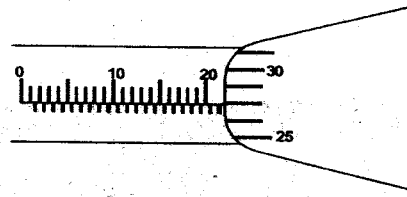


Answer all questions.

1. The figure below shows a micrometer screw gauge being used to measure the diameter of a metal rod. The thimble scale has 50 divisions.



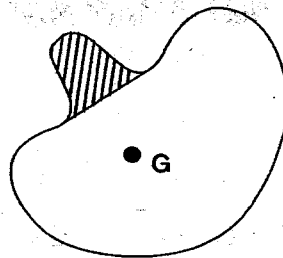
What is the reading shown?

(1 Mark)

2. The figure below represents a rock balanced at point O. G is the centre of gravity of the rock. Use this information to answer the questions that follow.

a) Draw and label on the figure, the force acting on the rock.

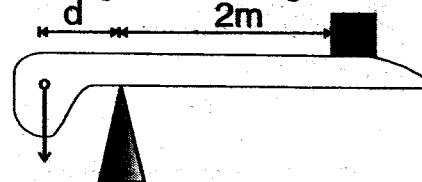
(2 Marks)



b) If the portion of the rock represented by the shaped part is chopped off, explain why the rock may topple to the right.

(2 Marks)

3. The figure below shows a non-uniform leg of mass 100kg balanced on the pivot by a 2kg mass.



Determine the distance of the centre of gravity from the pivot.

(3 Marks)

4. The figure below shows a uniform bar in equilibrium.



Water is added into beaker A and B, until the weights are submerged. It is observed that the bar tips towards B. Explain this observation.

(2 Marks)

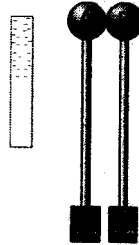
5. A bottle full of water has a mass of 45g. When full of Mercury, its mass is 360g. If the density of Mercury is 13.6g/cm^3 , calculate the mass of the empty bottle. (Take the density of water = 1g/cm^3)

(3 Marks)

6. An enamelled silver jewel has a mass of 93g and is found to have a volume of 10cm^3 . What part of the mass is enamelled? Density of silver = 10.5g/cm^3 and that of enamel is 2.5g/cm^3 .

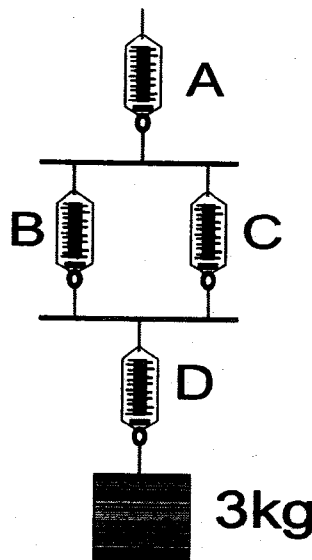
7. A measuring cylinder of height 30cm is filled to a height of 20cm with water and the rest occupied by kerosene. Determine the pressure acting on its base. Take density of water = 1000kg/m^3 . $g = 10\text{m/s}^2$ and density of kerosene = 800kg/m^3 . (3 Marks)

8. Two metal spheres A and B each stands on an insulating base and are in contact. A negatively charged rod is brought near the sphere A as is shown below.



- i) What effect does the charged rod have on the electrons in A and B? Why? (1 Mark)
- ii) In what way will A and B differ if separated while the rod is near. (1 Mark)
- iii) How would the apparatus be used to leave A and B equally positively charged. (1 Mark)

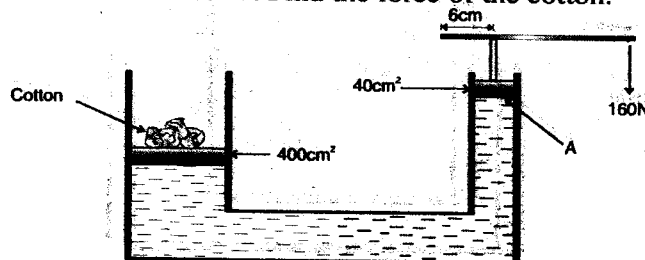
9. The figure below shows 4 spring balances, A, B, C and D, each of mass 200g supporting a load of mass 3kg.



