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MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

THE MOCK EXAMINATIONS, 2025

232/1 **PHYSICS** **PAPER 1**

May/June, 2025 **TIME: 2 Hrs**

MARKING GUIDE

Instructions

(a) Write your name, admission number, date, stream and signature in the spaces provided above.
(b) All answers must be written in the spaces provided in this question paper.
*(c) This paper consists of **13** printed pages with **2** sections.*
(d) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing
(e) Candidate should answer the questions in English

FOR EXAMINERS' USE ONLY

Section	Question	Maximum Score	Candidate's Score
A	1 – 12	25	
B	13	12	
	14	12	
	15	08	
	16	10	
	17	12	
	Total Score	80	

H.O.D.

SECTION A (25 MARKS)

Answer all questions in this section in the spaces provided:

1. **Figure 1** shows a section of an un-graduated Vernier calipers.

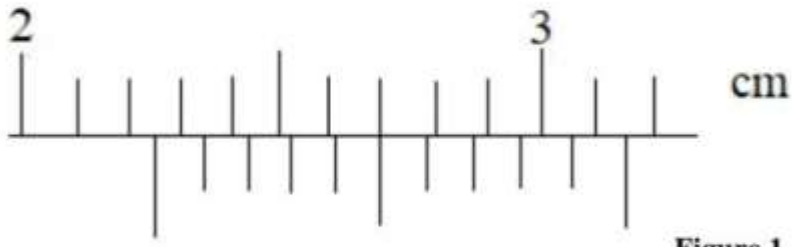


Figure 1

State the reading as indicated by the scale (1 mark)

Main scale: 2.2cm

Vernier scale: 5 X 0.01 = 0.05cm

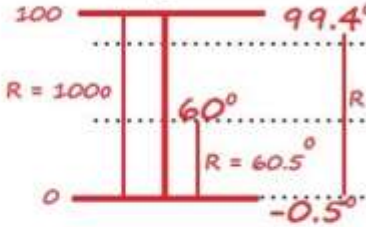
Total reading: 2.2 + 0.05 ✓1

= 2.2 + 0.05 = 2.25cm

2. Explain why a person would jump higher on earth than on Saturn. (2 marks)

Earth is smaller in size than Saturn ✓1 hence experiences lower gravitational field strength. ✓1

3. A mercury thermometer with its fixed points incorrectly marked has the reading of pure melting ice as -0.5^{0}C and of steam at standard atmospheric pressure as 99.4^{0}C.Calculate the correct temperature when the thermometer reads 60^{0}C. (2 marks)



range 99.9 rep 100°

range 60.5 rep $\frac{60.5 \times 100}{99.9}$ ✓1

= 60.56°C ✓1

4. State **two** ways the surface tension of a liquid may be increased. (2 marks)

-Reducing the temperature of the liquid ✓1

-Removing impurities ✓1

Dancun Ouya

5. **Figure 2** shows a three identical springs and have negligible weights. The extension produced on the system of the spring is 40cm.

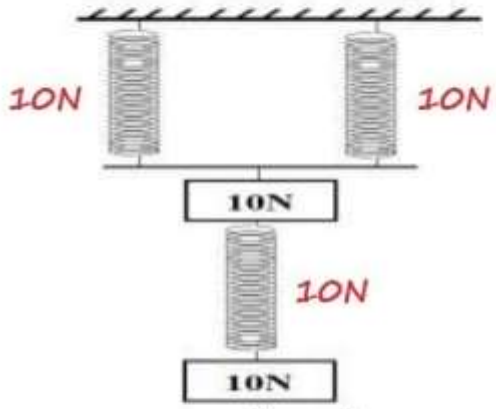


Figure 2

Determine the spring constant of each spring. (2 marks)

Each spring experiences 10N

e per system = $\frac{0.4m}{2}$

= 0.2m

$k = \frac{F}{e}$ ✓1

$= \frac{10N}{0.2m}$

= 50N/m ✓1

6. An oil drop of radius 0.35mm when placed on water spreads out to form a circle of radius 35cm.Using this information:

(a) Estimate the size of the oil molecule. (3 marks) ~~(2 marks)~~

$V_{drop} = \frac{4}{3} \times \frac{22}{7} \times (0.35)^3$

$= 0.1797mm^3$

$A_{patch} = \frac{22}{7} \times 350^2$

$= 385000mm^2$

$Size = \frac{V_{drop}}{A_{patch}}$ ✓1

$= \frac{0.1797mm^3}{385000mm^2}$ ✓1

$= 4.668 \times 10^{-7}mm \parallel 4.668 \times 10^{-10}m$ ✓1

(b) State any **one** assumption you made during your calculation. (1 mark)

