

URANGA PHYSICS EXAMINATION

Kenya Certificate of Secondary Education



232/1

PHYSICS

Paper 1

(Theory)

4TH EDITION (AUG/SEP. 2021) – TIME 2 Hours

Name:..... School:

Class Adm No..... Index Number.....

Candidate's Signature..... Date:

Instructions to candidates

- Write your **name, index number, class** and **school** in the spaces provided above.
- Sign** and **Write** the date of Examination in the spaces provided above.
- This paper consists of **two** sections; **A** and **B**.
- Answer **all** the questions in section **A** and **B** in the spaces provided.
- All working **must** be clearly shown.
- Silent non-programmable** electronic calculators may be used.
- Candidates should answer the questions in **English**.

FOR EXAMINERS USE ONLY

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-13	25	
B	14	10	
	15	12	
	16	11	
	17	12	
	18	10	
TOTAL SCORE		80	

This paper consists of 14 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A (25 MARKS)

Answer all the questions in this section

1. **Figure 1** shows a girl viewing an overhead tank carrying a liquid of mass 8,400 kg. The tank is calibrated in m^3 .

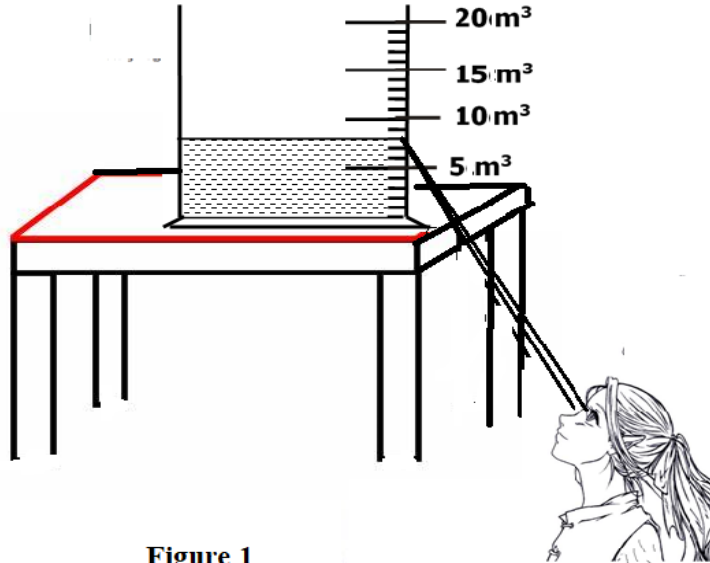


Figure 1

The girl read the volume from the tank and then used it for further calculation. Determine the density of the liquid as obtained by the girl. (3 marks)

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2. State two forces that can act on objects without physical contact. (2 marks)

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3. **Figure 2** shows circuit of a fire alarm. When fire breaks it rings the bell to alert in case of fire breakout.

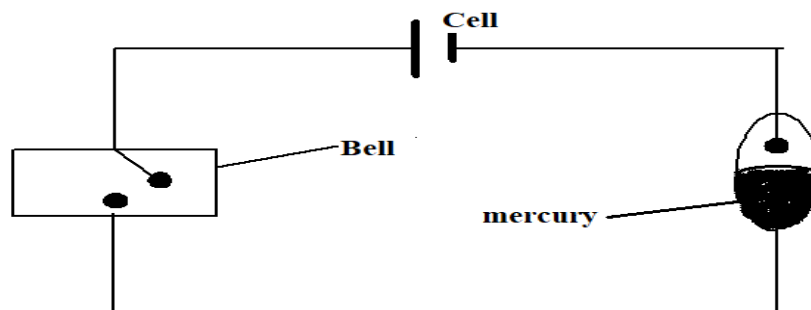


Figure 2

Give a reason why water is not suitable in the place of mercury at low temperatures below 5°C .

(1 mark)

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4. **Figure 3** represents the path taken in air by a smoke particle as observed by a student during a Physics lesson.

