Name: .... **Index No.** ....

Candidate's Sign. ....

Date: ....

232/1
PHYSICS
PAPER 1
TIME: 2 HOURS
MARCH 2013

Kenya Certificate of Secondary Education (K.C.S.E.)

Physics
Paper 1

INSTRUCTIONS TO THE CANDIDATES:

- Write your **nameand 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 workings ***must*** be clearly shown.
- Mathematical tables and silent electronic calculators may be used.
- Take : Acceleration due to gravity, $g = 10m/s^2$

  Density of water = $1g/cm^3$

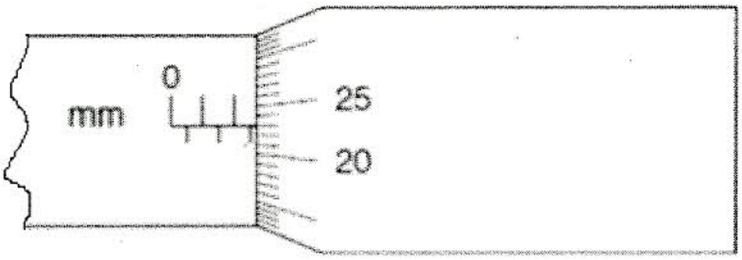
For Examiners' Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
Section A	1-14	25	
Section B	15	10	
	16	13	
	17	12	
	18	12	
	19	**08**	
	TOTAL	**80**	

This paper consists of 12printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A: 25marks

1.The figure below shows part of a measuring instrument for length



What is the reading shown on the instrument (1mk)

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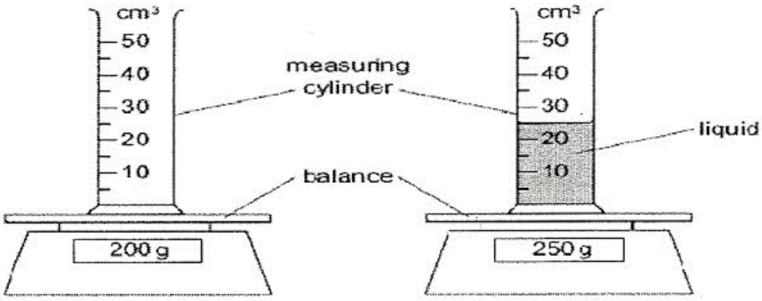
2.The diagram shows an experiment to find the density of a liquid.



Determine the density of the liquid (3mks)

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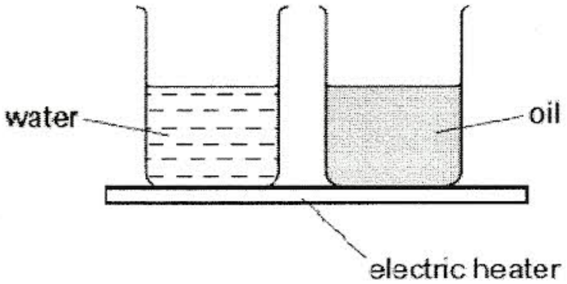
3.The diagram shows an electric heater being used to heat a beaker of water and an identical beaker of oil for several minutes



The temperature of the water and the temperature of the oil increase constantly. The rise in temperature of the oil is much greater than that of the water. (1mk)

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4.Give two reasons why weight of a body varies from one place to another (2mks)

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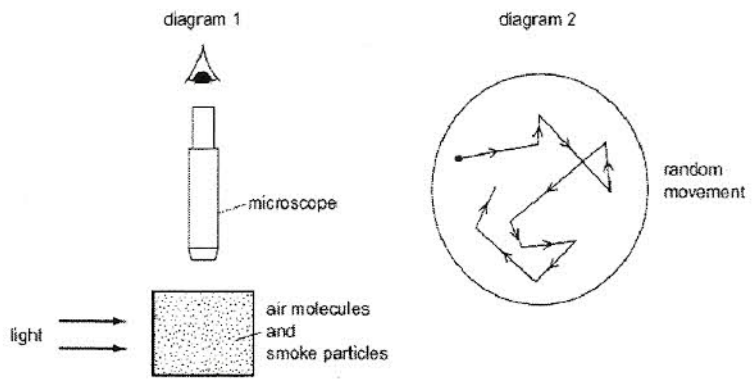
5.The diagram 1 shows apparatus being used to observe smoke particles.Diagram 2 shows how a smoke particle moves randomly



Account for the observation made (1mk)

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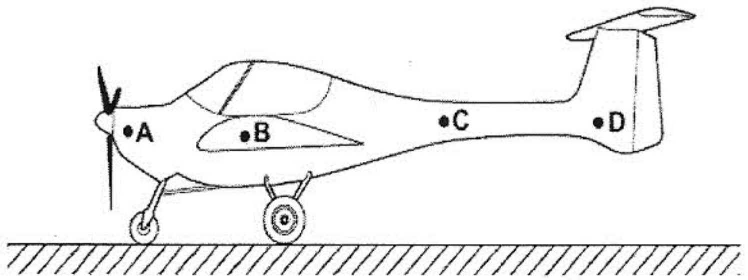
6.A light aircraft stands at rest on the ground. It stands on three wheels, one at the front and two further back.