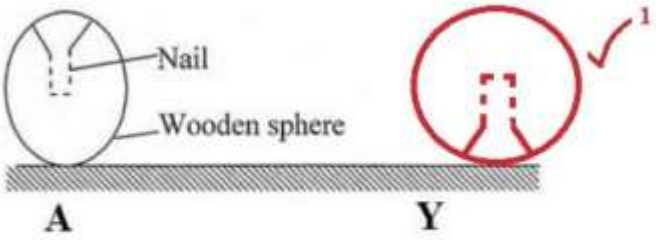
-The oil drop is a perfect sphere ✓1

-The oil patch is a perfect circle

-The oil patch forms a monolayer

-There was no evaporation

7. **Figure 3** is a wooden sphere with a nail hammered into it at a point **A** as shown below



✓1 the nail has a higher density hence rests at the lowest position for max. stability ✓

Figure 3

Dancun Ouya

The sphere is rolled on a horizontal ground and comes to rest after some time at point **Y**. On the same **Figure** 3 draw the sphere after it comes to rest at point **Y** and explain (2 marks)

8. In **Figure 4** below, a pipe with two different cross-sectional areas has two pipes dipped into its walls at the points of different cross-section areas. The pipes **A** and **B** are identical in cross sectional areas.

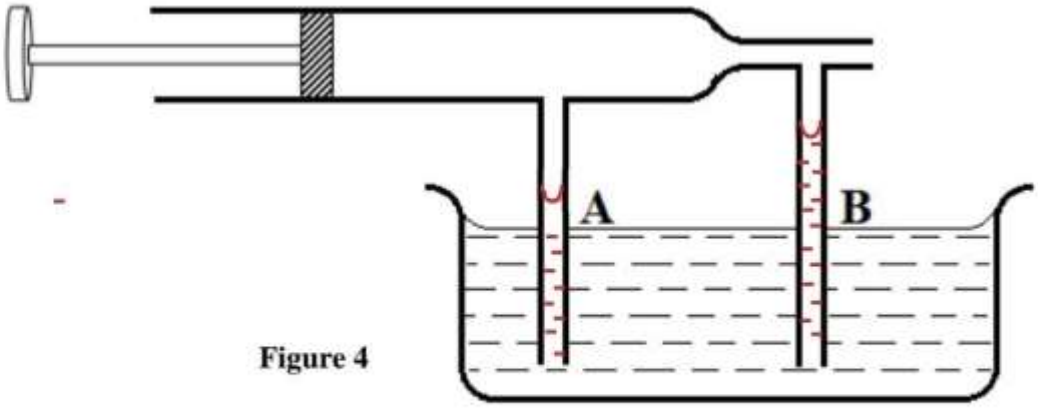


Figure 4

✓1 level at B higher than A

Show the new level of water in columns **A** and **B** when the piston is pulled back. (1 mark)

9. A student performed an experiment find out how the length **L** of a spiral spring varies with the compression force, **F**. **Figure 5** shows the results obtained.

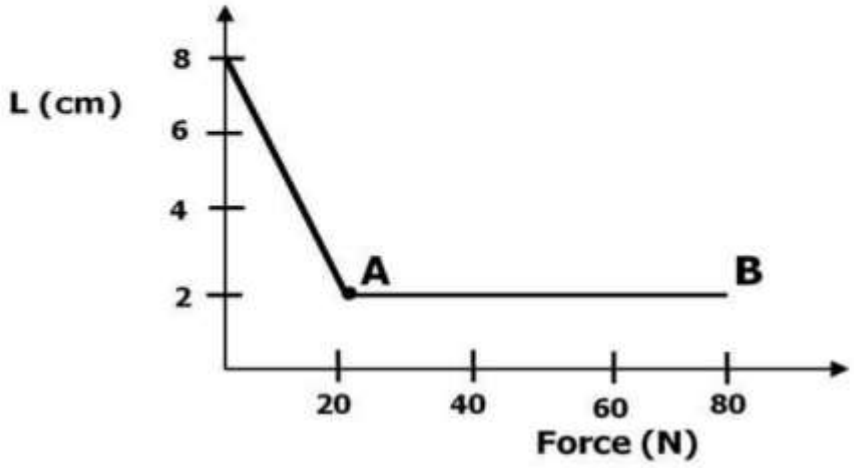


Figure 5

State a reason for the shape of the graph between 20N and 80N. (1 mark)

