URANGA PHYSICS EXAMINATION

Kenya Certificate of Secondary Education

232/1 PHYSICS Paper 1

(Theory)

FORM 3

4TH EDITION (FEBRUARY 2022) – TIME: 2 Hours

Name: ……..…….. **Adm. No:** …… **Class:** ……

School: ……..…….. **Candidate's Sign:** …..…… **Date:** ……../02/2022

INSTRUCTIONS TO CANDIDATES

a) Write your name, school and admission number in the spaces provided above.
b) Sign and write the date of examination in the spaces provided.
c) This paper consists of two sections: **A** and **B**.
d) Answer ALL questions in section A and B in the spaces provided below each question.
e) ALL working **must** be clearly shown.
f) Silent non – programmable electronic calculators may be used.
g) This paper consists of **14 printed pages**. Candidates should check the question paper to ensure that all pages are printed as indicated and that no questions are missing.
h) All questions must be answered in ENGLISH.

FOR EXAMINER'S USE ONLY.

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 13	25	
B	14	07	
	15	10	
	16	12	
	17	07	
	18	08	
	19	11	
TOTAL SCORE		**80**	

SECTION A [25 MARKS]

1. **Figure 1** shows a section of a micrometer screw gauge.

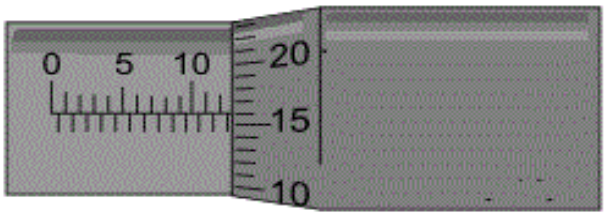

Fig. 1

The micrometer screw gauge is used to measure the diameter of a marble. What is the diameter of the marble if micrometer screw gauge has an error of -0.02mm? (1 mark)

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2. State the reason why bodies have more weight on earth than on the moon. (1 mark)

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3. **Figure 2** shows a measuring cylinder which contains water initially at a level A. When a spherical solid of mass 11g is immersed in the water, the level rises to B.

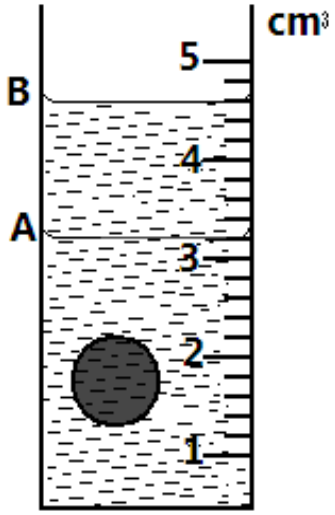

Fig. 2

Determine the diameter of the spherical ball. (2 marks)

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4. **Figure 3** shows a clinical thermometer which is not graduated.

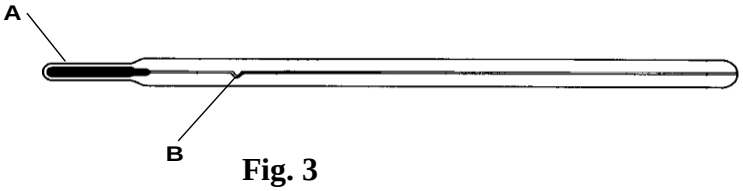

Fig. 3

State the function of the part labeled B. (1 mark)

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5. A pipe of radius 0.4cm is connected to another pipe of radius 0.6cm. If water flows in the wider pipe at a speed of 5m/s, determine the speed of the water in the narrower section. (2 marks)

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6. **Figure 4** shows a uniform bar of length 1.0 m pivoted near one end. The bar is kept in equilibrium by a spring balance as shown.

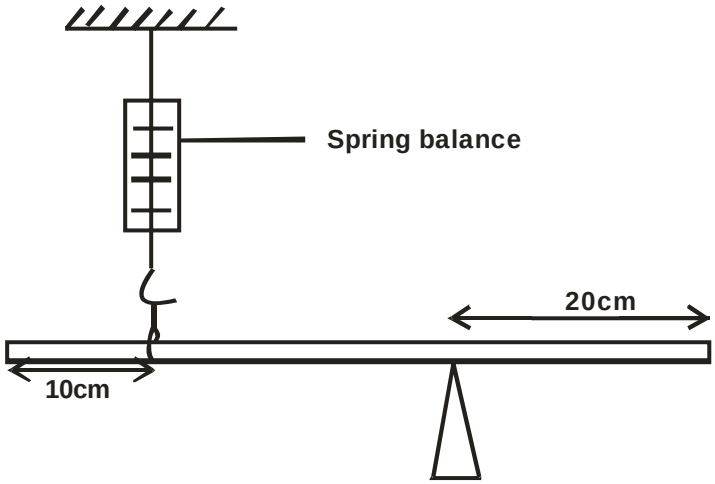

Fig. 4

Given that the reading of the spring balance is 0.6 N, determine the weight of the metre rule.