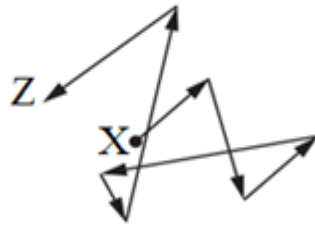


Figure 3

- (a) Explain how this movement can be observed.

(1 mark)

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- (b) State in full the law of motion that governs the movement from X to Z.

(1 mark)

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5. **Figure 4** shows a section of part of a scale of vernier calipers. The calipers was used to measure a pipe whose diameter is 3.47cm, the instrument had a zero error of -0.12 cm. Inset the vernier scale to show the reading displayed by the instrument in this measurement.

(2 marks)



Figure 4

6. A can containing only air is tightly screwed and left in strong sunlight. Using kinetic theory of gases, explain how the pressure inside the can will be affected.

(3 marks)

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7. **Figure 5** shows a man pushing down on a lever to lift one end of a heavy log. Assuming that the effective work done by the two arms the man is the same.

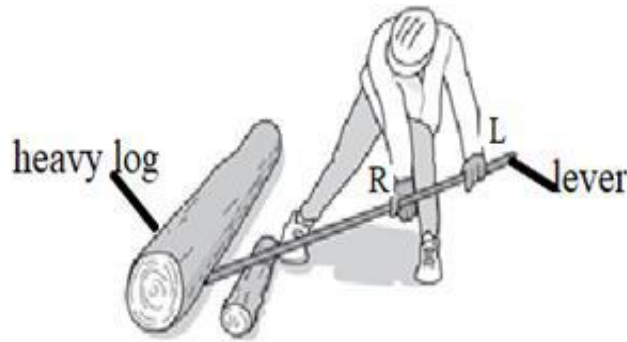


Figure 5

- (a) Which of the two arms of the man is applying more force? (1 mark)

- (b) **Figure 6** shows the forces acting as the man starts to lift the heavy log.

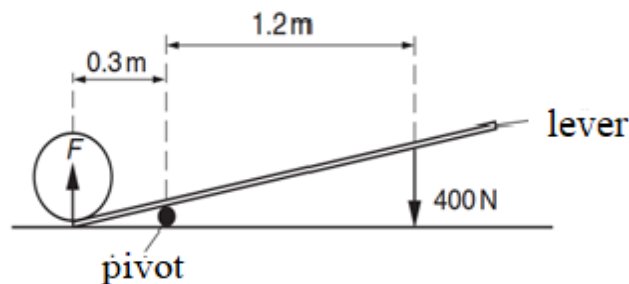


Figure 6

- Calculate the force F , exerted by the lever on the heavy log. (3 marks)

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8. In an experiment to determine the volume of one drop of oil, students released ten drops from a burette then they determine the volume change. The result was used to determine the volume of one drop. State the assumption made during their calculations. (1 mark)

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9. A student performed an experiment to find out how the length L of a spiral spring varies with the compression force, F . **Figure 7** shows the results obtained.