The spring had reached its compression limit hence could not be compressed further ✓1

Victor Odundo

10. A string of length 0.7m is used to whirl a stone of mass 500g in a circle in a vertical plane at 5 rev/s. Determine:

(a) The period (2 marks)

$f = 5 rev/s$

$T = \frac{1}{f}$ ✓1 $= 0.2s$ ✓1

$= \frac{1}{5}$ ✓1

(b) The angular velocity. (3 marks)

$\omega = 2\pi f$ ✓1

$= 2 \times \frac{22}{7} \times 5$ ✓1

$= 31.43 rad/s$ ✓1

11. **Figure 6** shows a uniform meter rule of Weight 2N with two weights 0.36N and 0.24N suspended from its ends.

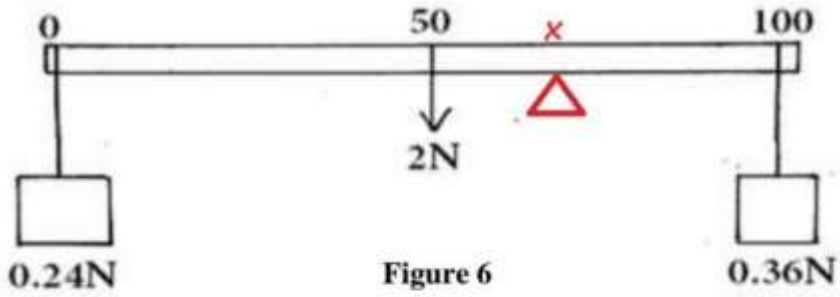


Figure 6

Determine how far from the 0.36N weight a pivot should be placed in order to balance the meter rule. (3 marks)

$F_1d_1 = F_2d_2 + F_3d_3$ ✓1

$0.36(100 - x) = 2(x - 50) + 0.24x$ ✓1

$36 - 0.36x = 2x - 100 + 0.24x$

$136 = 2.6x$

$x = 52.31cm$ mark

$100 - 52.31 = 47.69cm$ ✓1

12. State a reason why water is not suitable as a barometric liquid (1 mark)

It has a high barometric height || Its barometric height is not easily measurable || It has a low density hence rises to very high heights. ✓1

Maurice Asoro

SECTION B: (55 MARKS)

Answer ALL questions in the spaces provided

13.

(a) **Figure 7** below shows a set-up that may be used to verify pressure law.

