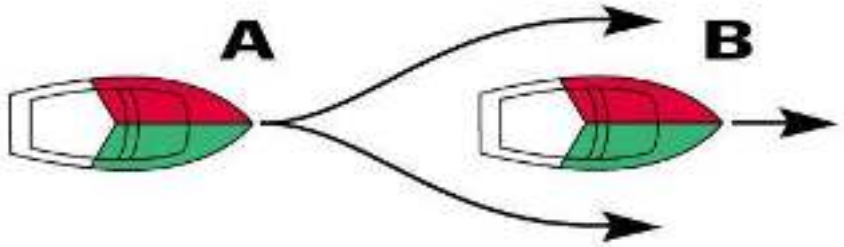
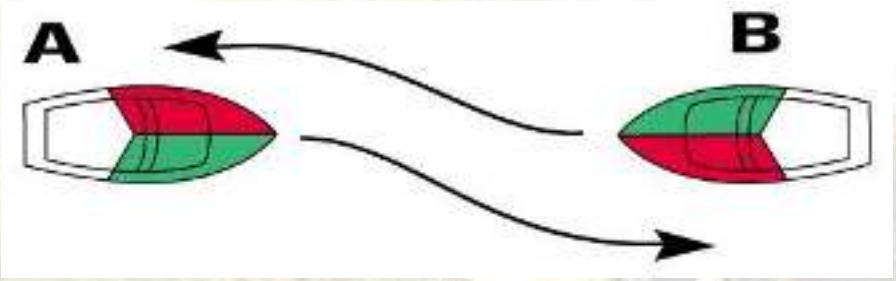


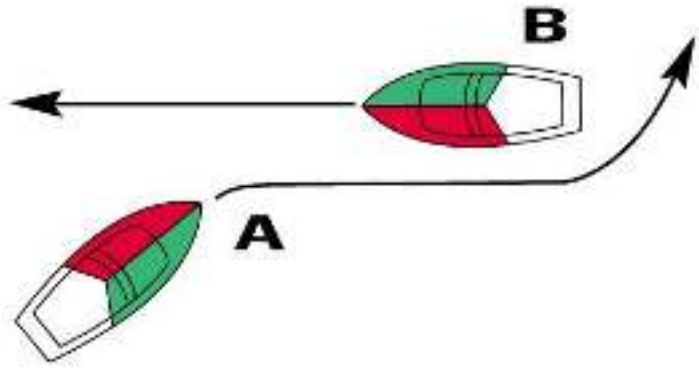
Head on situation:

Both vessels must give way to starboard and pass each other port to port.



Crossing situation:

This situation almost works like a four way stop. Vessel B closest to the crossing position has the right of way with vessel A the give way vessel.



Responsibilities between various vessels:

Power driven vessels must keep clear of:

1. Any vessel that is not under command.

2. A sailing vessel.
3. Vessel at anchor.
4. A vessel towing a water skier, or tube
5. A vessel towing another vessel.

A vessel involved in water skiing and a sailing vessel shall also observe the rights of other water users.

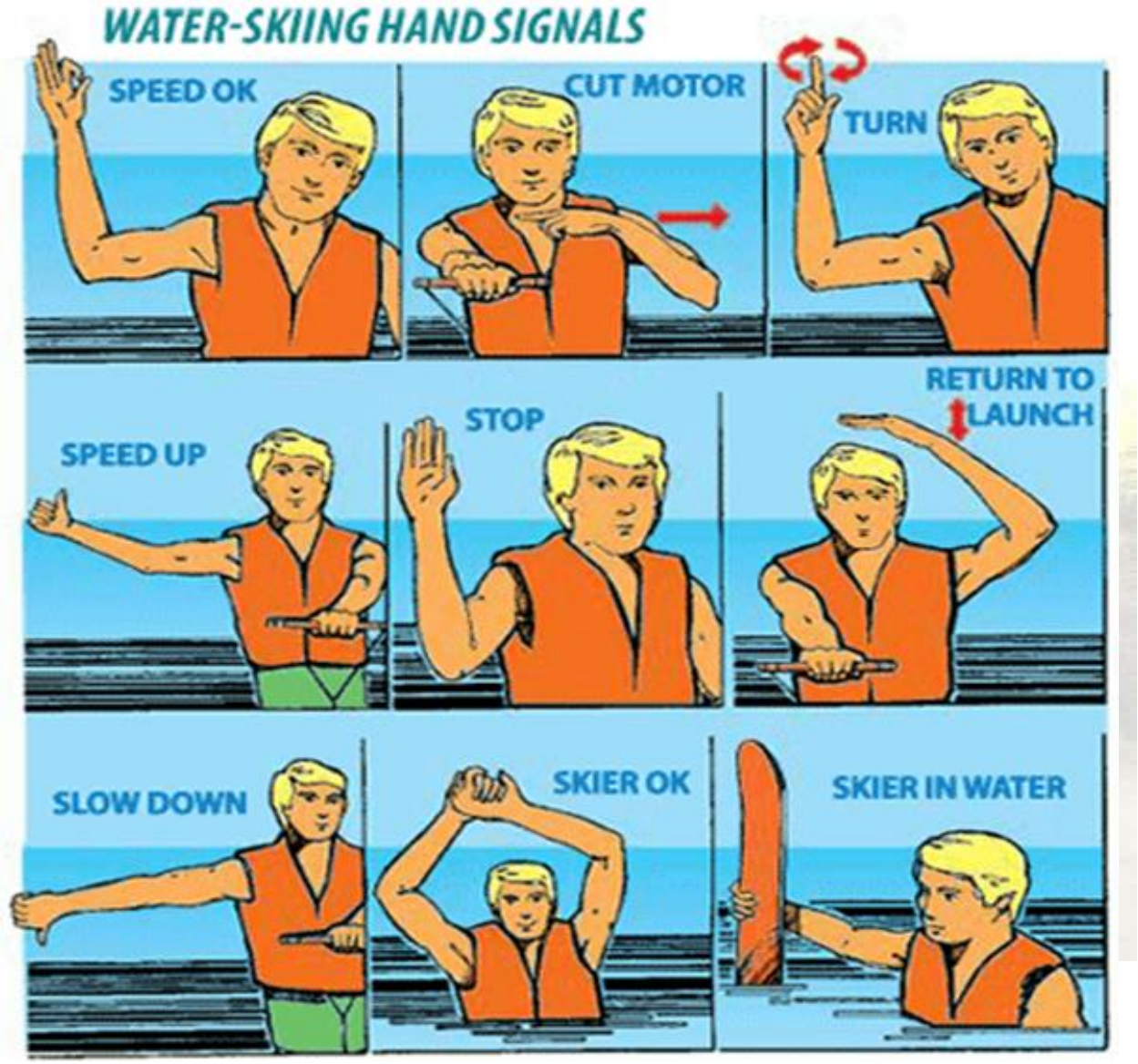
Water skiing:

1. Must be indicated by regulating Authority.
2.
3. No water skiing while under the influence of intoxicating liquor or drugs.
4. No water skiing between the hours of dusk and dawn.

Water skiing rules:

1. Skier must wear a suitable flotation aid.
2. Have knowledge of hand signals.
3. May not use steel rope, or rope with steel reinforcement.
4. May not let go of the rope in congested areas.
5. 500mm square red flag to hold in the air if skier is in the water.
6. A tow dropped by the skier must be retrieved immediately.
7. Must not create a nuisance to other water users.
8. Must have a competent person on vessel to look at skier, or a wide angle mirror.
9. Skipper of vessel must keep at least 100m from the wake of another vessel.
10. Must have Square red flag 500mm x 500mm: (Skiing)

SKIING HAND SIGNS:



CHAPTER 4

ENGINE CARE:

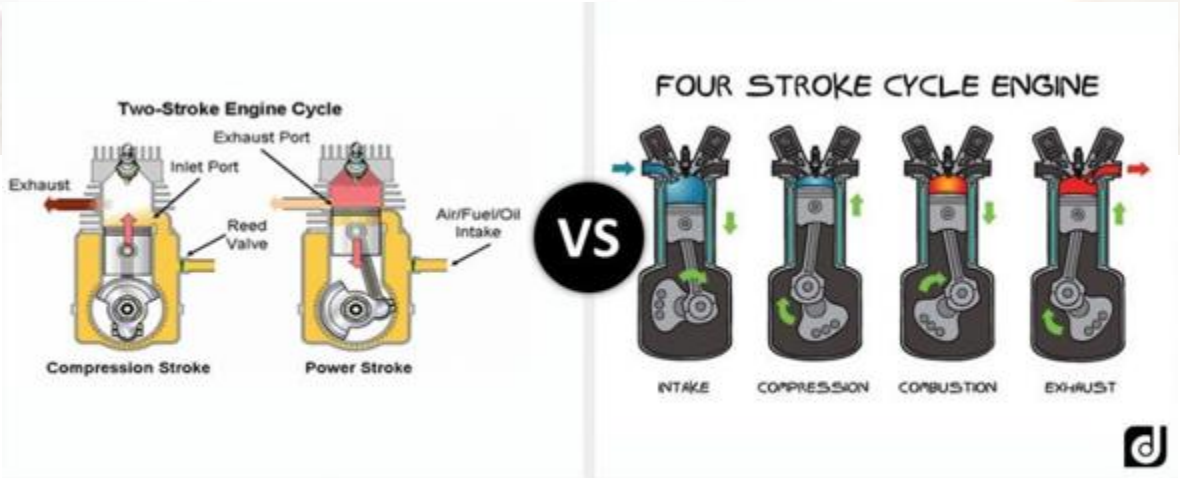
How does an engine get its power?

1. The outboard motor is a spark ignition engine.

2. Fuel from the fuel tank enters the carburetor where it mixes with air in a given proportion.
3. From the carburetor, the gas mixture enters the cylinder.
4. In the cylinder, a spark plug emits a spark that ignites the mixture, triggering an explosion that drives the piston. This sets in motion a crankshaft linked to the piston by a connecting rod.
5. Successive explosions in the cylinder cause the crankshaft to turn a driveshaft going down to the gearbox turning the propeller. With the gear lever you can shift in a forward or reverse motion

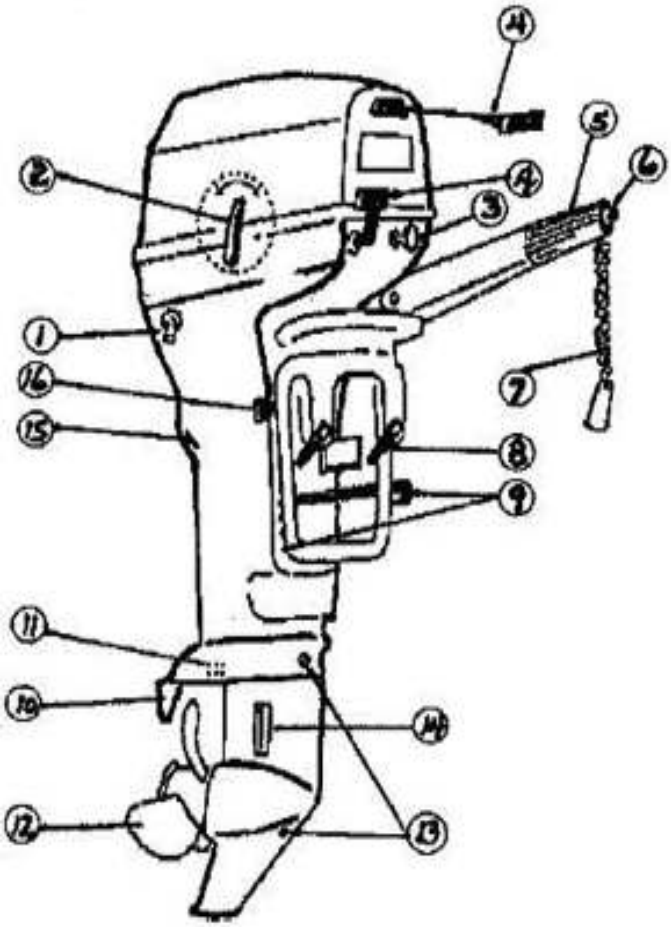
There are two types of engines.

