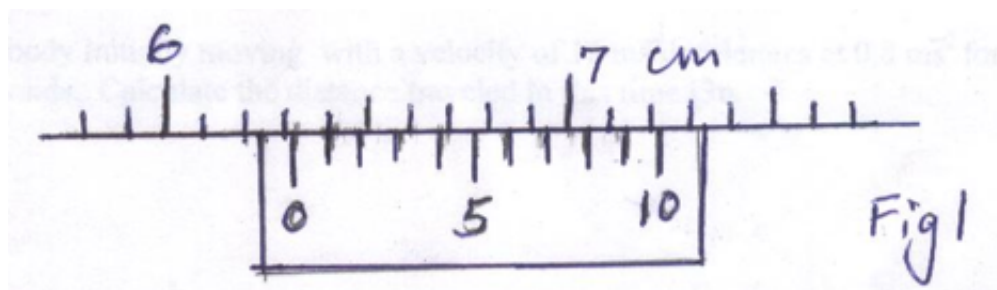
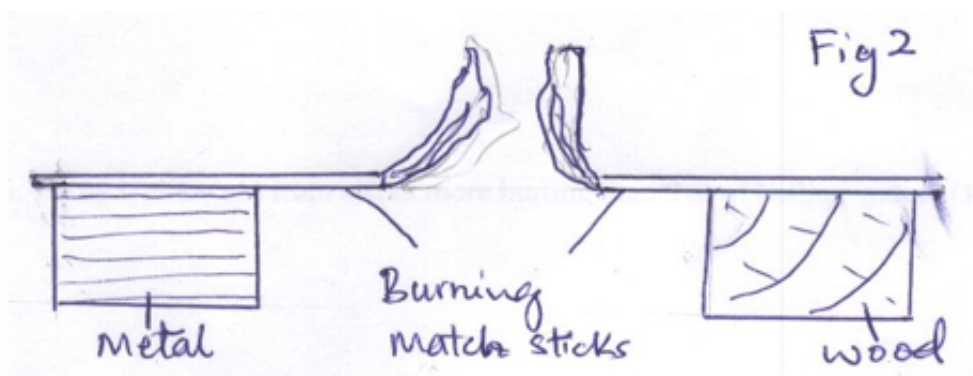


SECTION A (25 Marks)

1. Figure 1 shows part of a scale of a veneer calipers. What is the measurement shown if it had an error of $+0.02\text{cm}$?



2. Nyamwata lit match sticks and placed them at the same time on blocks of identical shape but different materials. The set up is shown in figure 2.



State and explain which flame gets extinguished earlier?

.....
.....

3. What is the purpose of the pear- shaped cross section of a clinical thermometer.

.....

4. A body initially moving with a velocity of 16ms^{-1} decelerates at 0.8ms^{-2} for 5 seconds.

Calculate the distance traveled in this time.

.....
.....

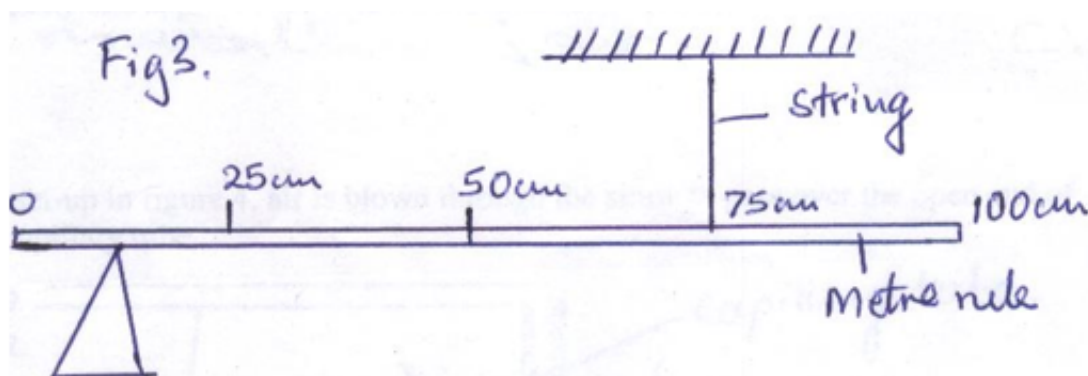
5. A driving gear wheel having 25 teeth engages with a second wheel with 100 teeth. If the gear system is 85% efficient, find the mechanical advantage.

.....
.....

6. Why is the scald from steam more hurting than that of boiling water?

7. A concrete block of length L , breadth b and thickness h is fully immersed in sea water of density ρ . Write down an expression for the upthrust it experiences.

8. Figure 3 represents a uniform metre rule resting on a knife edge and supported by a string as shown below.



Other than the forces acting through the knife edge indicate one other force acting on the metre rule.