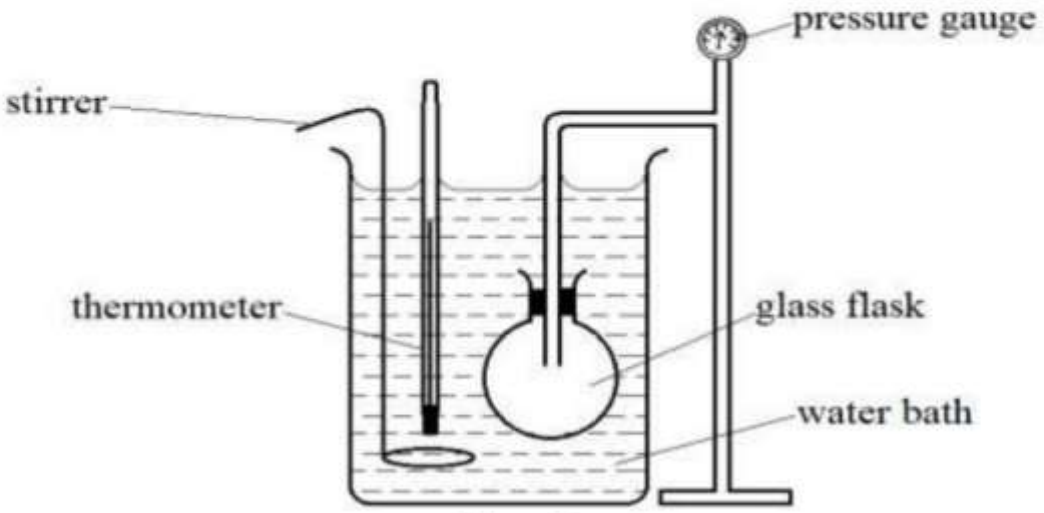


Figure 7

(i) State the measurements that should be taken in the experiment. (2 marks)

-Thermometer reading ✓[1]

-Pressure gauge reading ✓[1]

(ii) Explain how the measurements in **(i)** above may be used to verify pressure law.

(3 marks)

Record the initial thermometer and pressure gauge readings

Heat the water bath and record the thermometer and corresponding pressure gauge readings. ✓[1]

Plot a graph of pressure against absolute temperature. ✓[1]

A straight line graph passing through the origin is obtained, showing that the pressure of a fixed mass of a gas is directly proportional to its absolute temperature at constant volume. ✓[1]

Peter Okoth

(b) A column of air 26cm long is trapped by mercury thread 5.0cm long as shown in the **Figure 8 (a)** below

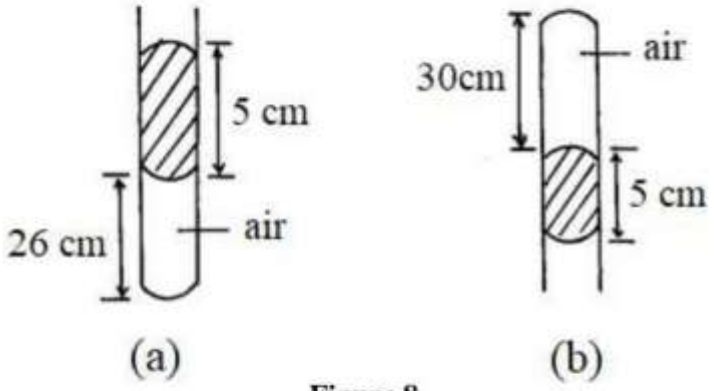


Figure 8

When the tube is inverted as in **Figure 8(b)** the air column becomes 30cm long. What is the value of atmospheric pressure? (3 marks)

$P_1V_1 = P_2V_2$ ✓1

$26(P + 5) = 30(P - 5)$ ✓1

$26P + 130 = 30P - 150$

$4P = 280$

$P = 70\ cmHg$ ✓1

(c) A steel cylinder of capacity 0.5m³ contains nitrogen at a pressure of 30,000Pa when the temperature is 27°C. What will be the pressure of nitrogen if it is allowed to flow into another cylinder of capacity 9.5m³ with the temperature reduced to -23°C? (3 marks)

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ ✓1

$\frac{30,000 \times 0.5}{300} = \frac{P_2 \times 9.5}{250}$ ✓1

$P_2 = 1315.79\ Pa$ ✓1

(d) State the difference between the temperature in Kelvin scale and Celcius scale. (1 mark)

Kelvin scale starts at absolute zero while the Celcius scale starts at -273°C ✓1

Austine Oduor

14.

(a) **Figure 9** shows a block **A** immersed in water. It weighs 2N in air and has a density of 2.0g/cm^3. If the bar is pivoted at its center and is in equilibrium find the distance x (ρ *of water* = *1g/cm^3*) (3 marks)