- **2 Stroke**: Fuel is mixed with two stroke oil in a specific ratio as stipulated for that engine. 25:1, 50:1, 100:1. It can be hand mixed or premixed in the engine itself. Lubrication on engine parts is done by the oil mixture in the fuel.
- **4 Stroke:** Normal car engine where oil is in the sump and only fuel in the tank. Lubrication of moving parts is done by an oil pump, which lubricates all the moving parts.
- Therefore: In 2 stroke engines oil must be mixed with fuel and in 4 stroke engines you only use fuel without oil.



2 Stroke Engine vs. 4 Stroke Engine

Sl.No	Four Stroke Engine	Two Stroke Engine
1.	One working stroke for every two revolutions of the crankshaft.	One working stroke for each revolutions of the crankshaft.
2.	Turing moment on the crankshaft is not even due to one working stroke for every two revolution of the crankshaft. Hence heavy flywheel is required and engine runs unbalanced.	Turing moment on the crankshaft is more even due to one working stroke for each revolution of the crankshaft. Lighter flywheel is required and engine runs balanced.
3.	Complicated lubricating system.	Simple lubricating system.
4.	Engine design is complicated.	Engine design is simple.
5.	Less mechanical efficiency due to more friction on many parts.	More mechanical efficiency due to less friction on a few parts.
6.	More output due to full fresh charge intake and full burnt gases exhaust.	Less output due to mixing of fresh charge with the burnt gases.
7.	Less fuel consumption and full burning of fuel.	More fuel consumption and fresh charge is mixed with exhaust gases.
8.	Engine consists of inlet and exhaust valves.	Engine consists of inlet and exhaust ports.



1. Water pump indicator
2. Drive selector or gear selector
3. Choke
4. Starter cord
5. Throttle
6. Emergency stop/tension control
7. Emergency stop cord
8. Fastening clamp
9. Motor tilt control
10. Drift corrector/anti-corrosion anode
11. Water outlet
12. Propeller
13. Oil indicator (emptying and filling)
14. Water intake device
15. Fuel exhaust
16. Lift Lever

Must the engine be cooled?

The internal temperature of a spark ignition engine reaches up to 2500°C around the cylinders before cooling; therefore the motor must be water cooled. Outboard motors make use of the impellor to suck up water and force it through the engine, and out through the exhaust as well as a telltale out of the engine

How does the engine cool down?

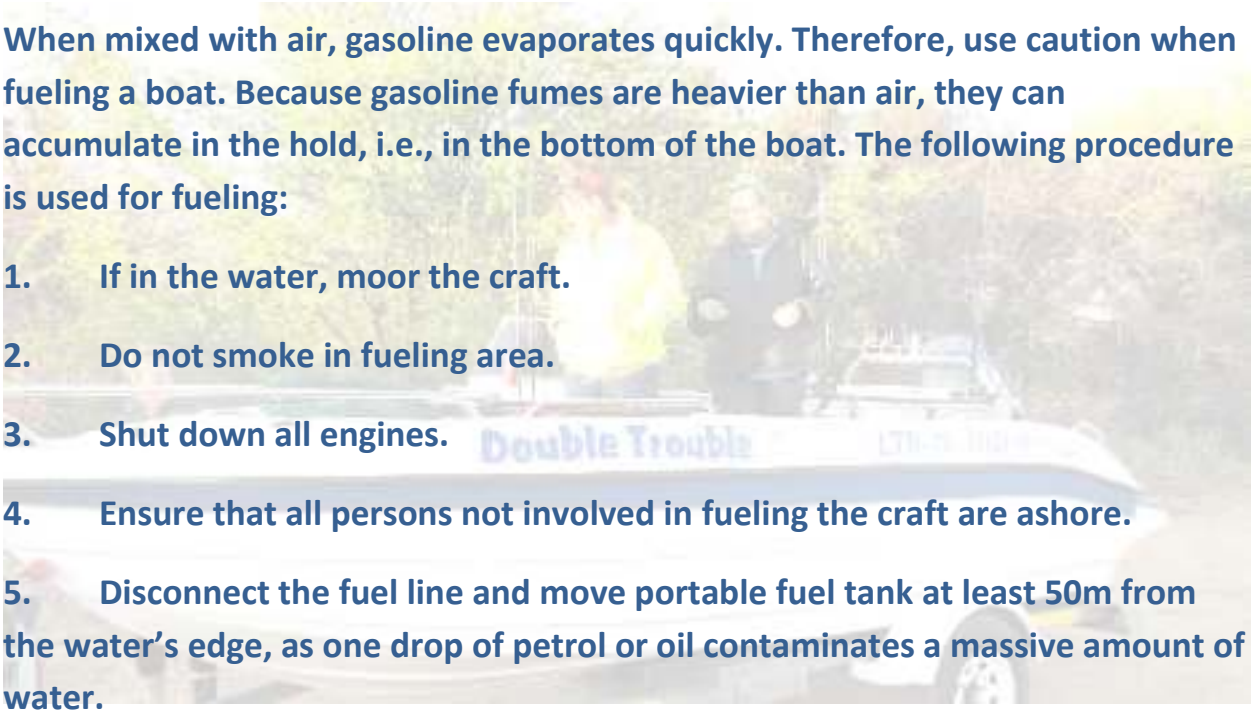
While the motor is running, water is drawn in through openings located at the base of the motor under the anti-cavitation plate. Water flows around the cylinder head and sleeves before being flushed out into the surrounding body of

water through a cooling system control jet. It exits through an orifice (telltale) located near the cylinder head.

What are the 3 requisites for an engine to work?

1. **Fuel of good quality.**
2. **Full compression**
3. **Strong spark**

Always use a good quality fuel.