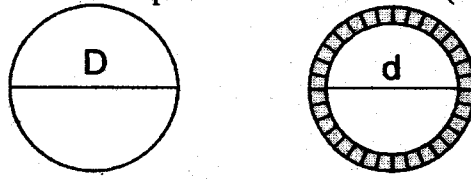
What does spring balance C read?

(2 Marks)

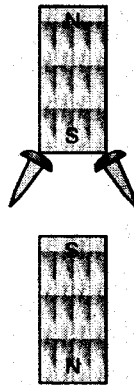
10. The figure below shows a hydraulic press used to press cotton. The effort applied is 160N at the end of a level 36cm long bar and pivoted at the other end. The plunger is 6cm from the pivot. The area of the plunger piston A is 4cm^2 and that of cotton B is 400cm^2 . Find the force of the cotton. (3 Marks)



11. Explain how the wheel shown in the figure below can be made to fit in the ring perfectly, if the diameter of D is larger than the diameter d , at room temperature. (2 Marks)



12. Two steel pins are attracted by a magnet. When a south pole was brought in between the two pins, the pins moved further apart as shown below.



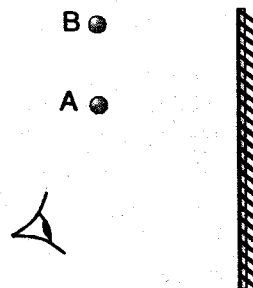
Explain why the pins moved apart.

(2 Marks)

13. State one method of varying the size of the image formed by a pin hole camera.

(1 Mark)

14. The figure below shows two object points, A and B placed in front of a mirror, M.



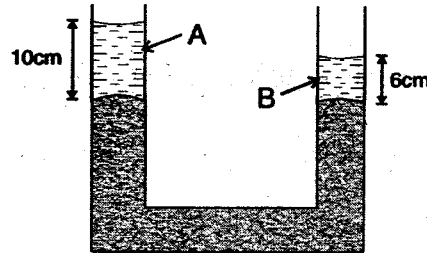
Sketch a ray diagram to show the position of their images as seen by the eye.

(3 Marks)

15. a) Define the term pressure and state its SI units.

(1 Mark)

b) A student had a U-tube with mercury as shown below.



He noted that liquid A and B balanced the level of mercury in the tube.

i) Explain why the liquid A is more than liquid B.

(1 Mark)

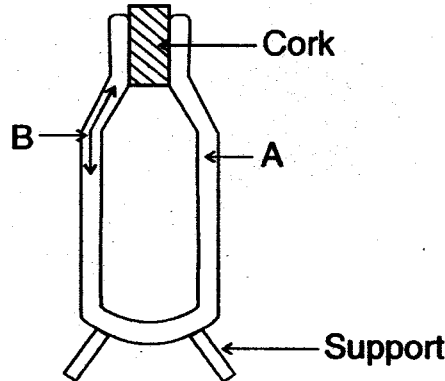
ii) Calculate the density of liquid B. If that of liquid A is 2gcm^{-3} .

(3 Marks)

iii) Lucy while climbing a mountain noted that she was breathing too fast and her pen poured all its ink. Explain this.

(2 Marks)

16. The figure below shows a cross-section of a vacuum flask.



i) Name the part labelled A and B.

(2 Marks)

ii) Explain how the heat losses are minimised when hot liquid is poured into the flask.

(3 Marks)

17. You are provided with the following :-

- Large shallow tray
- Water
- Lycopodium powder
- Some olive oil
- Metre rule
- Burette

a) Describe an experiment to estimate the diameter of a molecule of olive oil.

(7 Marks)

b) Small quantities of Hydrogen and Helium at the same temperature are released simultaneously at one end of a laboratory. State with reason which gas is more likely to be detected earlier at the other end. (2 Marks)

18. The figure below shows the poles of two magnets close together.



Sketch the magnetic field pattern in the space between the poles.