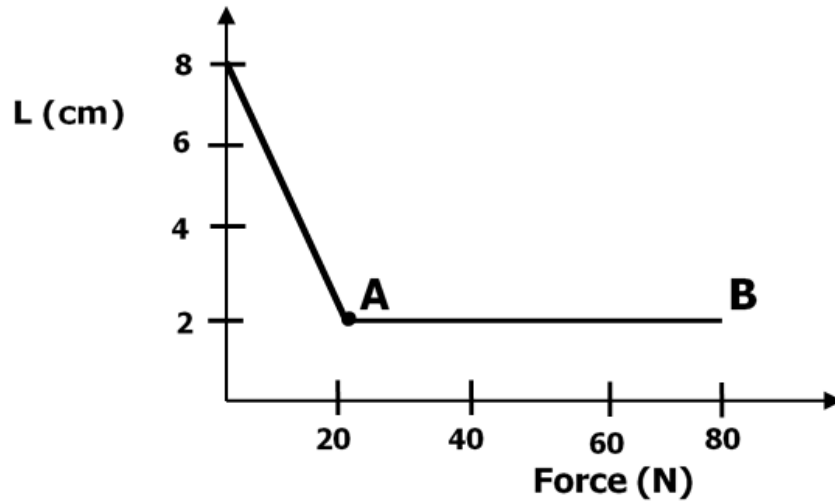


Figure 7

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

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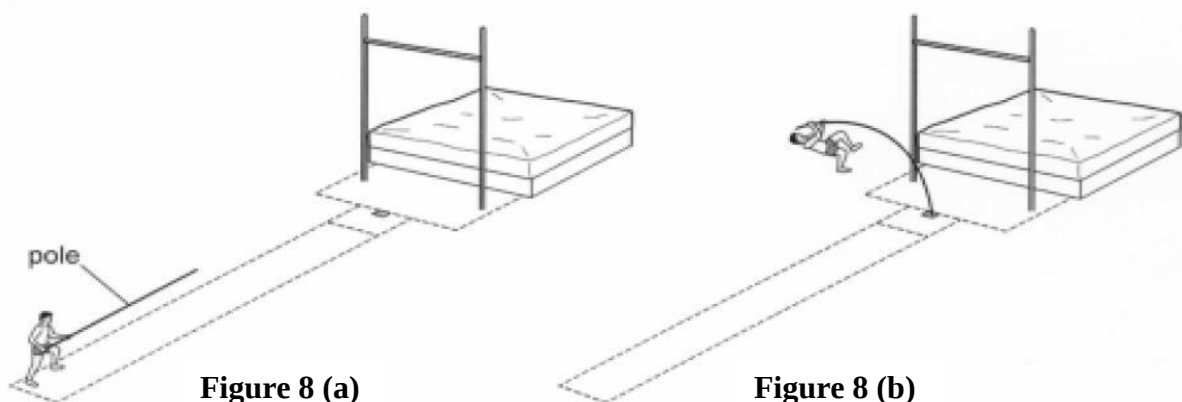
10. Water flows steadily in a tube of varying cross-sectional area of 120cm^2 and 40cm^2 . If the velocity of the water in the wider section is 0.4m/s , calculate the velocity in the narrower section. (2 marks)

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11. **Figure 8 (a)** shows a stationary pole vaulter holding a straight pole. **Figure 8 (b)** shows him during the vault with the pole bent.



State two energy changes that takes place to enable the pole vaulter jump over successfully.

(2 marks)

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Figure 9 shows a painter climbing up a ladder resting on a sandy ground. Use it to answer question 12 and 13.



Figure 9

12. The painter observed that when he climbs up, the ladder sinks down into the sand but when he is stationary at any height, the ladder does not sink yet his weight and that of the paint remains the same. Give a reason for this observation. (1 mark)

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13. Without making any changes on the way the ladder is placed, explain how the painter can prevent the ladder from sinking when he climbs up. (1 mark)

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SECTION B (55 MARKS)**Answer all questions in this section**

14.

- (a) Other than being not visible give another reason why water is not a good barometric liquid.

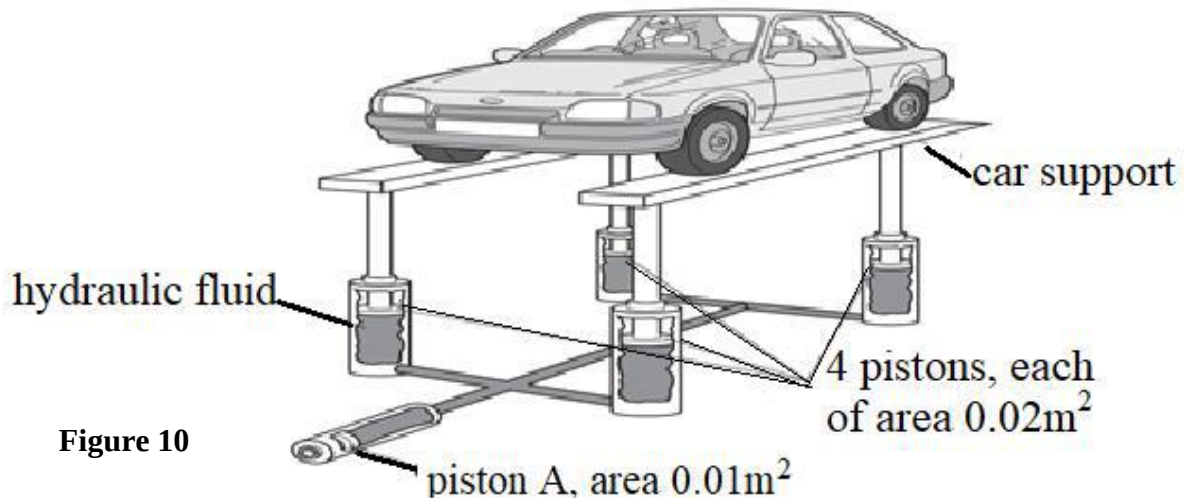
(1 mark)