When mixed with air, gasoline evaporates quickly. Therefore, use caution when fueling a boat. Because gasoline fumes are heavier than air, they can accumulate in the hold, i.e., in the bottom of the boat. The following procedure is used for fueling:

1. **If in the water, moor the craft.**
2. **Do not smoke in fueling area.**
3. **Shut down all engines.**
4. **Ensure that all persons not involved in fueling the craft are ashore.**
5. **Disconnect the fuel line and move portable fuel tank at least 50m from the water's edge, as one drop of petrol or oil contaminates a massive amount of water.**
7. **Place fire extinguisher within easy reach.**
8. **While fueling, ground the nozzle against the filler pipe to prevent the build-up of static electricity.**
9. **Avoid over filling the tank or splashing fuel.**
10. **Close the fuel tank and clean up spillage.**

11. Mix the oil and fuel in the tank, adding one and then the other (according to the manufacturer's recommended ratio)

12. Replace the tank in the vessel and reconnect the fuel line; the tank should be securely fastened in the vessel.

13. Press the primer bulb to fill carburetors reservoir with petrol.

14. The fuel tank should be kept away from sparks and heat and stowed in a well-ventilated location. Always store fuel in a suitable clearly marked fuel container manufactured for fuel. Fuel tanks are red or orange for safety reasons.

15. Only use approved HDPF plastic fuel tanks suitable for fuel. Do not use normal plastic containers to store fuel – they will harden and can crack.

General Engine Care:

1. Beware not to over rev a cold engine. The warm-up levers should not be more than one third open and the throttle about 1500 R.P.M. on starting. Run engines at this speed for about five minutes to ensure they are properly warmed up.

2. When you are ready to launch and you have all the crew aboard, only at this stage should you push the warm-up levers down and move the throttle forward too fast and engage the gears into position.

3. When engaging the gears into position, make sure the props are not stuck into the sand causing the motors to stall. This could damage both the props as well as the gearbox.

4. Make sure that the neutral lock mechanism is not removed from the control box, making it easy to select reverse by accident when throttling back suddenly. This could be a very expensive exercise.

5. Service your outboard motor/s regularly, making sure that you are aware of the warranty service intervals, and you should enjoy trouble free boating.

6. One item that is generally neglected is the battery. Please make sure that you service your battery regularly. Check the electrolyte level and clean the terminals.

7. Petrol and oil mixtures. In most cases outboards run on 250 ml oil to 25 liters fuel =100:1 or 500ml two stroke oil to 25l of petrol = 50;1. If the mixture is not correct the plugs will oil up and you will have a loss of power – not the engines fault.

8. Make sure the correct outboard oil is used. Do not use just any type of two-stroke oil.

9. The same applies to spark plugs. Make sure the gap is correct and that the correct plug is used.

10. Make sure that you grease all the moving parts regularly to prevent rusting. If you have your outboards serviced regularly, you should enjoy many years of trouble-free boating.

11. If you have spent the day on salt water, make sure that your engine is washed down. Run the engine with fresh water to clear all the chambers of the salt water.

Spreading Load:

An outboard motor boat is operated and maneuvered as if the hull were moving parallel to the water, causing a lot of friction. Passengers and materials must be placed to evenly distribute the load along the length and width of the boat to give the best performance. Most new motors know have Trim and Tilt to solve problem.

Trimming your motor:

Many outboards and most inboard engines come equipped with power trim which raises or lowers the drive unit. In this case the term “trim” refers to the running position of the engine drive unit.

Although most people know that the trimming movement raises and lowers the bow, many are unaware that it also can effect steering and performance as well as fuel consumption.

The three positions of trim and tilt and results are as follows:

Trimming In (Down)

- Lowers the bow
- Results in quicker planing, especially with a heavy load
- Improves ride in choppy water
- Increases steering torque or pull to the right

Neutral Trimming

- Lowers the bow
- Normally results in greater efficiency. (Note that the propeller shaft, which connects the propeller to the drive shaft, is parallel to the surface of the water.)

Trimming Out (Up)

- Lifts the bow
- Increases top speed
- Increases clearance in shallow waters
- Increases steering torque or pull to the left
- In excess, causes the boat to bounce

Where and how to use Trim and Tilt:

- When departing on your voyage from shore in shallow water you trim your motor out so that propeller is just under water to protect gearbox and propeller to be damaged against rocks or other dangerous obstacles.
- When in deeper water you trim motor into transom. Thrust in water by the propeller will then try to lift the back of the boat out of the water and the bow of vessel into the water. A quicker plane will then be achieved.
- Once on the plane the boat now plough through water with a lot of friction slowing the vessel.
- You know trim the motor up again until a smooth softer ride is achieved giving better fuel consumption at lower revs and a softer ride and less friction.

Troubleshooting and possible Causes:

Motor won't start:

1. Fuse problem, burnt fuse. Replace with new one.
2. Battery flat or disconnected. Recharge or replace if faulty.
3. Fuel tank is empty. Refill.
4. Primer bulb faulty, shut off valve not working, no fuel in carb. Replace with new.
5. Supply line is disconnected. Connect
6. Throttle not in Start position (neutral). Put in Neutral
7. Faulty spark plugs. Replace

Motor starts but not easily:

1. Fuel, oil mixture incorrect.
2. Air inlet of tank is closed. Open fuel tank cap air screw.
3. Fuel line is bent not allowing enough fuel to carb
4. Primer bulb not pressed enough (should be firm). Press until firm or replace with new.
5. Choke valve not operating properly. Service
6. Fuel to old or water contaminated. Replace
7. Loose spark plug wire. Tighten plug
8. Spark plug faulty or improper spark gap. Set correct
9. Engine needs to be serviced.

Motor running uneven:

1. Water or impurities in fuel
2. Idle mixture adjusting needle of carburetor requires adjustment
3. Spark plugs are defective (see above problem)

Propeller not pushing boat forward:

1. Debris caught in propeller
2. Selector not in drive

3. Shear pin broken.
4. Damaged propeller.
5. Cable broken
6. Gearbox damaged
7. Warn gears
8. Rubber inner damaged

VIBRATION ON MOTOR:

1. Fastening clamps are not properly tightened.
2. Unbalanced or broken propeller or shaft
3. Loose flywheel.
4. Broken crankshaft.
5. Broken engine mounting.