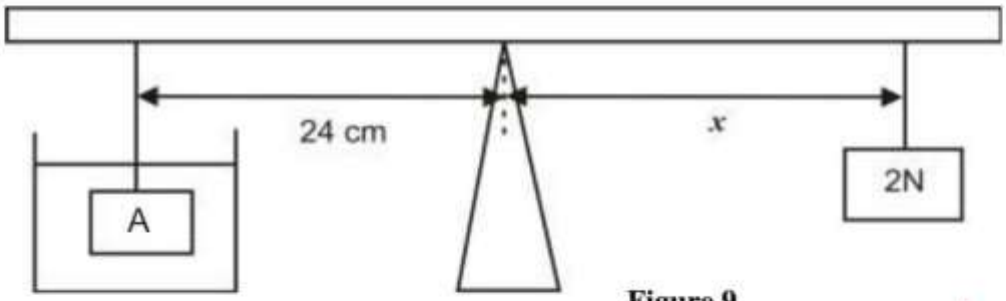


Figure 9

upthrust = 1N ✓1

vol block = $\frac{200g}{2g/cm^3}$

= 100g

water displaced = 100g = 100cm^3

$F_1d_1 = F_2d_2$

1 X 0.24 = x X 2 ✓1

x = 0.12m = 12cm ✓1

(b) **Figure 10** below shows a wooden log 10m long, density 800kg/m^3 and cross-sectional area 0.06m^2 floating in water of density 1g/cm^3 while partially submerged.

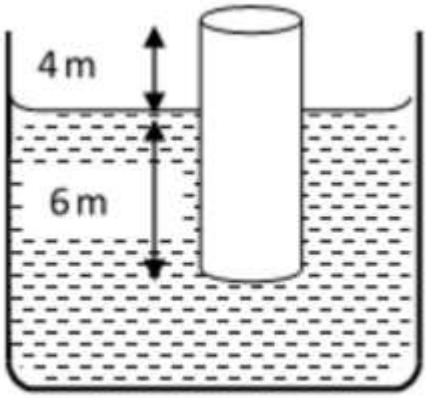


Figure 10

(i) Determine the weight of the block. (3 marks)

vol_{block} = 0.06 X 10 = 0.6m^3 ✓1

$mass_{block}$ = density X vol

= 800 X 0.6

= 480kg ✓1

w = mg

=480 X 10

= 4800N ✓1

Kennedy Otieno

(ii) The upthrust on the block (3 marks)

vol water displaced = 0.06 X 6

= 0.36m³ ✓1

mass of water displaced = 0.36 X 1000

= 360kg ✓1

upthrust = wt. water

= 360 X 10

= 3600N ✓1

(iii)The minimum weight that can be placed on the block to just make it fully submerged.

(3 marks)

vol water = 0.6m³

mass water = 0.6 X 1000

= 600kg

upthrust = wt = 600 X 10

= 6000N ✓1

min weight = 6000 - 4800 ✓

= 1200N ✓1

15.

(a) A man used a wooden plank to lift a wooden log from the ground to a stationary truck as shown in **Figure 11**. The wooden plank is inclined at an angle of 30^0 to the ground.

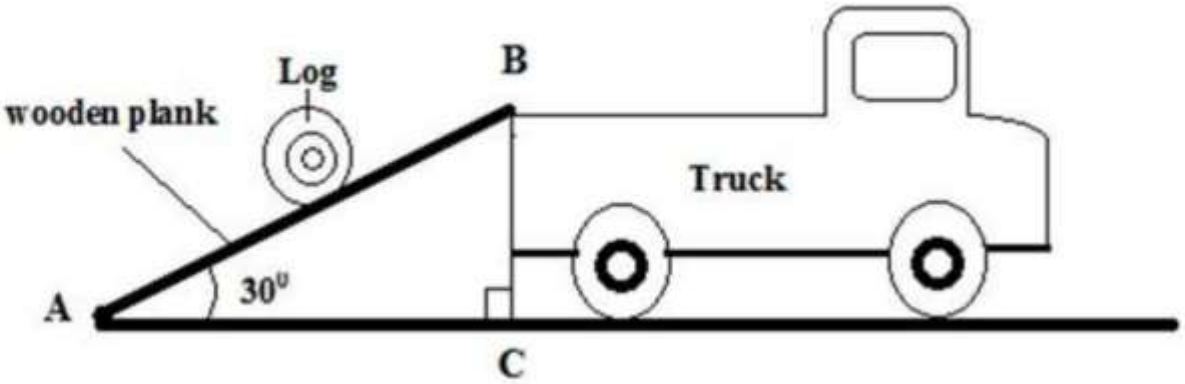


Figure 11

(i) Show that the velocity ratio of the system is Staten as V.R=$\frac{1}{Sin\ 30^0}$ (3 marks)

V.R. = Effort distance / Load distance ✓1

V.R. = AB (hyp) / BC (height)

sin 30 = BC / AB ✓1

V.R. = AB/BC = 1/sin 30 ✓1

Kennedy Otieno

(ii) Explain why the efficiency of this system cannot be 100%. (1 mark)

There is friction experienced on surface AB ✓1

(b) **Figure 12** shows a pulley system.

