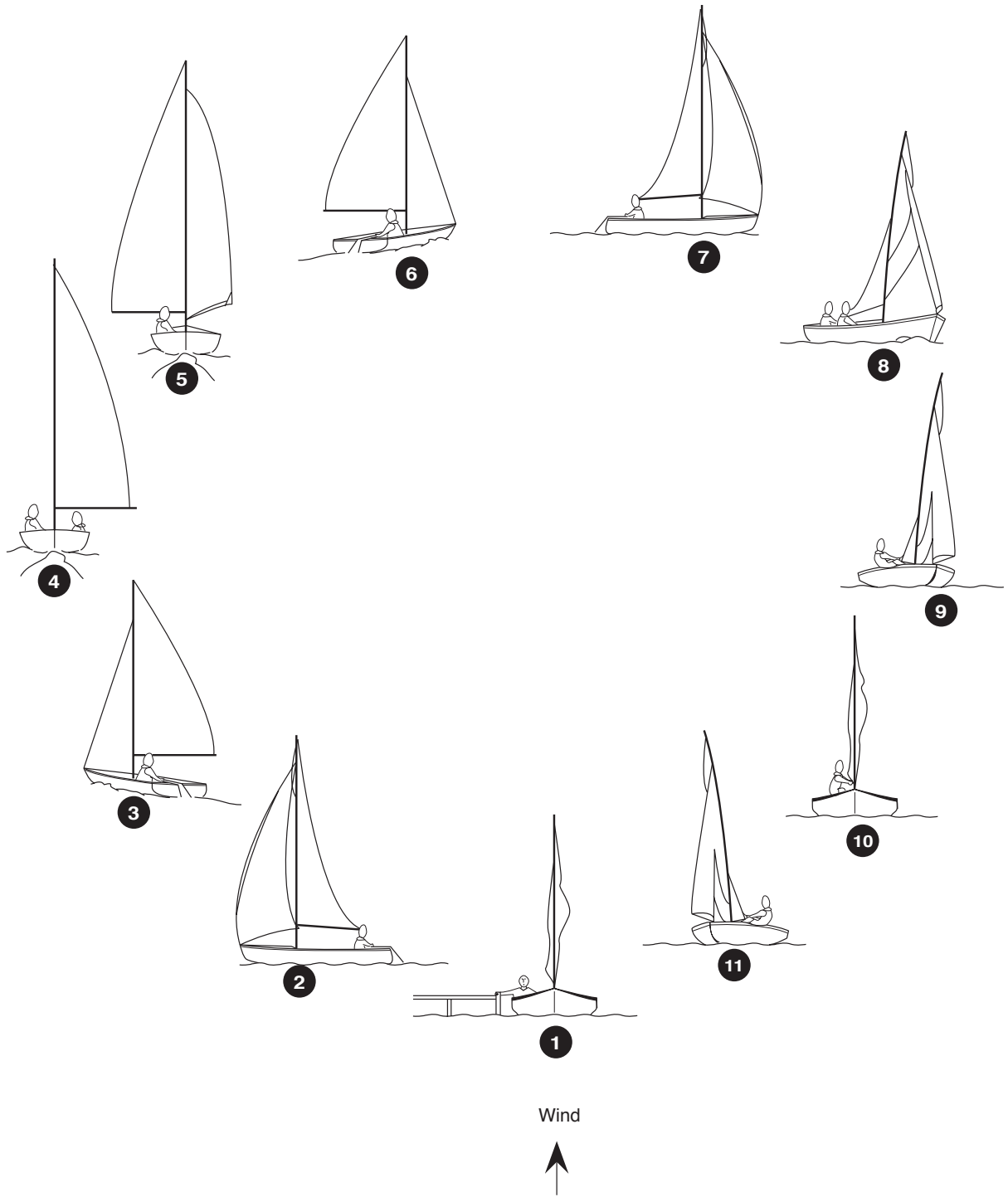


Figure 65.1 Tacking and gybing through points of the sail

Doing tacks and gybes face foreward if you are in a sailing dinghy but if in a catamaran then you will need to face backward. But by facing foreward you can see where you are going.