Motor suddenly stops:

1. Fuel tank is empty.
2. No oil in fuel (two-stroke engine).
3. Loose or faulty spark plug.
4. Cooling water intakes obstructed or the water pump defective.
5. Faulty stop button
6. Faulty inline fuse
7. Fuel filter blocked
8. Kill switch pulled out.

Motor Overheating:

1. Impeller worn.
2. Water pipe broken.
3. Water intake blocked.
4. Water passages in head and block clogged.

Motor jumps out of gear:

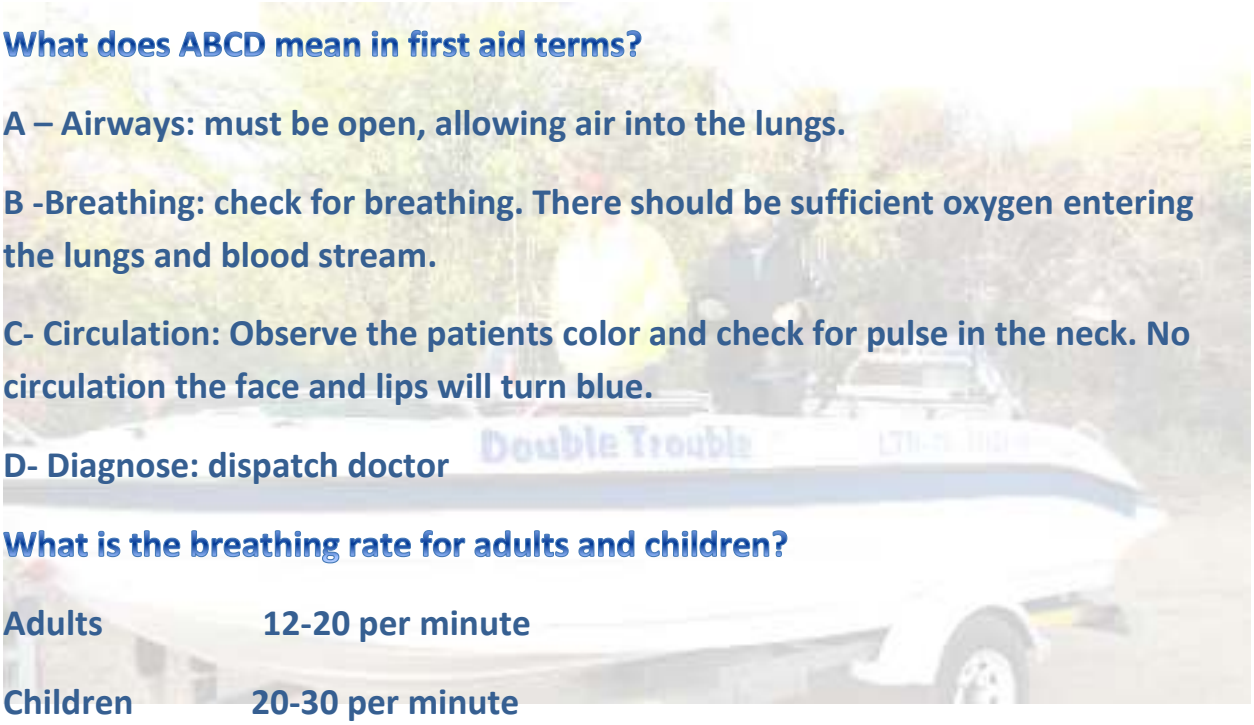
1. Worn dog or gears
2. Loose gear shift shaft

3. Gear shift cables incorrectly set
4. Broken engine mountings

CHAPTER 5

FIRST AID:

To qualify for your Certificate of Competence you need to have a basic understanding of first aid, but most importantly, be able to identify that there is a medical problem. We strongly recommend that a skipper do a first aid course, – it might just save a life.



What does ABCD mean in first aid terms?

A – Airways: must be open, allowing air into the lungs.

B -Breathing: check for breathing. There should be sufficient oxygen entering the lungs and blood stream.

C- Circulation: Observe the patients color and check for pulse in the neck. No circulation the face and lips will turn blue.

D- Diagnose: dispatch doctor

What is the breathing rate for adults and children?

Adults 12-20 per minute

Children 20-30 per minute

Pulse:

Adults 60-80 per minute

Children 100-120 per minute

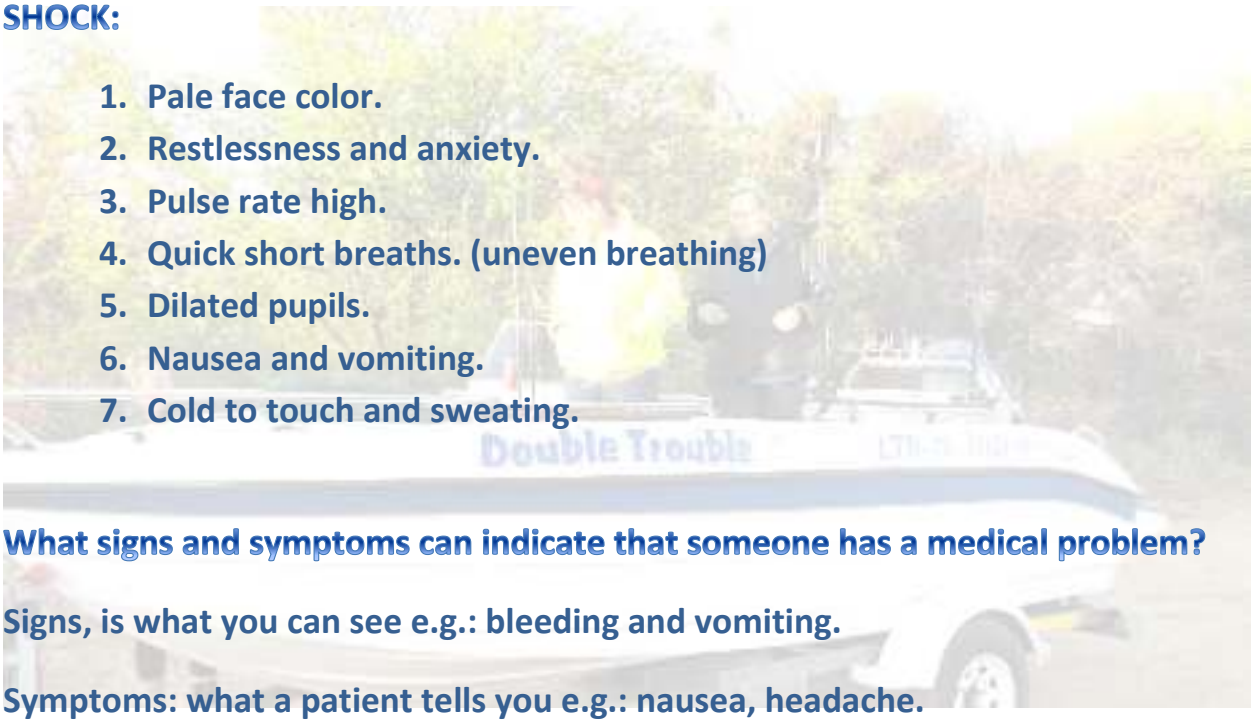
What can cause shock?