(3 marks)

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7. **Figure 5** shows a tape obtained from an experiment using a ticker – timer of frequency 50Hz.

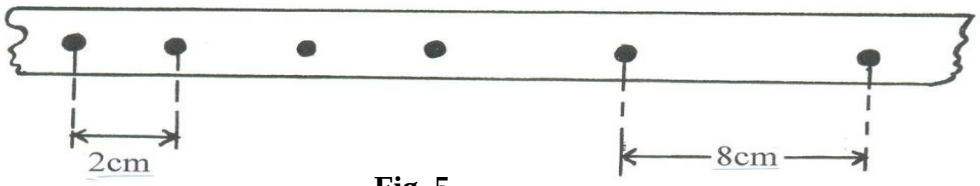

Fig. 5

Calculate the acceleration of the body whose motion is represented by the tape. (3 marks)

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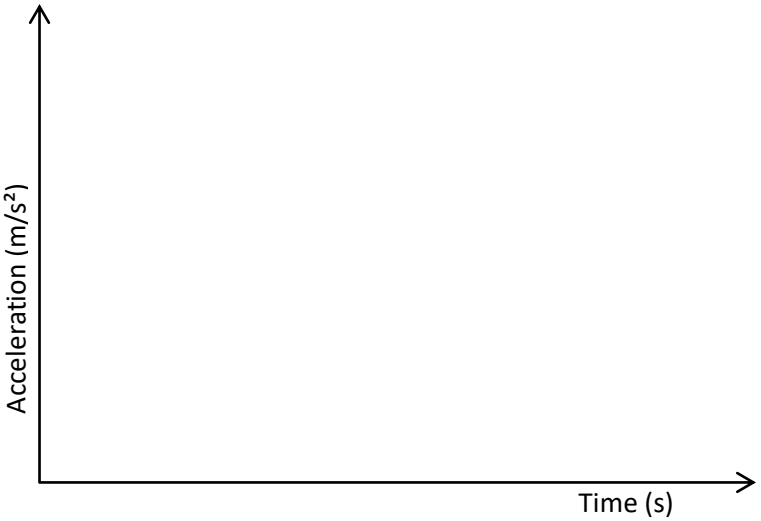
8. A steel ball is dropped into a cylinder containing oil. Sketch on the axes given **below** a graph showing the variation of acceleration with time. (1 mark)



9. State how heat losses by convection and radiation are minimized in a thermos flask. (2 marks)

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10. Give the reasons why a safety seat belt used in a vehicle;

(i) Should have a wide surface area. (1 mark)

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(ii) Should be slightly extensible. (1 mark)

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11. **Figure 6** shows a mass of 6kg hanged on a set of 3 identical springs.

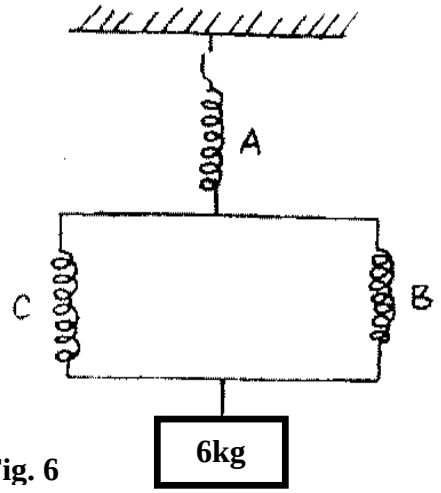

Fig. 6

When a mass of 750g was hanged on spring A, its extension was 5cm. Find the extension of the combination shown if each spring has mass of 50g. (3 marks)

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12. A steel needle when placed carefully on water can be made to float. When a detergent is added to the water it sinks. Explain this observation. (2 marks)

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13. **Figure 7** shows the behavior of mercury in a capillary tube.

