NAME……………………………………………INDEX NO………..CLASS……

CANDIDATES SIGNATURE………………………………DATE……………

232/1
PHYSICS
PAPER 1
SEPTEMBER, 2021
TIME: 2HOURS

MOMALICHE 2 CYCLE 8

INSTRUCTION TO CANDIDATES

- Write your name and index number in the spaces provided above.
- Answer all the questions both in Section **A** and **B** in the spaces provided below each question.
- All working **must be clearly shown**; marks may be awarded for correct steps even the answers are wrong.
- Mathematical tables and non programmable silent electronic calculators may be used. (Take acceleration due to gravity - 10m/s. Density of water -1g/cm)

For examiners use only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
A	1-12	25	
B	13	8	
	14	9	
	15	9	
	16	9	
	17	10	
	18	10	

SECTION A (25 marks)

Answer ALL the questions in the spaces provided.

1. The water level in a burette is 30.6cm³, 50 drops of water each of volume 0.2cm³ are added to the water in the burette. What is the final reading of the burette.

(2 marks)

2. Figure 1 shows a graph showing the behaviour of a helical spring.

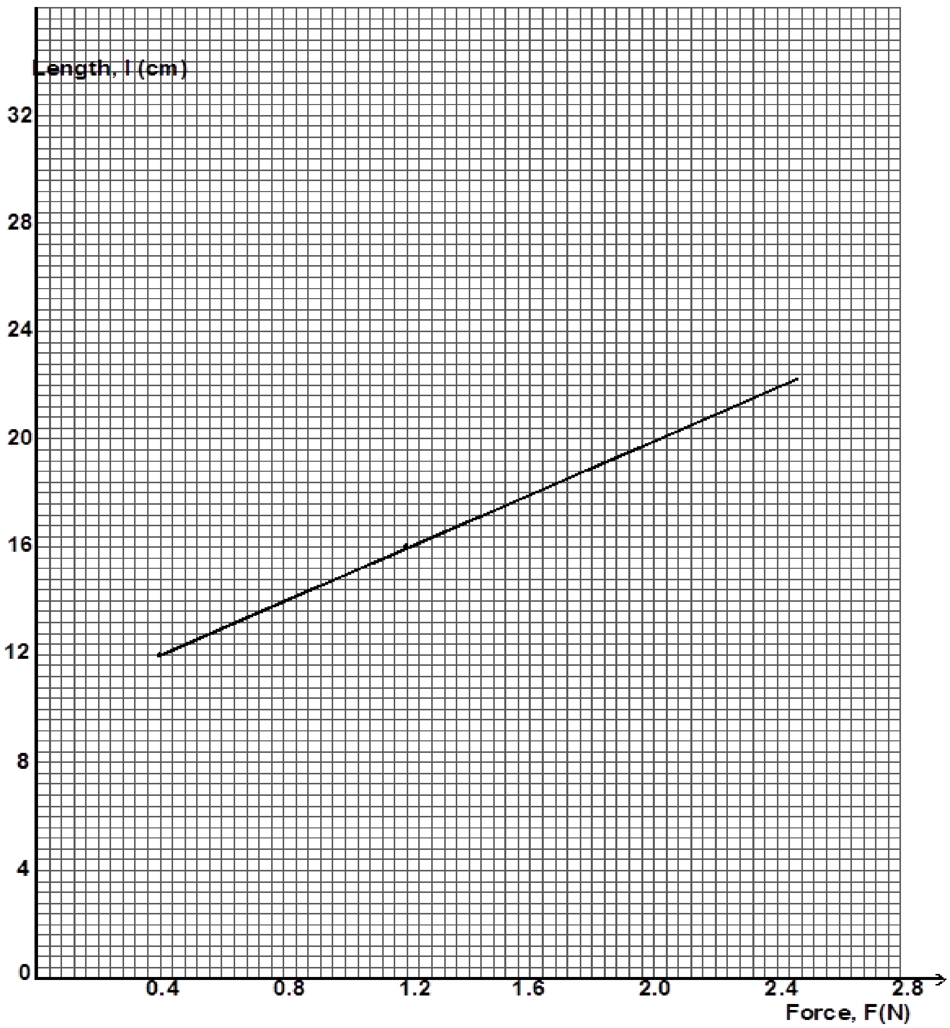


Fig 1

Determine the spring constant in SI units. (3 marks)