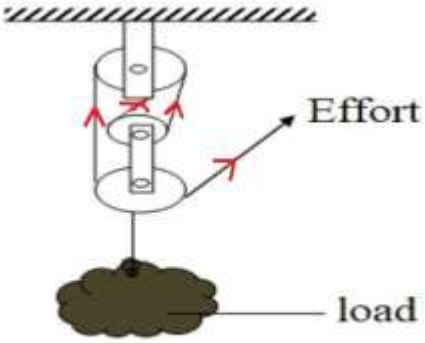


Figure 12

(i) State the velocity ratio of the machine. (1 mark)

4 ✓1 [four strings are under tension]

(ii) Explain what happens to the mechanical advantage of the machine as the load is increased gradually. (1 mark)

It increases ✓1

(c) Water falls from a water fall to the bottom. The temperature of the water is found to be higher at the bottom than at the top. State the energy transformation. (1 mark)

Potential energy → Kinetic energy → Heat energy ✓1

Peter Okoth

16. A boy stands at the top of a cliff of height, h, above the ground and throws a ball vertically upwards.The variation of time t and velocity v of the ball is shown in **Figure 13**

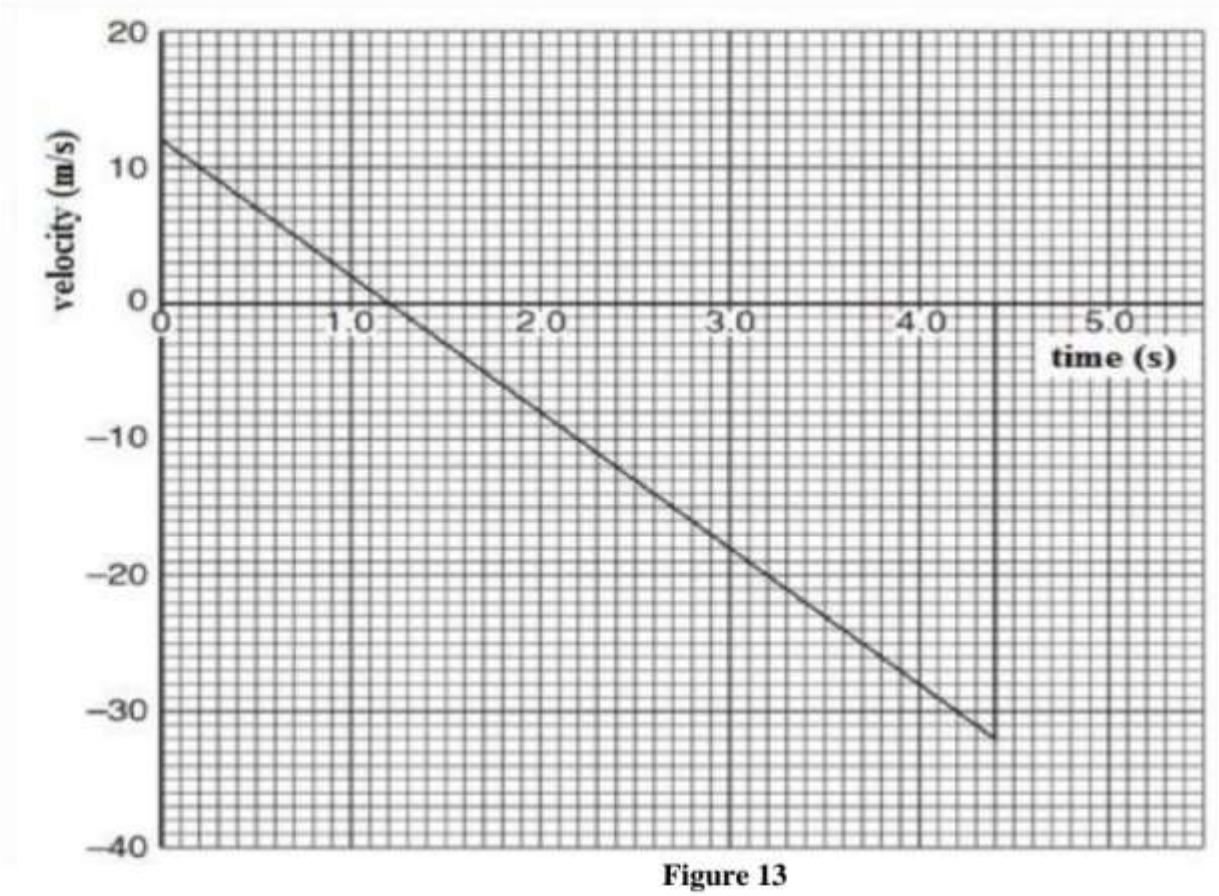


Figure 13

Use graph above to determine;

(a) Time taken to reach the maximum height (1 mark)

1.2 s ✓1

(b) Time taken from the maximum height to the ground below the cliff. (1 mark)

4.4s - 1.2s

= 3.2s ✓1

(c) Determine the maximum height above the base of the cliff to which the ball rises. (3 marks)

= Area under the graph ✓1

= $\frac{1}{2}$ X 3.2 X 32 ✓1

= 51.2m ✓1

H.O.S.

(d) the value of **h**, height of the ball before projection (2 marks)

= Area under graph

$= \frac{1}{2} \times 12 \times 12 = 72m$

51.2 - 7.2 = 44.0m

(e) The ball has mass 250 g. Calculate the magnitude of the change in momentum of the ball between the time that it leaves the girl's hand to time t = 4.0 s. (3 marks)

Δmomentum = Final momentum - Initial momentum