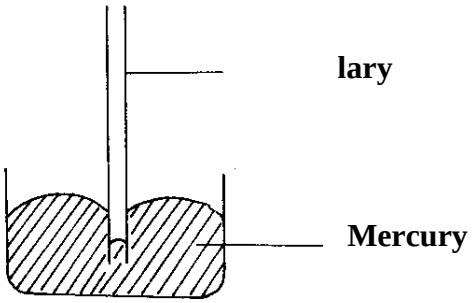

Fig. 7

Explain the behavior. (2 marks)

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SECTION B [55 MARKS]

14.

(a) Define the term velocity. (1 mark)

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(b) **Figure 8** below shows the velocity-time graph for the journey of a car in 100 minutes.

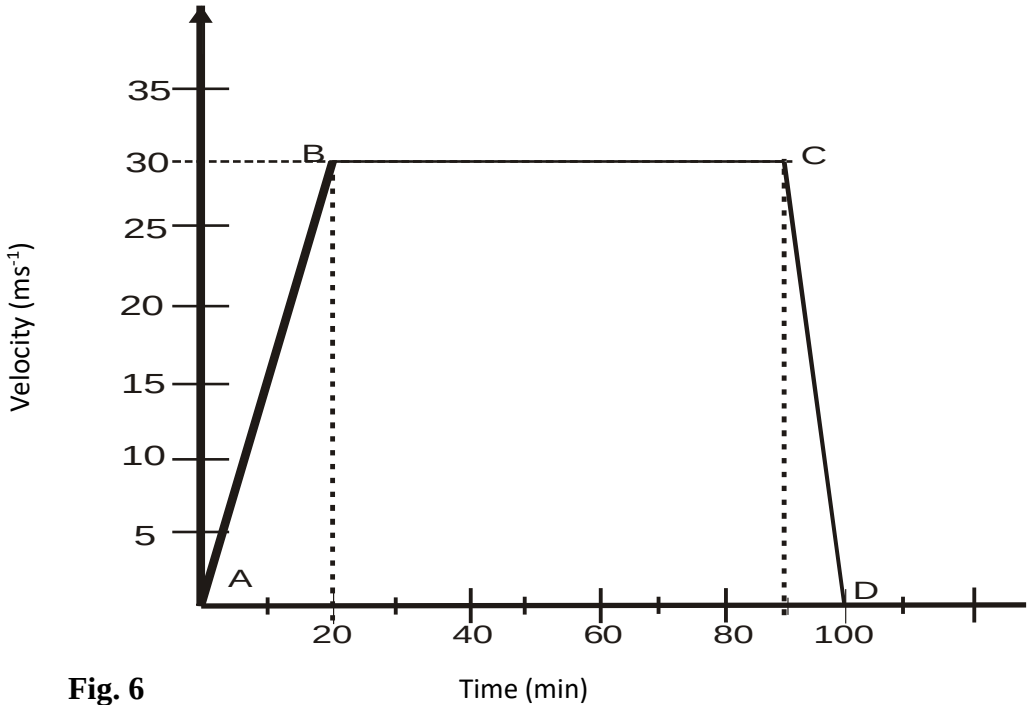

Fig. 6

(i) Determine the acceleration of the car between A and B and between C and D. (2 marks)

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(ii) Determine the displacement by the car during the journey. (2 marks)

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(iii)Determine the average velocity of the car. (2 marks)

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15.

(a) State Hooke's law. (1 mark)

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(b)

(i) A vertical spring of outstretched length 30cm is clamped at its upper end. When sand is placed on a pan attached to the lower end of the spring its length becomes 45cm. When a 20g mass is placed on top of the sand, the length increases to 55cm. determine the mass of the sand. (4 marks)

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(ii) If the spring in (i) above is compressed from its original length to 24 cm, calculate the work done in compressing the spring. (2 marks)

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(c) **Figure 9** shows the variation of force (N) with extension (mm) for a certain spring.