(2 Marks)

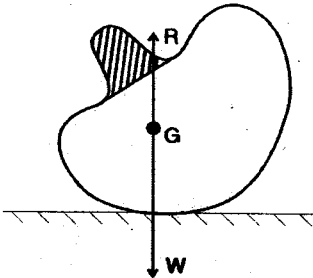
19. An object is placed 4.0cm in front of a concave mirror of focal length 12.0cm. An image is formed

- 30.0cm from the mirror. Find the magnification and state the characteristics of the image. (4 Marks)
20. State two factors affecting surface tension. (2 Marks)
21. a) What liquid is used as brake fluid? (1 Mark)
b) State two properties of the fluid that makes it suitable as a hydraulic fluid. (2 Marks)
22. A drop of oil of volume $1.0 \times 10^{-3} \text{cm}^3$ spreads out on clean water surface to a film of area 10cm^2 . Calculate the thickness of the film. (4 Marks)

PHYSICS MARKING SCHEME FORM 2

1. 21.50
± 0.28
21.78 mm

2a)



The position of centre of gravity shifts slightly towards that direction hence tilting.

3. Clockwise moment = anticlockwise moment
(2 x 2) = 100 x d
d = 0.04m

4. Volume of object A is bigger hence the upthrust experienced more than that of object B.

5. Let mass of the bottle be M. Volume of mercury = Volume of water.
 $\frac{360 - M}{13.6} = \frac{45 - M}{1}$
 $360 - M = 13.6(45 - M)$
 $360 - M = 612 - 13.6M$
 $12.6M = 252$
M = 20g

6. Let mass of silver be x.
Let mass of enamel be y.
x + y = 93
 $\frac{x}{10.5} + \frac{y}{2.5} = 10$

$$\begin{aligned} x + 4.2y &= 105 \\ (-) \quad x + y &= 93 \\ \hline 3.2y &= 12 \\ y &= 3.75g \end{aligned}$$

7. $P = (1000 \times 0.2 \times 10) + 800 \times 0.1 \times 10$
 $= 2800 \text{ N/m}^2$

8. i) Electrons move towards B and protons towards A.
ii) A - Positively charged
B - Negatively charged
iii) Earth sphere B, withdraw the charging rod and separates the two spheres.

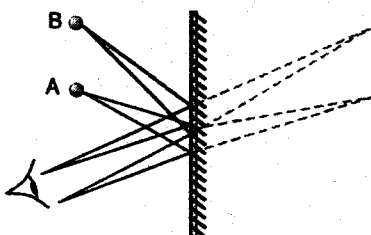
10. Spring A supports = $3\text{kg} + (3 \times 0.2\text{kg})$
 $= 3 + 0.6 = 3.6\text{kg}$
Spring B supports = $\frac{3.0 + 0.2}{2} = 1.6\text{kg}$

12. Heat the steel ring to expand, then fit the wheel and let them cool.

13. The end of pins get south poles hence are repelled by magnet.

14. Moving the camera away
-Moving the camera towards the object.

15.



16. a) Pressure is force acted perpendicular per unit area. The SI unit for pressure is Pa(N/m²)

b) i) Density of B is more than that of A.

ii) $P_A = P_B$
 $2 \times 10 \times g = P_B \times 6 \times g$
 $P_B = \frac{20}{6} = 3.3\text{g/cm}^3$

iii) Atmospheric pressure at mountain is low.

17. i) A - Vacuum
B - Shiny surfaces
ii) Vacuum - Reduced by convection and conduction
Shiny - Reduce by radiation
Cork - Reduced by conduction and evaporation.

18. Fill a tray with water until it overflows
-Clean the surface of water by removing a wax coated rod across.
-Place two waxed beams at the centre
-Sprinkle lycopodium powder on the water surface
-Touch the surface with the drop until it spreads on the surface
-Adjust the rods and use a metre rule to estimate the diameter.

19. Hydrogen will be detected earlier, density of Hydrogen is less and hence diffuses faster.

20. u = 4cm
v = 30cm
f = 12
 $M = \frac{v}{u} = \frac{30}{4} = 7.5$

Characteristics
-Virtual
-Erect
-Magnified

21. Temperature
Impurities

22. Oil

23. - Incompressible
-Do not corrode
- Low freezing point and high boiling point

24. $\pi r^2 h = 1.0 \times 10^{-3} \text{ cm}^3$
 $\pi r^2 = 10 \text{ cm}^2$

$$\begin{aligned} \frac{V}{A} &= \frac{\pi r^2 h}{\pi r^2} = h = \frac{1.0 \times 10^{-3}}{10} \\ &= 1.0 \times 10^{-4} \text{ cm} \end{aligned}$$