initial momentum = 0

final momentum = mv

= 0.25 X 32 ✓1

= 8kgm/s

Δmomentum = 8 - 0 ✓1

= 8kgm/s ✓1

17.

(a) The moon goes round the earth at a constant speed. Explain why it is true to say the moon is accelerating. (1 mark)

This is due to instantaneous change in direction of velocity at different points of the circle. ✓1

(b) **Figure 14** below shows a pail of water being swung in a vertical circle.

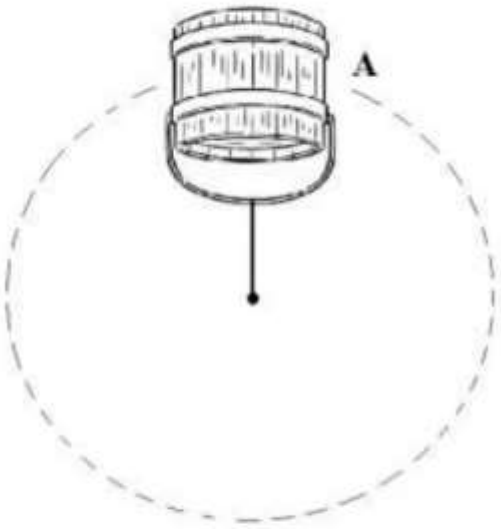


Figure 14

H.O.S.

Explain why the water does not pour out when the pail is at position **A**. (1 mark)

Centripetal force is greater than the weight of water ✓1

/Centripetal acceleration is greater than free fall.

(c) A string of negligible mass has a bucket tied at the end. The string is 60cm long and the bucket has a mass of 45g. The bucket is swung horizontally making 6 revolutions per second. Calculate:

(i) The angular velocity. (2 marks)

$\omega = 2\pi f$

$= 2 \times \frac{22}{7} \times 6$ ✓1 | $= 37.71 rad/s$ ✓1

Allow transfer of error

(ii) The angular acceleration. (3 marks)

$a = r\omega^2$ T.E.

$= 0.6 \times 37.71^2$ $= 0.6 \times$ ans (i)

$= 853.23 m/s^2$ = correct answer in m/s^2

(iii) The tension on the string. (3 marks)

$T = \frac{mV^2}{r} = ma$ ✓1 T.E.

$= 0.045 \times 853.23$ ✓1 $= 0.045 \times$ ans (ii)

$= 38.40N$ ✓1 = correct answer in newton (N)

(iv) The linear velocity. (2 marks)

$= 2\pi f r$

$= 2 \times \frac{22}{7} \times 0.6 \times 6$ ✓1

$= 22.63 m/s$ ✓1