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- (b) **Figure 10** shows a hydraulic lift in a car repair workshop. The hydraulic fluid transmits the pressure caused by piston **A**, equally to each of the four pistons holding up the car supports. The pressure throughout the fluid is the same.

**Figure 10**

A force of 1000 N on piston **A** is just enough to raise the car.

Determine;

- i. The pressure caused by piston **A** on the hydraulic fluid. (2 marks)

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- ii. The total upward force caused by the fluid. (3 marks)

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- (c) The weight of each of the two car supports is 1000 N. Calculate the mass of the car. (2 marks)

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- (d) State two properties to be considered when choosing the hydraulic fluid used in this system. (2 marks)

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15.

- a) State Newton's second law of motion. (1 mark)

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- b) **Figure 12** shows a man trying to jump from a boat in water to the bridge at the shore.

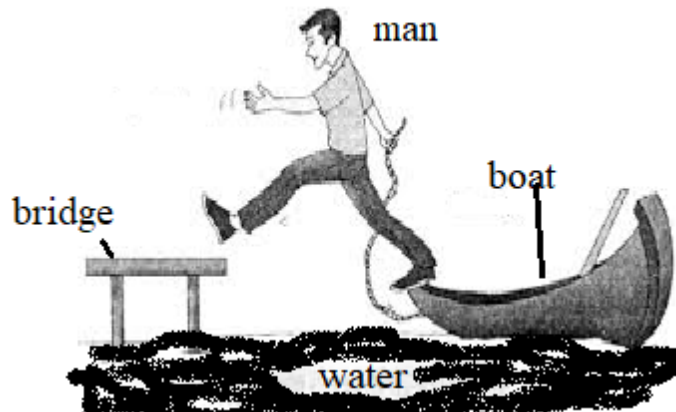


Figure 12

- It is observed that the man landed in water. Explain why man landed in water. (2 marks)

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c)

- i. A careless motorcyclist of mass m_1 moving with a velocity v_1 hits a lorry of mass m_2 moving with a velocity v_2 from behind and gets stuck on the lorry as the lorry moves on for some time. Show that their common velocity v after the impact is given by: (2 marks)

$$v = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$$

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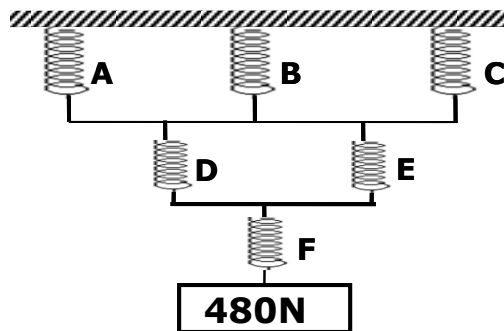
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- ii. If the mass of the motorcyclist initially moving with velocity of 20m/s is 450kg and that of the lorry whose initial velocity is 15m/s is 6000kg, calculate the common velocity, v . (2 marks)
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- d) The diagram below shows a force of **480N** hanged on a set of 6 identical springs. Each of the spring has elastic constant **100N/m**.