3. Two forces are acting on a body as shown in figure 2.

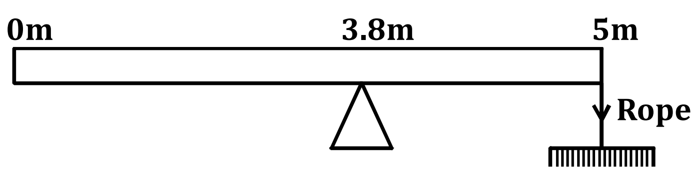
Fig 2

By use of a vector, draw the body and show the resultant force. (1 mark)

4. Two identical beakers A and B containing equal volumes of water are placed on a bench. The water in A is cold while in B is warm. Identical pieces of potassium permanganate are placed gently at the bottom of each beaker inside the water. It is observed that the spread of colour in B is faster than in A. Explain this observation. (2 marks)

5. A dropping dust particle in a still room does not trace a straight vertical path. Explain. (1 mark)

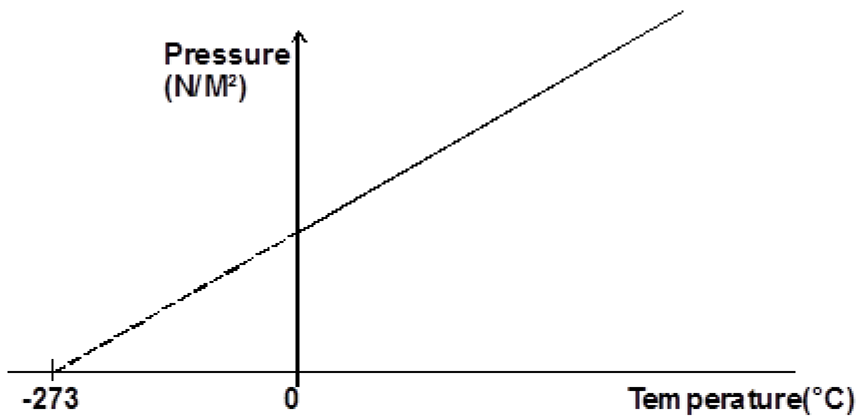
6. A uniform rod of length of 5m and a mass of 6kg is pivoted at 3.8m mark. The rod is held horizontally by a vertical rope at 5m mark as shown in figure 3 below.



Calculate tension on the rope. (3 marks)

7. When floating in a liquid of relative density 0.8 a rod displaces $90cm^3$; what volume will it displace when it floats in a liquid of relative density 1.2? (3marks)

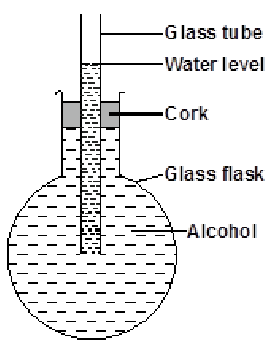
8.



State the law represented in figure above. (1 mark)

9. Alcohol was placed in a flask fitted with an air tight cork as shown in figure 5.

Fig 5



State and explain what would be observed if the flask was cooled. (3 marks)

10. A boy poured some boiling water into a plastic can and placed an air-tight cork on its open end. He then ran some cold water on it for about 20 seconds after which he shook the can vigorously. State and explain what he observed. (2 marks)

11. Water flows along a horizontal pipe of cross-sectional area $30cm^2$. The speed of the water is 4m/s but it reaches 7.5m/s in a constriction in the pipe. Calculate the area of the constriction in m^2 (2 marks)

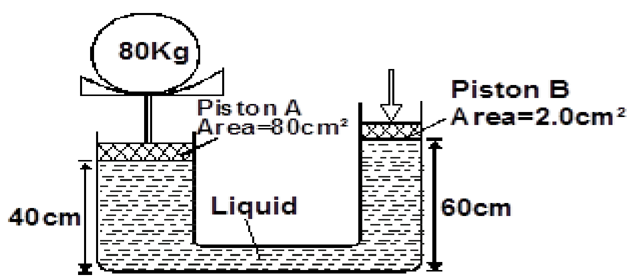
12. A 240V television set is switched on for five minutes. If a current of 0.25A flows in it, determine the amount of energy supplied to it. (2 marks)

SECTION B (55 MARKS)

Answer ALL questions in this section.