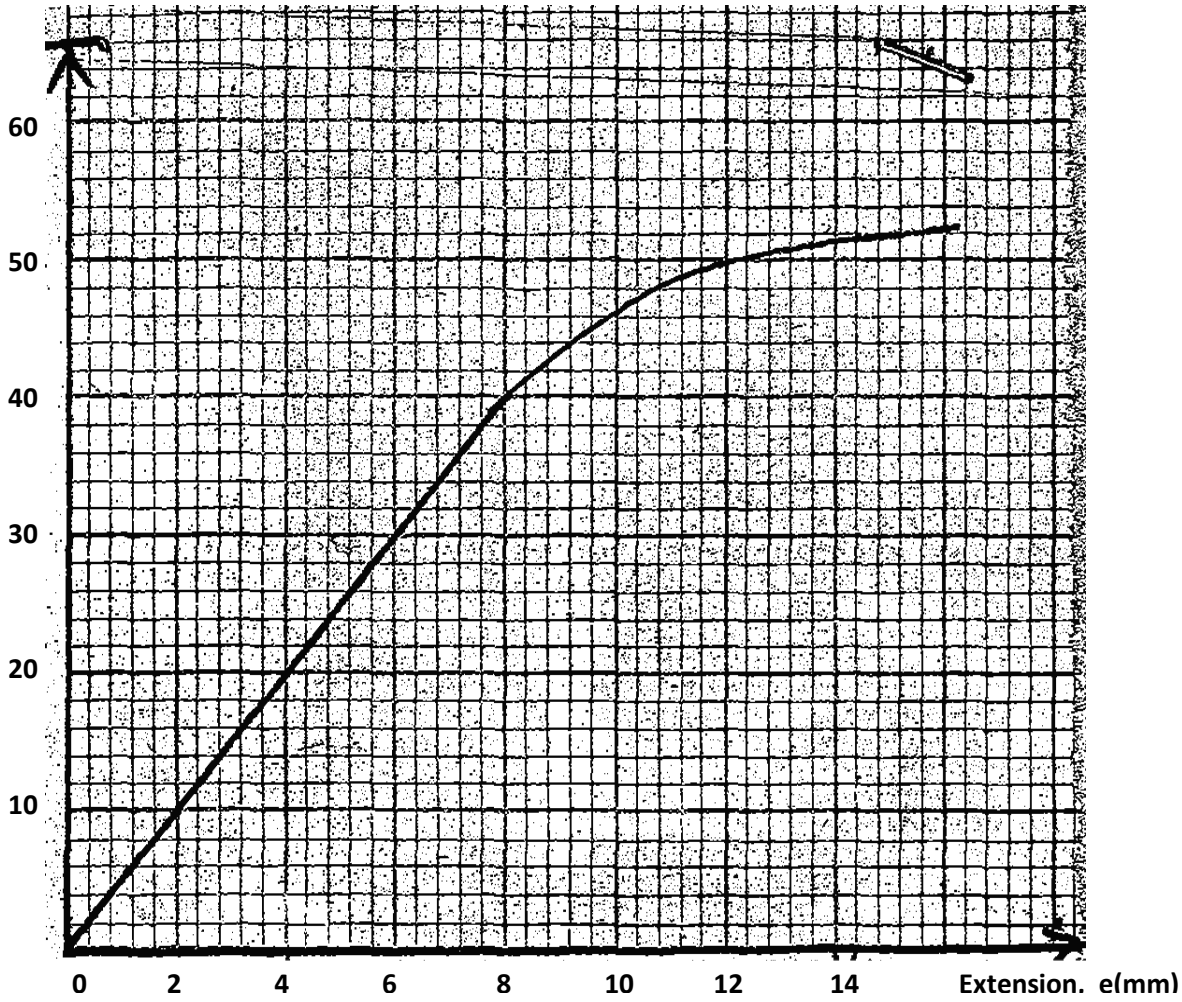

Fig. 9

(i) Determine the spring constant of the spring used. (2 marks)

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(ii) On the same axes, sketch the variation of force with extension for another similar spring whose diameter is double the first spring. (1 mark)

16.

(a) Define the term inertia . (1 mark)

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(b) A body **P** of mass 4 kg supported by alight inextensible string 4m long held at an angle of 60^o from the vertical position as shown in **Figure 10** below. A second body **R** of mass 4kg rests at the edge of a platform 2 m high, the body is released and strikes body **R** head-on in a perfectly elastic collision.