Number	Point of sail	Illustration	Your explanation
10	Head to wind		When you are in your boat and you are facing directly into the wind and the sails are flapping

Figure 65.2 Points of sail

Exercise 66 Improvements Capsize drill

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Skills

1. Don't panic. Call to each other. When everyone is accounted for then carefully go through the procedure to right the boat. Make sure you are in contact with the boat at all times.
2. Crew checks the centreboard is down and sheets are free. Helmsperson swims around back of the boat and checks the rudder.
3. Crew stays in cockpit holding toe straps and floating. Helmsperson holding the main sheet, swims to the centreboard.
4. Helmsperson shuts the bailers and climbs onto the centreboard. The crew throw the jib sheet over to the helmsperson.
5. The helmsperson, once on the centreboard, checks the crew is ready, stands close to the boat and levers back with the jib sheet.
6. When the mast is level with the water, check everything is OK.
7. As the boat rights, it will swing head to wind. Bring it up in a controlled manner. When nearly righted, the crew should be in the boat and the helmsmen rolls in over the gunwale.
8. Bail and sail. Be ready to avoid another capsize. Steer the vessel.

Questions

1. A person falls overboard, what does the helmsperson do?
2. Your sailing boat capsizes. What is the first thing you should do?
3. Use the information in Figure 66.1 to complete five sentences which describe what to do if a sailing boat capsizes.

Safety

1. Climb over the trailing edge of the centreboard so it cannot close on your finger.
2. Move quickly so that the mast does not go to the bottom.
3. If you are caught under the sail, reach out to find the edge an pull yourself out.