13. a) State the principle of transmission of pressure in liquids. (1 mark)

b) A mass of 80kg is being lifted by a force F applied on the other piston of the machine as shown in figure below



Determine the value of F needed to just lift the 80kg mass given the density of the liquid is $1.2g/cm^3$. (4 marks)

c) Give one reason why a lift pump raises water to heights less than 10m. (1 mark)

d) In an experiment, it was observed that soapy water placed on a wet smooth surface displaced the particles of non-soapy water. State and explain this observation. (2 marks)

14. a)A block of metal of mass 250g at 100°C is dropped into a lagged calorimeter of heat capacity $40JK^{-1}$ containing 100g of water at 25°C. The temperature of the resulting mixture was found to be 40°C. Determine; (C_w = 4200J/kgk)

i) Heat gained by calorimeter. (2 marks)

ii) Heat gained by water. (2 marks)

iii) Heat lost by the block. (2 marks)

iv) Specific heat capacity of the metal block. (3 marks)

15. a) State Newton's third law of motion. (1mk)

b) Distinguish between elastic and inelastic collision. (2mks)

c) A mini bus of mass 2000kg travelling at a constant velocity of 36km/hr collides with a stationary car of mass 1000kg. The impact takes 2 seconds before the two move together at a constant velocity for 20 seconds. Calculate.

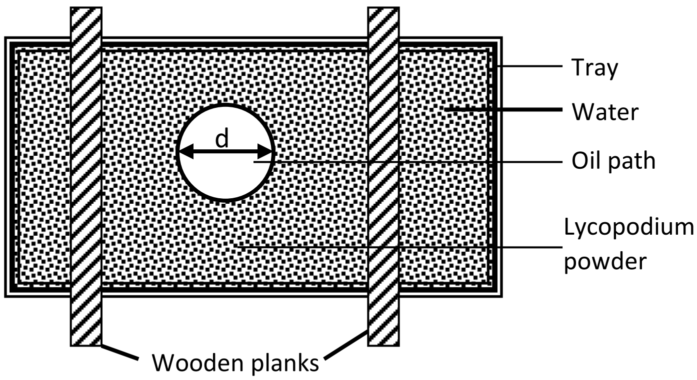
i) The common velocity (2mks)

ii) The distance moved after impact. (2mks)

iii) The change in Kinetic energy. (2mks)

16. The figure 8 below shows an experimental set up for estimating the diameter of an oil molecule.

Figure 8



a) Describe how the oil patch is formed (3 Marks)

b) i) In this experiment the diameter 'd' of the oil patch was measured to be 21cm for an oil drop of radius 0.28mm. Determine the diameter of the oil molecule. (3Marks)

ii) State any two assumptions made in calculating the diameter of the oil molecule (2Marks)

c) What is the role of the lycopodium powder in this experiment? (1Mark)

17.a)State two ways in which the centripetal force on a body of mass M can be increased. (2 marks)

b)Figure 9 shows an object of mass 200g at the end of a string 120cm long being whirled round a vertical circle in the direction shown.

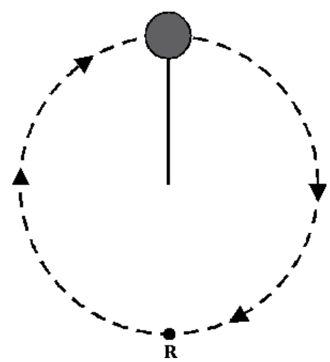


Fig 9

i) State two forces acting on the object at any instant as it continues to move in the vertical circle. (2 marks)

ii)Indicate with an arrow on the figure the direction of ;

I) Centripetal force.

(1 mark)

II) Velocity at the position shown

(1 mark)

iii) State the reason why the object is accelerating while its speed remains constant. (1 mark)

iv) Given that the angular velocity of the body is 5 rad s^{-1}, find the tension of the string at point R, the lowest point. (3 marks)

18. a) i) State the pressure law of gases. (1 mark)

ii)Using the kinetic theory of gases, explain how rise in temperature of a gas causes a rise in pressure of the gas if volume is kept constant. (2 marks)

b) A certain mass of hydrogen gas occupies a volume of $1.6m^3$ at a pressure of 160Kpa and the temperature of 16ºC. Determine its volume when the temperature is 0ºC at a pressure of 160KPa. (3 marks)

c) A column of air 26cm is trapped by mercury thread 5cm long as shown in diagram (a) below. When the tube is layed horizontally as in (b) the air column is now x cm long. When inverted as shown in (c) the length of the column is ycm. Find the values of x and y. (Take atmospheric pressure to be 70cmHg) (4 marks)