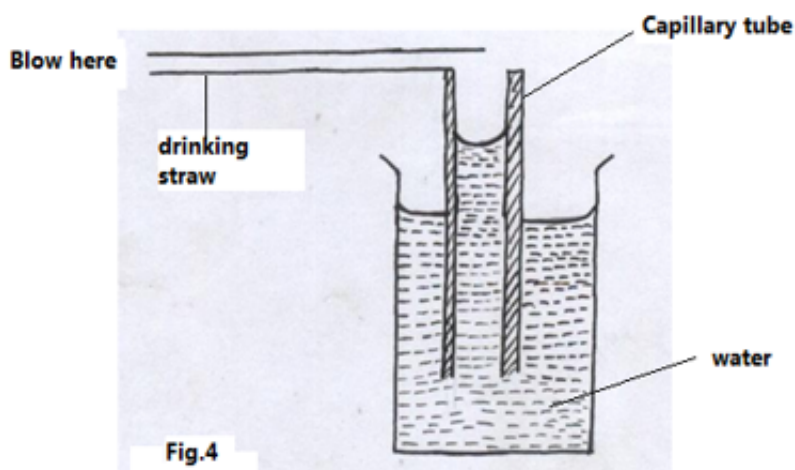
9. A spring extends by 2cm when a mass of 50g is hanged on it. What force is required to extend it by 2.5cm?

10. State and explain the effect of decrease in temperature on the surface tension.

11. The volume of an air bubble just before emerging from the surface of water in a sea is 5 times its volume at the bottom of the sea. Calculate the depth of the sea. Atmospheric pressure is $1.0 \times 10^5 \text{ N/m}^2$ and density of sea water is 1025 kg/m^3

12. Explain why water stored in an earthen jar becomes cooler than the one which is stored in a metallic jar.

13. The set-up in figure 4, air is blown through the straw to pass over the open end of the capillary tube.



Explain why blowing through the straw causes the water to rise further up the capillary tube.

.....

14. For a body to be at equilibrium under the action of parallel forces two conditions must be satisfied.

State one condition of equilibrium.

.....

.....

SECTION B (55 Marks)

15. a) i) State Newton's second law of motion.

.....

.....

ii) A force F acts on a body of mass M such that its velocity changes from u to v in time t . Derive from first principles the equation: $F=ma$.

.....

.....

b) A trolley having a mass of 3kg and velocity 5m/s collides with another trolley having a mass of 1kg, which is at rest. If the trolleys join after the impact,

calculate,

i) the common velocity after collision.

.....

ii) the kinetic energy (K.E) before collision.

.....

iii) The kinetic energy (K.E) after collision.

.....

.....
iv) Comment on the values in b (ii) and (iii).
.....

16. a) State Boyle's law.
.....

b) The figure 5 below shows a set-up that may be used to verify a gas law.

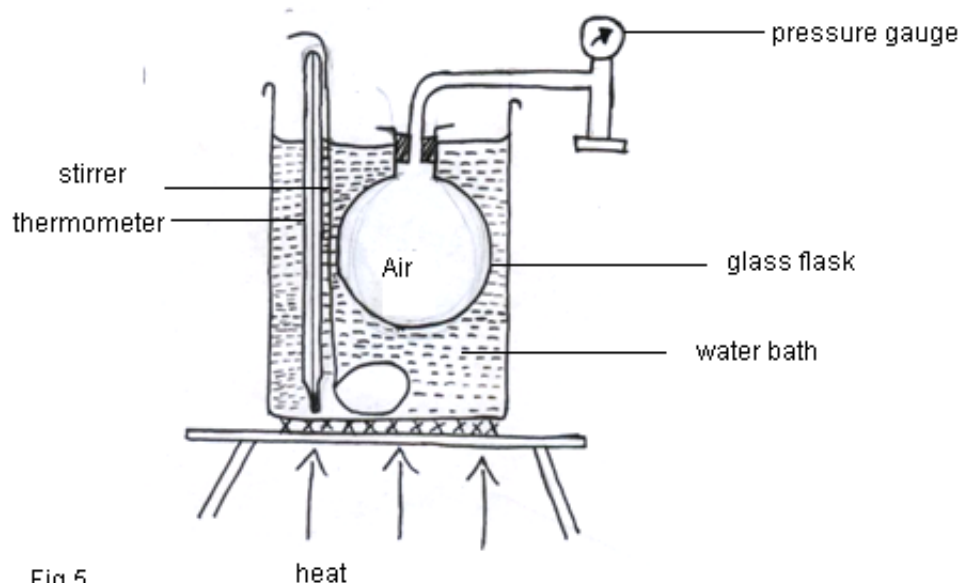


Fig.5

i) State the measurement that should be taken in the experiment.
.....
.....

ii) Explain how the measurements taken in (i) above may be used to determine the absolute zero temperature.
.....
.....

c) Why would it be impossible for the pressure of a gas to be reduced to zero in practice.
.....
.....

d) The air in the tube connecting the gauge to the flask may be at a lower temperature than the air in the flask. State how this can be corrected.
.....

e) A certain mass of gas occupies 2.4m^3 at a pressure of 1.6×10^5 pa and temperature

27°C.

Determine the pressure of the gas when its volume is 3.0m^3 at a temperature of 196°C.

.....
.....

17. a) State two conditions under which a material should be when determining its specific latent heat of fusion.