Shock is caused by a disruption in the circulatory system resulting in a lack of oxygen to the blood.

Three major causes of shock: (internal)

1. Content failure: loss of blood/fluid either internal or external.
2. Pump failure: inability of the heart to pump efficiently.
3. Pipe failure: sudden vasodilatation e.g.: spinal injury or allergic reaction.

KEY SYMPTONS AND SIGNS TO LOOK FOR WHEN CHECKING IF A PATIENT IS IN SHOCK:



1. Pale face color.
2. Restlessness and anxiety.
3. Pulse rate high.
4. Quick short breaths. (uneven breathing)
5. Dilated pupils.
6. Nausea and vomiting.
7. Cold to touch and sweating.

What signs and symptoms can indicate that someone has a medical problem?

Signs, is what you can see e.g.: bleeding and vomiting.

Symptoms: what a patient tells you e.g.: nausea, headache.

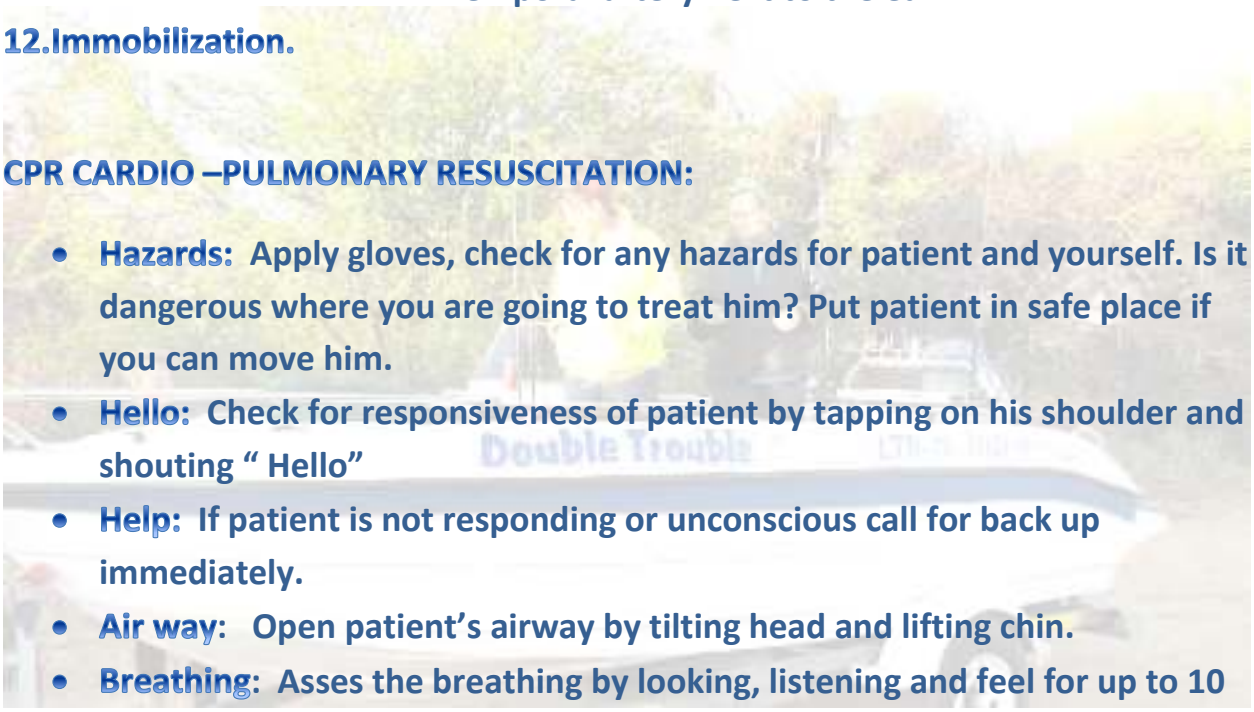
WOUNDS and BLEEDING:

The average person has 4 – 6 liters of blood.

If the patient loses more than 40% of blood the chances are good that he will not survive. It is VITAL to stop bleeding as soon as possible.

Methods to control bleeding:

8. **Direct pressure.** Forceful application of pressure directly on the wound with your gloved hand.
9. **Pressure bandage.** Replacing your hand with the application of pressure bandage until blood loss stops.
10. **Elevation.** If possible raise the wound higher than the heart.
11. **Indirect Pressure.** Put pressure on one of the four pressure points.
    - Brachial artery on the arm.
    - Circulation: Carotid artery in the neck.
    - Femoral artery on the leg.
    - Temporal artery next to the ear.
12. **Immobilization.**



CPR CARDIO –PULMONARY RESUSCITATION:

- **Hazards:** Apply gloves, check for any hazards for patient and yourself. Is it dangerous where you are going to treat him? Put patient in safe place if you can move him.
- **Hello:** Check for responsiveness of patient by tapping on his shoulder and shouting " Hello"
- **Help:** If patient is not responding or unconscious call for back up immediately.
- **Air way:** Open patient's airway by tilting head and lifting chin.
- **Breathing:** Asses the breathing by looking, listening and feel for up to 10 seconds. If no breathing give patient two breaths. Chest must rise with each breath.
    1. If no signs of life after the two breaths start with compressions by pushing down on the center of the sternum between both nipples. Push down a third and a half of the chest wall thickness and PUSH at a rate of 2 compressions per second.
    2. Continue 30 compressions and 2 ventilations for 5 cycles. Check if patient has any signs of life. If not continue CPR until help arrives. Never assume the patient is dead.