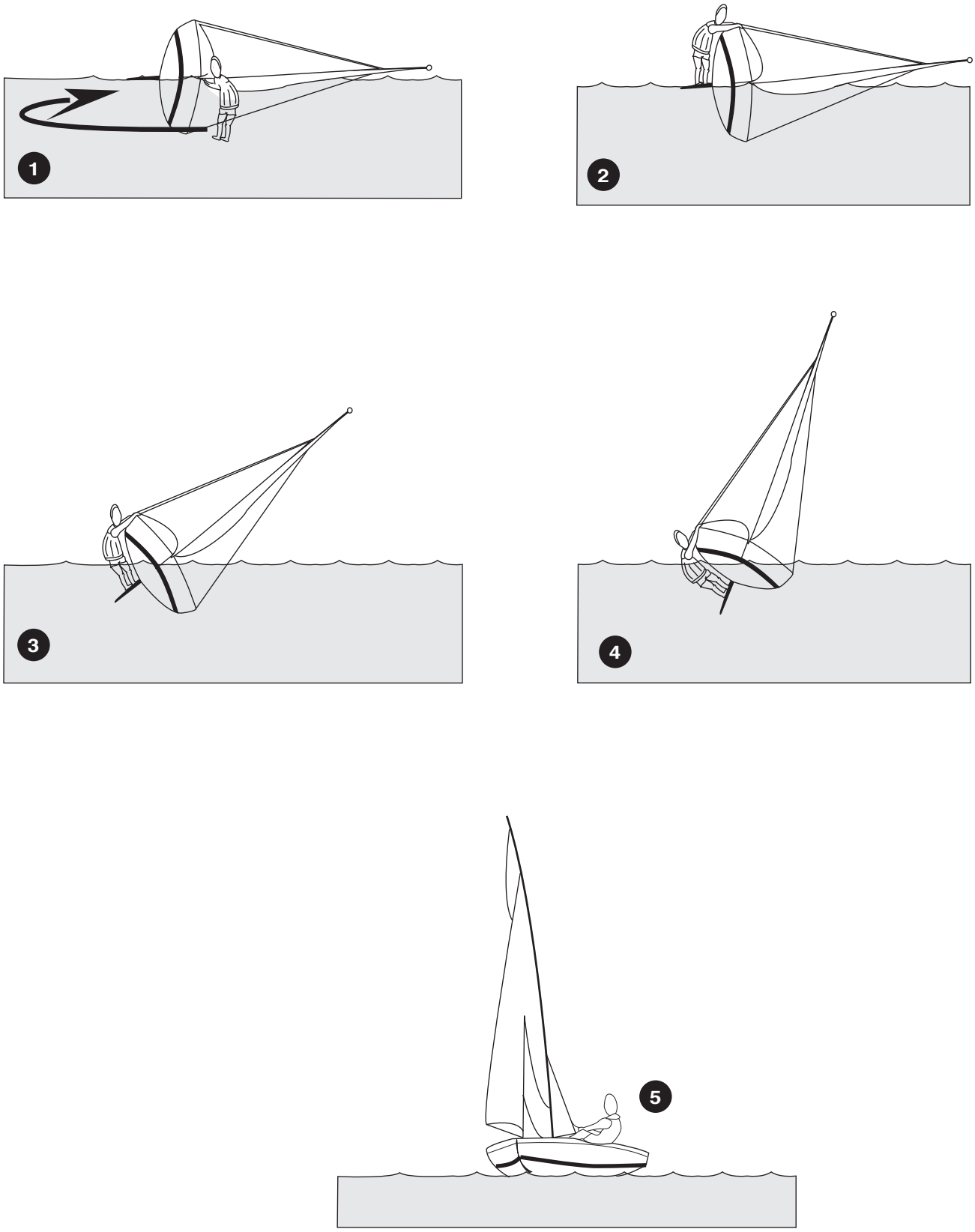

Figure 66.1 Capsize drill

Exercise 67 Improvements Launching a sailing boat

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The purpose of this exercise is to learn how to launch a sailing boat.

QUESTIONS

Most of the skills used in launching are also used when retrieving a boat.

1. Study Figure 67.1.
   a. Which way do you face the boat before raising the sails?
   b. What has to be done before the mast is raised?
   c. What is the crew member doing to the rudder and tiller?
   d. How should you leave this shore and which direction should you face the boat?
2. Which jib sheet does the crew use?

   Look at figure 67.2. If you were launching a swing keel boat from a shore that becomes deep quickly, describe how you would go about it if there was an onshore breeze.
4. List the safety equipment on your sailing dinghy.
5. Describe the way you would leave shore from in front of your Marine Studies centre in an offshore breeze.
6. What is the difference between a fixed keel, a swing keel and a retractable daggerboard?

   Redraw the diagrams in Figure 67.2 in your notebook to help explain your answer.
7. Write a one-page essay on your experiences from your recent sail. Describe what you felt, how you controlled the boat, what you liked and what you disliked.

SAFETY

1. Be careful of broken glass and sharp objects around the shoreline. (wear shoes)
2. Vessel head to wind. When the boat is in the water, hold the bow only if possible.
3. Check the rudder has a securing pin or rope to hold it on in a capsize.

Rigging procedure

This is a basic procedure that can be used for most sailing dinghies:

1. Unpack and check all equipment
2. Stand and step mast
3. Hoist jib
4. Hoist main
5. Attach rudder, close bailers
6. Fit bungs just before launching
7. Check all safety gear