- (i) Determine the total extension of the system. (4 marks)
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- (ii) State the assumption you made in the calculation in **(i)** above. (1 mark)

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16.

- a) You are provided with an irregular lamina made from a manila paper, a complete stand retort and boss, a plumb line and pencil. Outline four steps to be followed in order to determine the centre of gravity of the lamina. (4 marks)

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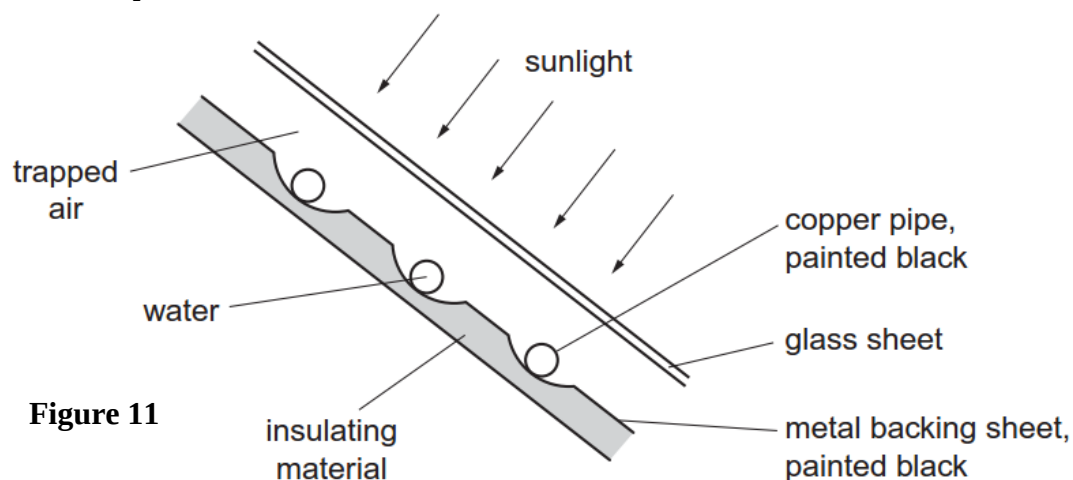
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- b) A solar panel is mounted on the roof of a house. **Figure 11** shows a section through part of the solar panel.



A pump makes water circulate through the copper pipes. The water is heated by passing through the solar panel. Give a reason for the following;

- (i) the pipes are made of copper. (1 mark)

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- (ii) the pipes and the metal backing sheet are painted black. (1 mark)

- (iii) an insulating material is attached to the metal backing sheet. (1 mark)

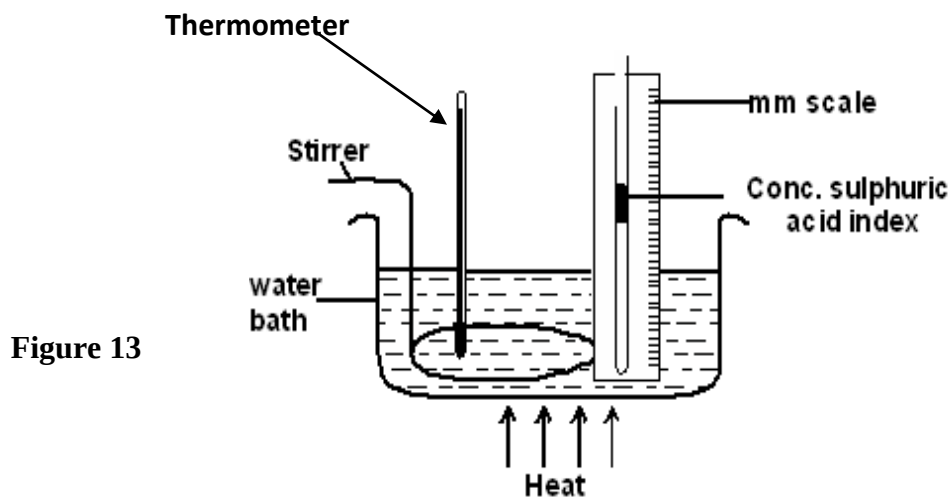
- c) During one day, 250 kg of water is pumped through the solar panel. The temperature of this water rises from 16 °C to 38 °C. The water absorbs 25% of the energy falling on the solar panel, and the specific heat capacity of water is 4200 J/kg.K. Calculate:

- i. the heat energy absorbed by water. (2 marks)

- ii. the energy falling on the solar panel during that day. (2 marks)

17.