3. CPR does save lives if started early and continued without stopping until help arrives. Just remember Push hard and push fast, don't forget to blow.
4. The younger the patient, the less pressure will be exerted on the chest.
5. With infants only use two fingers.

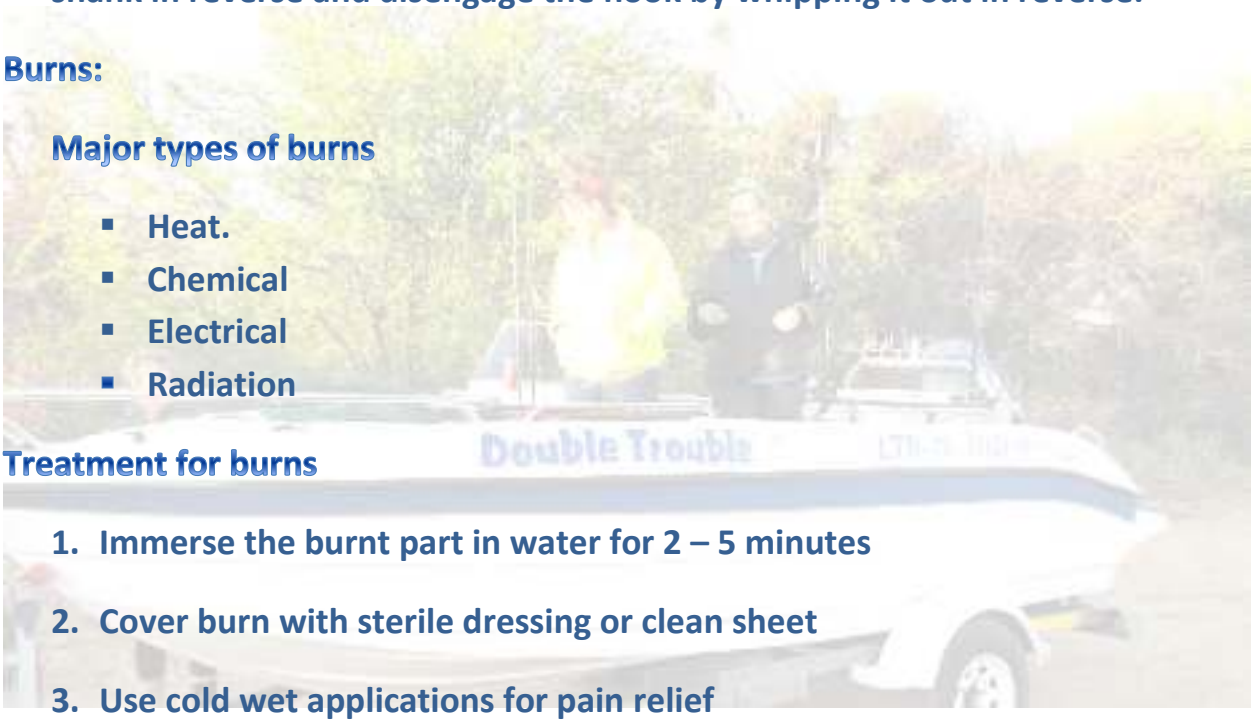
Fish kooks:

For small fish hooks you can use the reverse whip method by pressing the shank in reverse and disengage the hook by whipping it out in reverse.

Burns:

Major types of burns

- Heat.
- Chemical
- Electrical
- Radiation



Treatment for burns

1. Immerse the burnt part in water for 2 – 5 minutes
2. Cover burn with sterile dressing or clean sheet
3. Use cold wet applications for pain relief
4. Transport and continue cold applications

Do's and don'ts with burns:

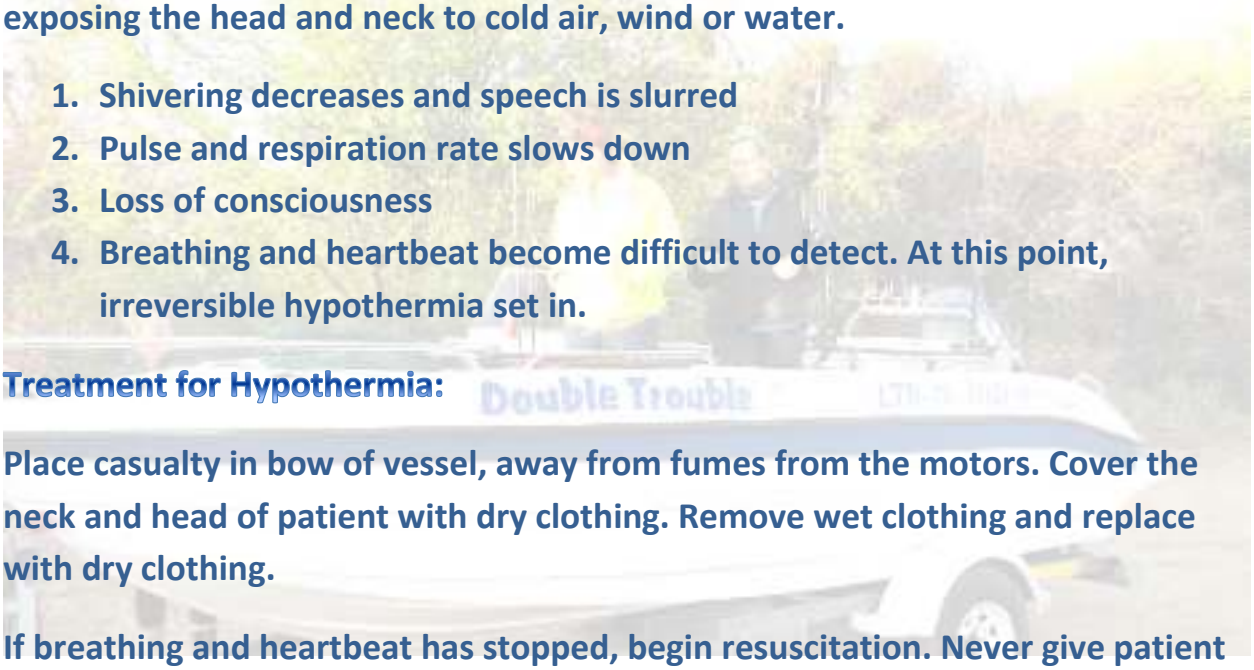
1. Do not use adhesive dressings
2. Do not apply lotion or any fatty substance to burnt part
3. Do not brake blisters or remove loose skin