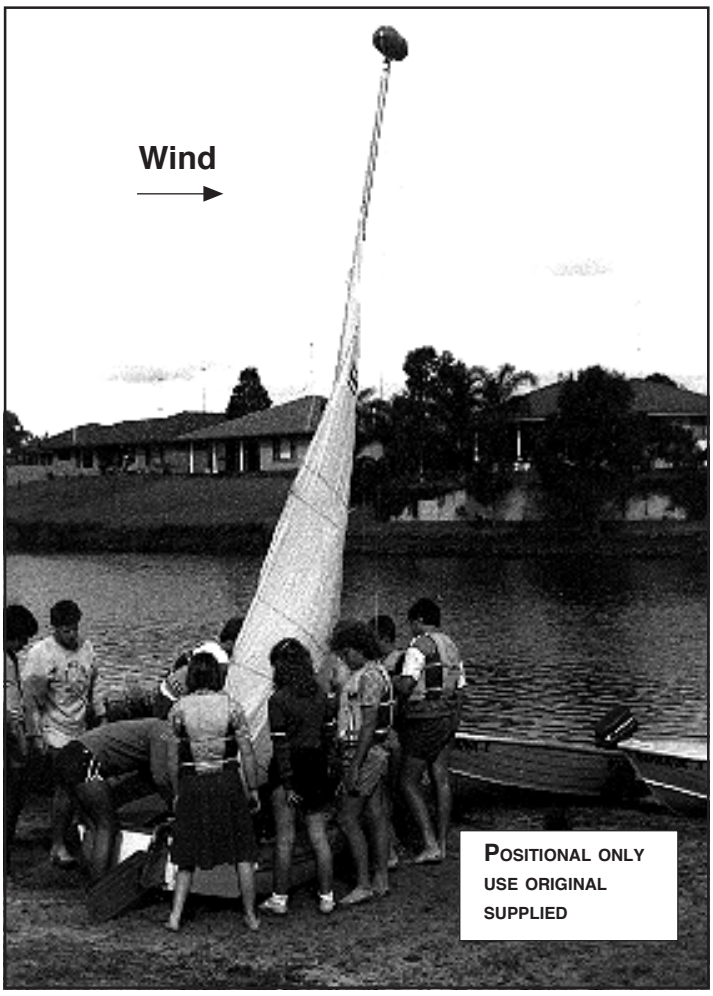

Figure 67.1 Preparing to launch

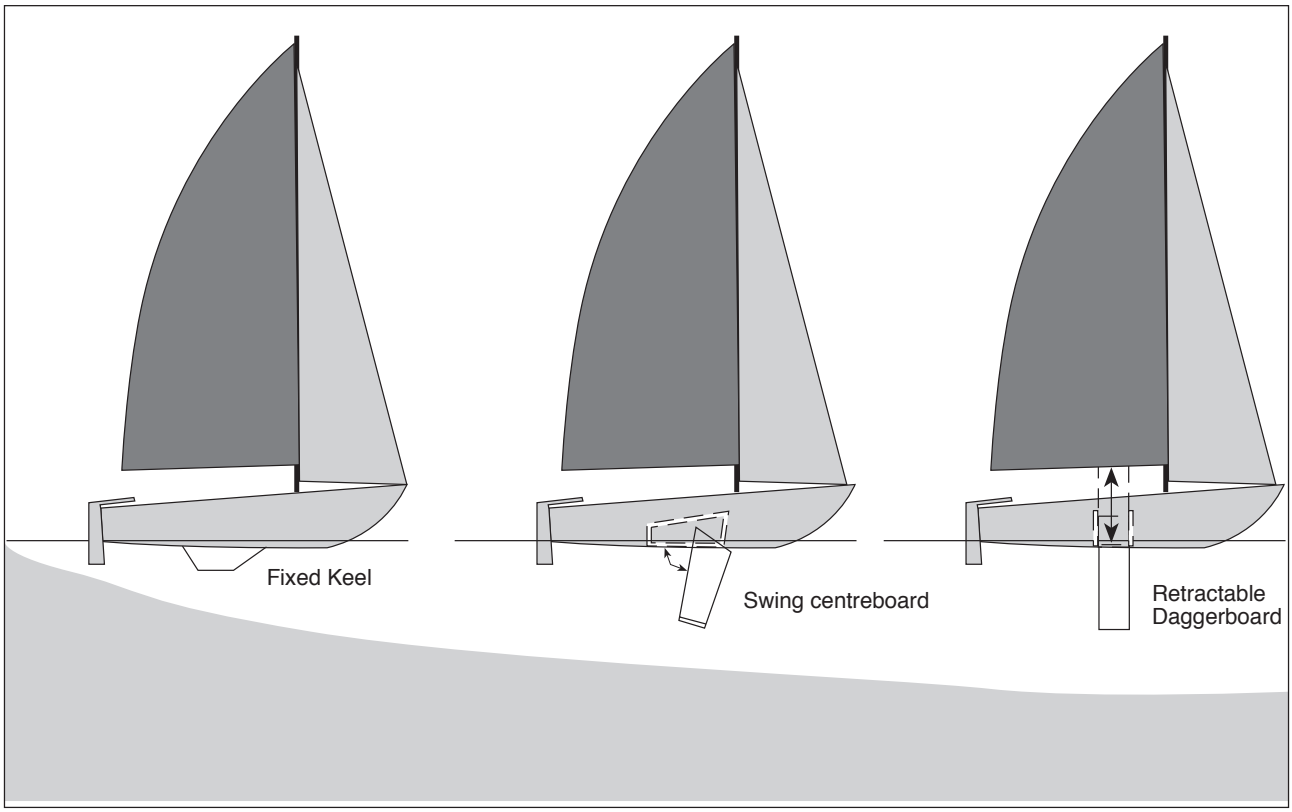

Figure 67.2 Types of keel

Exercise 68 Improvements Reefing the sails and motoring

Based on original work by Graham Rogers, Clontarf Beach State High School, Queensland and the Expedition Boat Shed in Fremantle, WA. Reproduced with permission.

QUESTIONS

1. What happens when the sails are reefed?
2. Name two methods by which this can be achieved.
3. When a part of a sailing vessel breaks there are often ways to improvise. This may not be the best but will enable you to get to safety. An example is if a gooseneck breaks, use a piece of rope around the mast then the boom positioned beside the mast.

   Under what circumstances would you need to paddle your sailing boat?
4. Why do the sailing boats in Figure 68.2 have motors?
5. Look at the boats in Figure 68.2. This question is only for students in Western Australia.
   a. What type of boats are they and where are they located?
   b. What is a sea trek and where do schools go sea trekking?
