CHAPTER NINE

HEAT:

Heat is a type of energy which flows from the hot to the cold part of a body.

TEMPERATURE: This is a number which tells us how hot or cold a body is.

SOURCES OF HEAT:

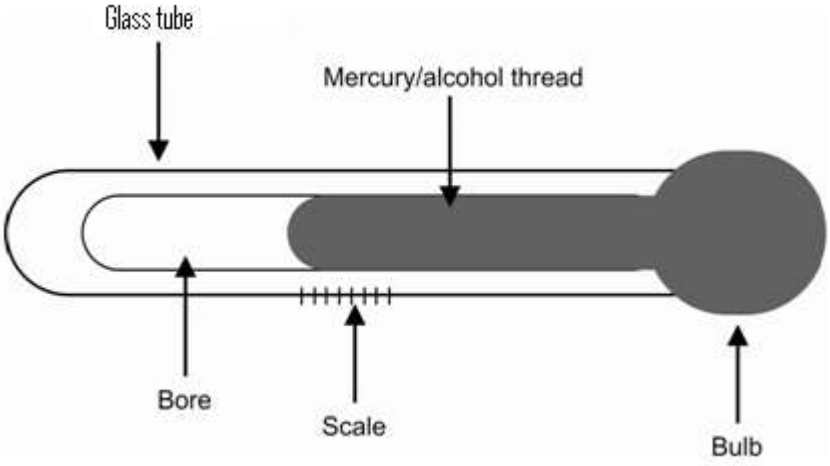
Some of the sources of heat are:

(I) The sun.
(II) Hydroelectric power.
(III) Friction.

THERMOMETER:
This is used to measure temperature.
There are different types of thermometers and examples are:
(I) Liquid-in-glass thermometer.
(II) Digital thermometer.
(III) Gas thermometer.

Liquid-in-glass thermometer:
This type of thermometer contains a liquid.
There are two types and these are:
(I) Mercury thermometer.
(II) Alcohol thermometer.
Whilst mercury is the liquid used in the mercury thermometer, alcohol is the one used in the alcohol thermometer.

The structure of the liquid-in-glass thermometer:



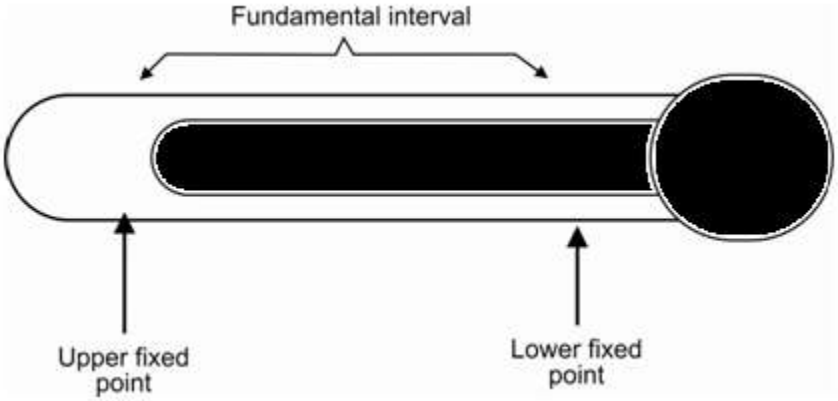
- The liquid in glass thermometer consists of a glass bulb which is joined to a glass tube.
- Within the glass tube can be found a space called the bore.
- The mercury or the alcohol (i.e. the mercury or the alcohol thread), can rise and fall within the bore.
- Found on the thermometer is a scale, from which the temperature is read.

How the liquid in glass thermometer works:

When matter is heated, it expands or increases in size. But when matter cools or is cooled, it contracts or becomes smaller. If the thermometer is placed into a hot substance or brought into a hot environment, the liquid it contains becomes hot and as such it expands.This expansion causes the liquid (the alcohol or the mercury thread); to rise within the bore which tells us there has been an increase in temperature.

If the thermometer is placed into a cold substance or brought into a cold environment, the liquid it contains becomes cold. The liquid therefore contracts or become smaller, causing the alcohol or the mercury thread to fall within the bore. This tells us that there has been a decrease in temperature.

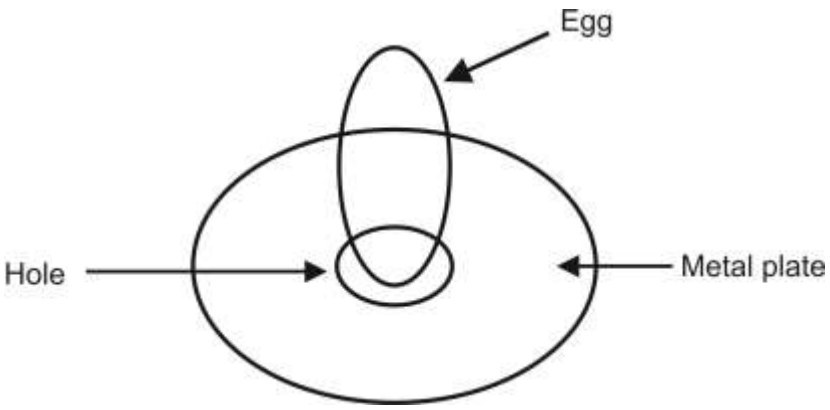
The fixed points of a thermometer:



Every thermometer has two marks or points marked on it, and these are the upper fixed point and the lower fixed point. To get the lower fixed point, we place the thermometer into pure ice. The mercury or the alcohol thread will start falling, and stops falling at a particular point. This point is marked as the lower fixed point. To get the upper fixed point, we place the thermometer inside steam or water vapour.
The mercury or the alcohols thread starts rising, and stops rising at a particular point. This point is marked as the upper fixed point. The distance between the upper fixed point and the lower fixed point, is called the **Fundamental Interval.**

Expansion of Solids: Solids expands when heated and contracts when they cools.

Experiment to show that solids expand when heated and contract when they cool:



- A hole is created in the middle of a metal plate; and the size of the hole must be such that, an egg must not be able to pass through it.
- Place an egg in this hole and heat the metal.

- After a few minutes, the hole expands or becomes bigger as a result of the expansion of the metal.
- The egg therefore falls to the ground.
- Allow the metal to cool, and this time the egg will not be able to pass through the hole.
- This shows that solids such as metals expand when heated, and contract when they cool.

Effects of the expansion of Solids:

Bridges built of metals expand when the sun shines on them, and to prevent such bridges from being damaged, we must make room for this expansion. For this reason one end of the bridge is fixed to the ground, while the other end rests on rollers or small wheels.

In other cases, both ends of the bridge are made to rest on rollers. By so doing room is made for expansion, since the movement of the roller or rollers causes an increase in the length of the bridge when it expands. If both ends of the bridge are fixed to the ground and its expansion occurs, the bridge will be damaged. These facts must be taken notice of:

1. Railway lines are not laid continuously, but are laid with gaps or spaces left between them. This is to make room for its expansion on hot days. If no gaps are left and the line is laid continuously, then its expansion on hot days will cause its damage.
2. Metal roofing sheets expand on hot days. To make room for expansion on hot days, roofing sheets have their edges placed on top of one another.