Hypothermia:

Common cause is inadequate protection against a cold environment, or being exposed too cold for a prolonged period of time, resulting in the general cooling of the body through the loss of heat through the head and neck area.

The patient stars feeling cold and starts shivering. Casualty feels cold to touch and experience uncontrollable shivering.

Heat is lost through the head and neck area. 750ml of blood circulates up the neck and through the head every minute. Therefore in seven minutes the temperature of the whole body's blood content has been lowered merely by exposing the head and neck to cold air, wind or water.



1. Shivering decreases and speech is slurred
2. Pulse and respiration rate slows down
3. Loss of consciousness
4. Breathing and heartbeat become difficult to detect. At this point, irreversible hypothermia set in.

Treatment for Hypothermia:

Place casualty in bow of vessel, away from fumes from the motors. Cover the neck and head of patient with dry clothing. Remove wet clothing and replace with dry clothing.

If breathing and heartbeat has stopped, begin resuscitation. Never give patient any alcohol and never rub the limbs to warm him. Only give sweet hot drinks if the patient can drink it himself.

The recovery period will take normally the same time it took to become hypothermic.

Never assume the patient is dead. If there is no breathing or heartbeat start with CPR and get patient to the nearest hospital or doctor.

Remember: Protect the brain and the brain will protect the body. Alcohol thins the blood and the brain cannot control thin blood. Rubbing the patients limbs also thin the blood.

CHAPTER 6

Marine Environment:

A basic understanding of a synoptic chart is required, including a general knowledge of the following weather phenomena: pressure systems with their associated wind and weather patterns, cold fronts, cyclones, pressure gradients on how they affect wind strength and direction, as well as sea breezes, berg winds and the cape South Easter and the Westerly buster.

1. The use of the Barometer to predict weather
2. Weather reports, their use and where obtained
3. A brief understanding of the wind and water conditions which would be dangerous for a small vessel on the water.
4. A basic understanding of the formation of waves, currents and tides.

BASIC METEOROLOGY:

The study of the elements: (weather and climate). Some of these elements are air temperature, atmospheric pressure and wind precipitation.

AIR TEMPERATURE:

Air temperature is the condition of the air with regard to heat or cold. It is measured in degrees Celsius © or Fahrenheit (F). Most of the heat of the air comes from the earth's surface that was heated by the sun as well as direct from the sun.

Factors that has an effect on the temperature of the air:

1. The angle at which the sun meets the earth's surface. The greater the angle gets, more heat will be released from the earth into the atmosphere.
2. More heat will be absorbed by the earth during summer than winter months because of longer days than nights in summer.
3. Carbon dioxide, clouds, water vapors and winds are all factors that will affect the way the earth absorbs heat
4. Cold and warm fronts has a massive influence on weather conditions.

ATMOSPHERIC PRESSURE:

The earth is surrounded by a thin layer of air which is held on to the earth by the earth own gravity. Atmospheric pressure is the result of the force of gravity acting on air. Pressure acts in all directions. Atmospheric pressure decreases with altitude and is measured in mill bars (mb). Pressure at sea level is 1013mb.

WEATHER AND CLIMATE:

When we talk about climate we divide the year in four seasons. Normally a warm and rainy season, a mild to cold season, cold season, cold to mild season and a mild to warm and rainy season again.

Weather conditions are divided in:

Weather report is what is happening at any precise moment, where the information is obtained from a lighthouse keeper or another ship or small vessel at sea or on inland waters.

Weather forecast giving the weather conditions over a 24 hour period and is compiled by the weather bureau for the Department of Environmental Affairs. It is updated twice daily and is obtainable from:

1. All major coastal weather offices and airports.
2. They are also broad casted on radio stations.
3. VHF radio.
4. Cell phones.
5. Internet.

Forecasts are usually based on approximated estimates at not more than 50NM apart.

WIND:

Wind blows because of differences in air pressure. Air will always blow from a region of high pressure to a region of low pressure in an attempt to equalize the difference in pressure. The rate at which pressure changes in any direction is known as the Pressure gradient. (i.e. the more rapid the change in pressure, the stronger the winds velocity will be).

FOG AND MIST:

1. Fog is a very dense mist that occurs near the coast. Warm air from the land encourages evaporation from the sea. When this moist air is cooled, fog is formed. This is one of the most dangerous situations for small craft on the water. Precaution should be taken in dense fog.
2. Mist is when a lot of small particles of water are in the air forming mist. The more particles there are the denser the mist will be. Mist is formed when condensation and cloud formation takes place.

BAROMETER:

Studying the Barometer is the essence of being competent. It enables you to have the foresight to prepare yourself in advance for a possible change in the weather conditions before going out on dams or in the sea.
A high pressure on your Barometer indicates good weather over an area, once this pressure on your Barometer drops it indicates that bad weather is on its way. Thumbs up is good weather (high pressure) and thumbs down is bad weather (low pressure). While the Barometer reading stays on high, the good weather will prevail.