.....

b) A copper calorimeter of mass 25g contains water of mass 150g at 60°C. 30g of ice at 0°C is added to the water, melted and well stirred until a temperature 38°C is attained. Calculate the specific latent heat of fusion of ice. Specific heat capacity of copper is $400\text{Jkg}^{-1}\text{K}^{-1}$ and for water

c) An electric kettle rated 3.0KW is used to heat 3.0kg of water from 20°C to its boiling point 100°C. Take specific heat capacity of water $4,200\text{Jkg}^{-1}\text{K}^{-1}$, heat capacity of the kettle = 450JK^{-1} , specific latent heat of vaporization of water = 2.3MJkg^{-1} .

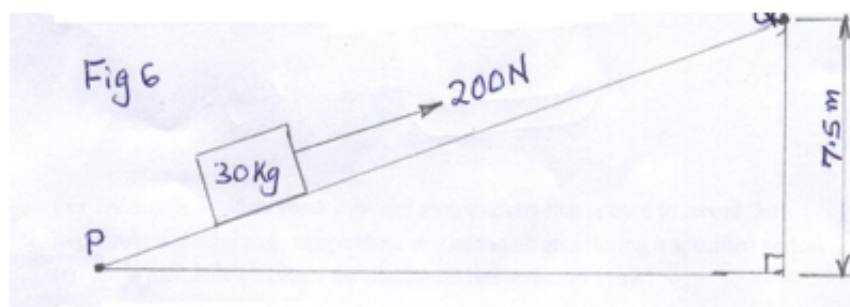
Determine;

- The heat absorbed by the water.
- Heat absorbed by the electric kettle.
- The time taken for the water to boil.

18. a) Suggest one method of improving the efficiency of an inclined plane.

.....

b) A mass of 30kg shown in the figure 6 below is being pulled from point P to point Q with a force of 200N parallel to the inclined plane. The distance PQ is 22 m and the mass is raised through a vertical height of 7.5m.



- Determine the work done

I. By the force;

.....
.....

II. On the mass;

.....
.....

III. To overcome friction;

.....
.....

ii) Determine the efficiency of the inclined plane.

.....
.....

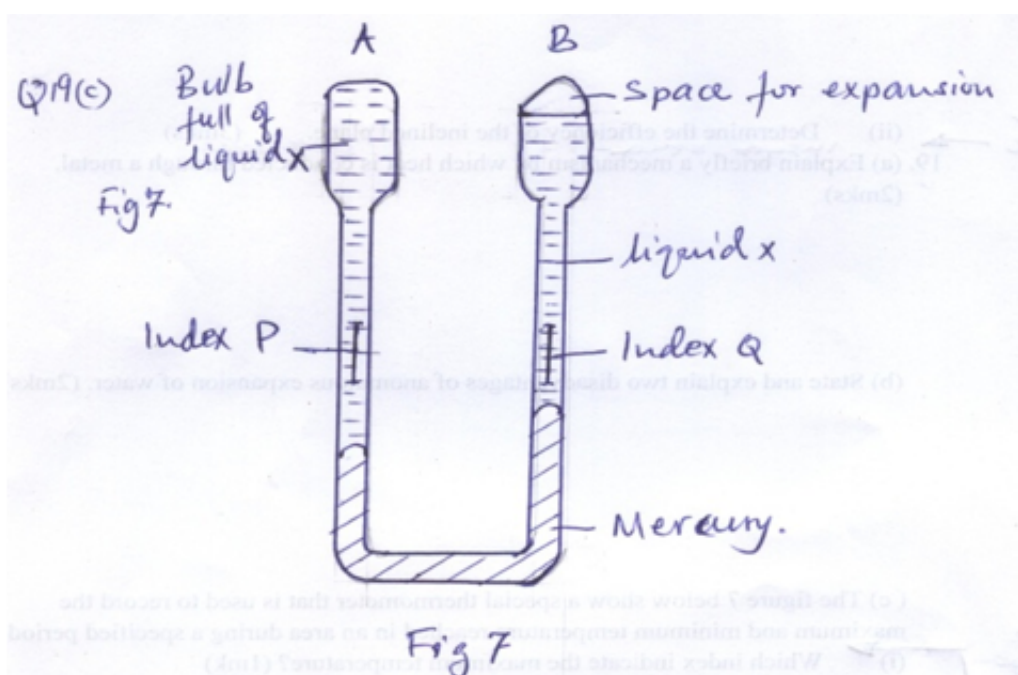
19. a) Explain briefly a mechanism by which heat is conducted through a metal.

.....

b) State and explain two disadvantages of anomalous expansion of water.

.....
.....

c) The figure 7 below show a special thermometer that is used to record the maximum and minimum temperature reached in an during a specified period.



i) Which index indicate the maximum temperature?

.....

ii) Name liquid x

.....

iii) Which liquid is the thermometric liquid?

.....

iv) Explain how the thermometer is reset.

.....

d) An engineer wants to fit a brass ring tightly onto a steel rod of diameter equal to the inner diameter of the ring.

Explain how this can be achieved.

.....

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