- (a) **Figure 13** shows a set up to investigate one of the gas laws. All equipment are standardized.



i.Name the gas law being investigated. (1 mark)

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ii.Give two reasons for using the concentrated sulphuric acid index. (2 marks)

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iii.What is the purpose of the water bath? (1 mark)

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iv.State two measurements that should be taken in this experiment. (2 marks)

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v.Explain how the measurements taken in (iv) above may be used to verify the law. (3 marks)

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(b) A gas has a volume of 30cm^3 at 18°C and normal atmospheric pressure. Calculate the new volume of the gas if it is heated to 54°C at the same pressure. (3 marks)

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18. 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 14**.

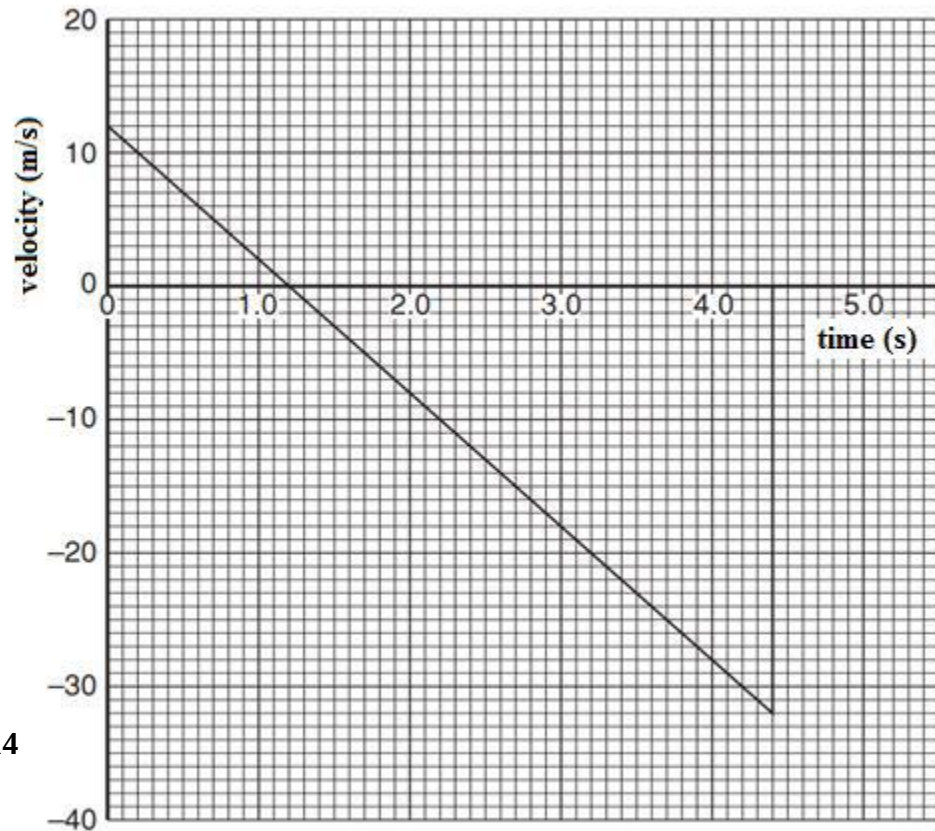


Figure 14

Use graph in **Figure 14** to determine;

- i. the time taken to reach the maximum height. (1 mark)

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- ii. the time taken from the maximum height to the ground below the cliff. (1 mark)

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

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- iv. the value of h , height of the ball before projection. (2 marks)

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- v. 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)

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