   c. What special provisions need to be taken on a sailing boat in a sea trek?
   d. What safety precautions are taken in sea treks?
6. All vessels on the water require a second means of propulsion. On a small sailing boat this is achieved with oars, a motor or paddles.

   Discuss the following points as a group.
   a. What is the best way to get to safety?
   b. How far is it?
   c. What human resources are available and how can they be best used?
   d. What help may be available?
   e. What dangers may arise?

Reefing of sails

This is a method, generally associated with larger sailing vessels, of controlling the power of the sails.

It involves reducing the area of sail on either the main, headsail or both. This can be achieved by taking down one sail and replacing it with a smaller one.

However this is often inconvenient and requires a large number of sails to be carried which is costly bulky.

Methods of reefing are shown below but all tend to distort the shape of the sail.

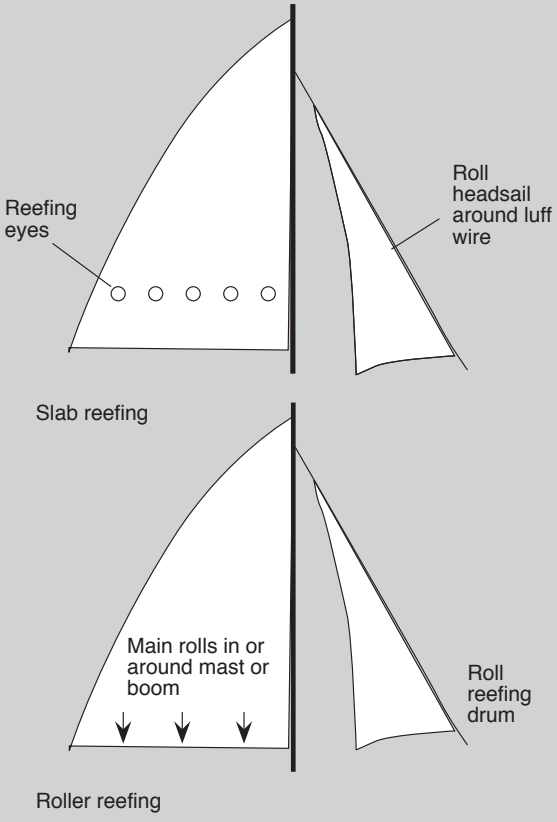

Figure 68.1 Reefing the sails

ISBN
978-1-86283-160-5