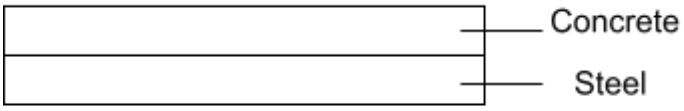
Thermal expansion

1. Figure 1 shows a beam balance made out of concrete and reinforced with steel



Use a diagram to explain the behaviour of the shape of the beam when heated up

2. (a) Sate **two** liquids which are used in thermometer.

(b) With a reason, state which of the two liquids in 3 (a) above is used to measure temperature in

areas where temperatures are:

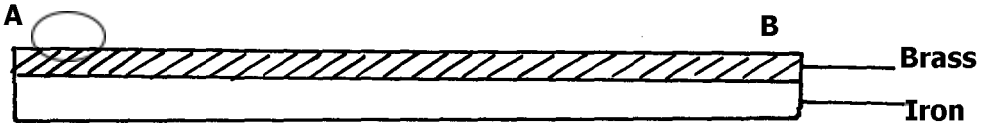
. (i) below -40^0c (ii) 150^0c

3. What do you understand by the statement '**lower fixed point'** on a temperature scale?

4. Name **two** adaptations that can be made to a mercury thermometer to make it more sensitive

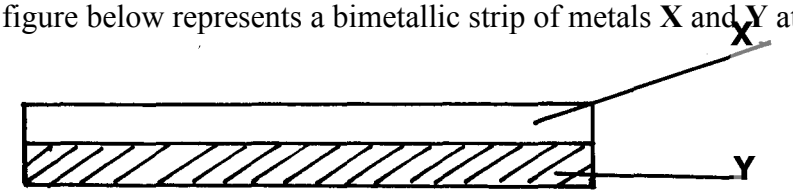
5. **Figure 5** shows a bimetallic strip made of brass and iron. A marble is placed at end **A** of the bimetallic strip as shown below:-

fig. 5

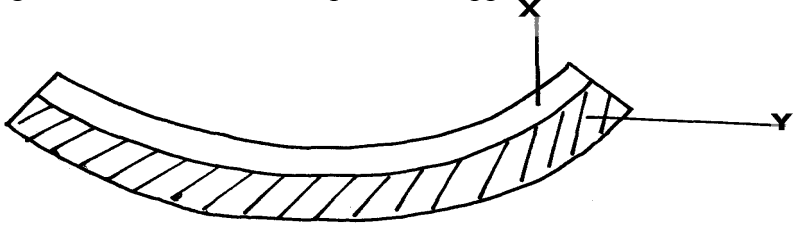


State and explain what will be observed when the bimetallic strip is strongly cooled

6. The figure below represents a bimetallic strip of metals **X** and **Y** at room temperature



The figure below shows its shape when dipped into crushed ice



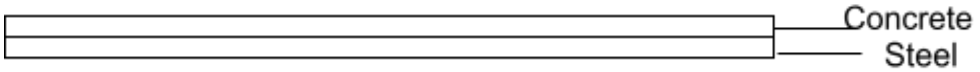
Sketch a diagram in the space given below to show the shape when the strip is heated to a

temperature above the room temperature

7. Give a reason why a concrete beam reinforced with steel does not crack when subjected to

Changes in temperature.

Thermal expansion

1. 

- *The beam expands linearly*
- *The beam remains straight but longer than before heating*
- ***Both concrete and steel have same rates of expansion***
- *Their value of linear expansivity is 11x10-6*

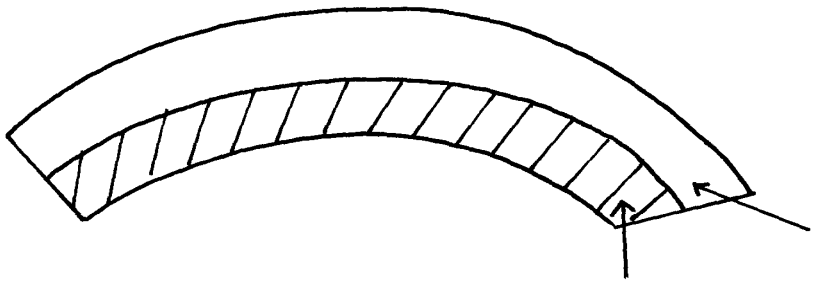
2. *a) – Alcohol. 1 mk*
   - Mercury. 1 mk
   b) i) below -40°c alcohol ½ because it has a low freezing point of –115°c.
   Mercury freezes ½ at -39°c.
   ii) 150°c ⟶ mercury ½ because it has a high boiling point of 357°, alcohol boils at 78°c. ½

3. *- This is the temperature of pure melting ice at standard/normal atmospheric pressure;*
   (Both pure and standard pressure mentioned;

4. *- Using a thin walled bulb √1*

   - Using a narrower capillary tube √1

5. *On cooling, the brass contracts more than iron, hence become shorter than iron and forms upwards curve, making the marble to roll and settle at the centre of the curve.*

6. 

Thermal expansion

1. Aquatic animals and plants are observed to survive in frozen ponds. Explain this observation

Thermal expansion

1. *Water freezes and the ice formed floats in water because its density is less than that of water, insulating water below it. Temperatures increases down the pond because of anomalous expansion of water*