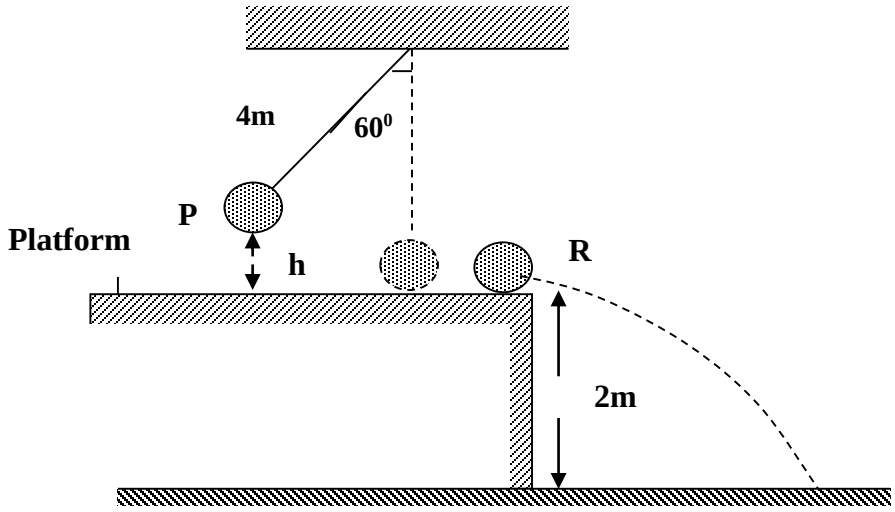

Fig. 10

(i) Explain the term elastic collision. (1 mark)

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(ii) Determine the maximum height, **h** attained by body **P** above the platform. (2 marks)

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(iii)Determine how long it takes for body **R** to strike the ground after being hit by **P**.

(3 marks)

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(iv) Determine the horizontal velocity of body **R**. (2 marks)

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(v) How far from the base of the platform will body **R** strike the ground if **P** stops after the collision? (2 marks)

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(c) A parachutist allows his leg to bend and roll over on the ground when he lands. Explain. (1 mark)

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17.

(a) What is diffusion? (1 mark)

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(b) A smoke cell contains a mixture of trapped air and smoke. The cell is brightly lit and viewed through a microscope. State and explain what is observed. (2 marks)

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(c) A beaker is filled completely with water. A spoon full of common salt is added slowly. The salt dissolves and the water does not overflow. State the reason why water does not overflow. (1 mark)

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(d) In **figure 11** below, ammonia gas and an acid gas diffuse and react to form a white deposit on the walls of a long glass tube as shown.

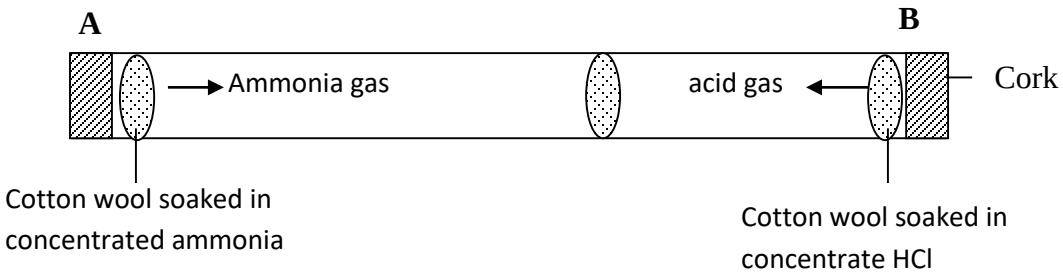

Fig. 11

(i) What conclusion can be made from the result of this experiment? (1 mark)

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(ii) How does the size and mass of a gas affect its rate of diffusion? (1 mark)

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(iii)The experiment is performed at a lower temperature. Explain how the time taken to form the white deposit would be affected. (1 mark)

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18.

(a) A pulley system having a velocity ratio of 5 is used to raise a load of 800 N through a height of 0.6 m at a constant speed using an effort of 200 N in a time of 15 seconds.

(i) Calculate the mechanical advantage of the pulley system; (2 marks)

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(ii) Find the efficiency of the pulley system; (2 marks)

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(iii)Calculate the power developed by the effort. (2 marks)

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(iv) Give **two** reasons why the efficiency of the pulley system is less than 100 %. (2 marks)

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19.

(a) State the Pascal's principle of fluid pressure transmission. (1 mark)

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(b) The atmospheric pressure at the foot of Mt. Longonot is 760mmHg while at the top of the mountain, the pressure is 580mmHg. Given that the density of mercury is $13{,}600\text{Kgm}^{-3}$ and for air is 1.3Kgm^{-3}, find the height of the mountain. (2 marks)

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(c) State one limitation of a lift pump. (1 mark)

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(d) In an experiment to determine the size of a molecule of oil, a single drop of oil was released from a burette onto a tray and it spread to form a circular patch of diameter 20cm. If one molecule of oil is estimated to have a diameter of 1.67×10^{-8}m and taking π =3.142, determine:

(i) The area of the patch. (1 mark)

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(ii) The volume of the drop from the burette. (2 marks)

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(iii) The size of the oil molecule. (2 marks)

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(iv) If 10 similar drops from the burette have a weight of 4.984×10^{-5}N, calculate the density of the oil. (2 marks)

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