Show on the diagram the likely position for the centre of gravity of the aircraft (1mk)

7. State one reason why alcohol is preffered over mercury for use in thermometers in arctic regions. (1mk)

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8. Give a reason why a ship rises out slightly when it moves from a region of fresh water to sea water (1mk)

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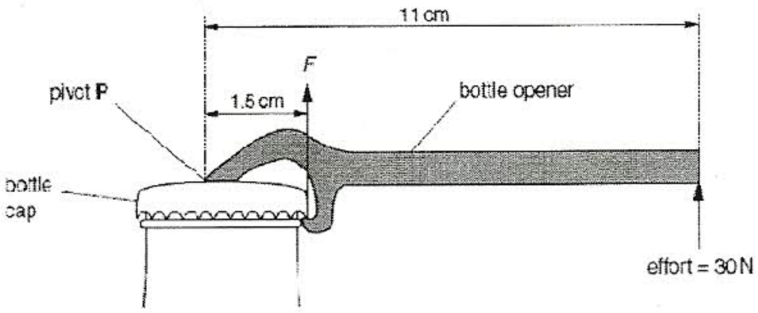
9.The figure below shows a bottle opener



A force of 30 N is applied at a distance of 11 cm from the pivot **P**. The force *F* on the bottle cap is 1.5 cm from the pivot **P**.Calculate the force *F* on the edge of the cap. (2mks)

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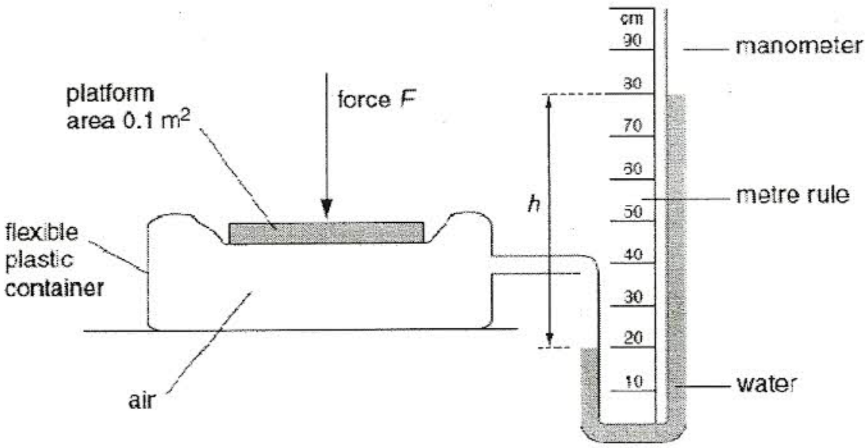
10.The figure shows a manometer used to measure the pressure difference between the air inside a plastic container and the atmosphere outside.



Calculate the force F exerted on the container (3mks)

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11. State how the velocity of a moving fluid varies with pressure (1mk)

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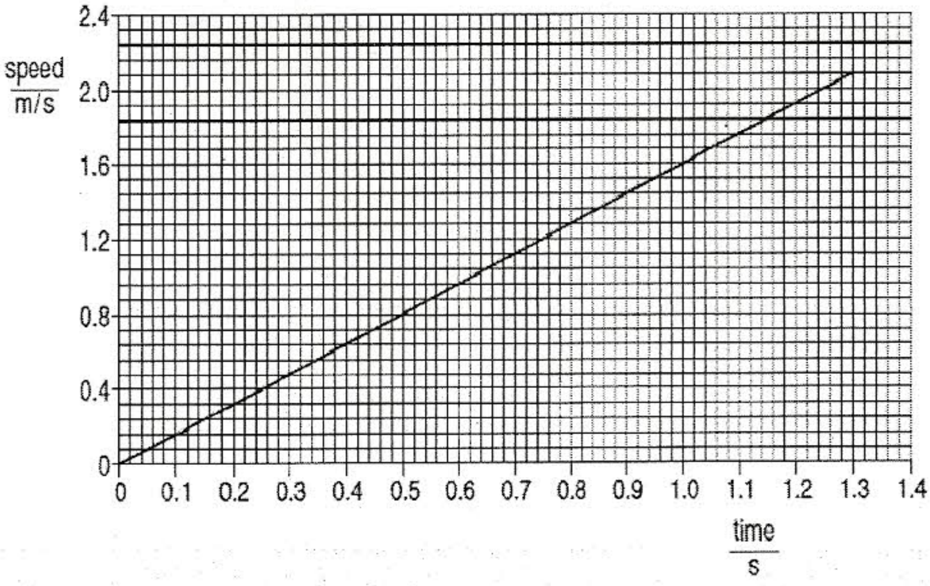
12.An astronaut drops a hammer on the Moon. The mass of the hammer is 0.5 kg.The figure below shows how the speed of the hammer changes with time as it falls.



For this falling hammer, calculate its weight on the Moon (3mks)

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13. An oil drop of average diameter 0.7mm spreads out into a circular patch of diameter 75cm on the surface of water in a trough .Calculate the average thickness of a molecule of oil (3mks)

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14. A minibus of mass 2000kg traveling at a constant velocity of 36km/h 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 the common velocity (2mks)

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SECTION B: 55 marks

15.(a) State Hooke's law (1mk)

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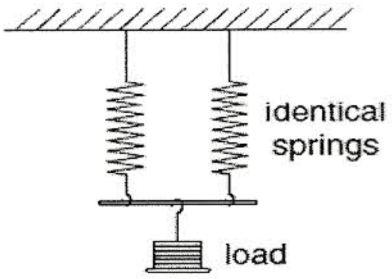
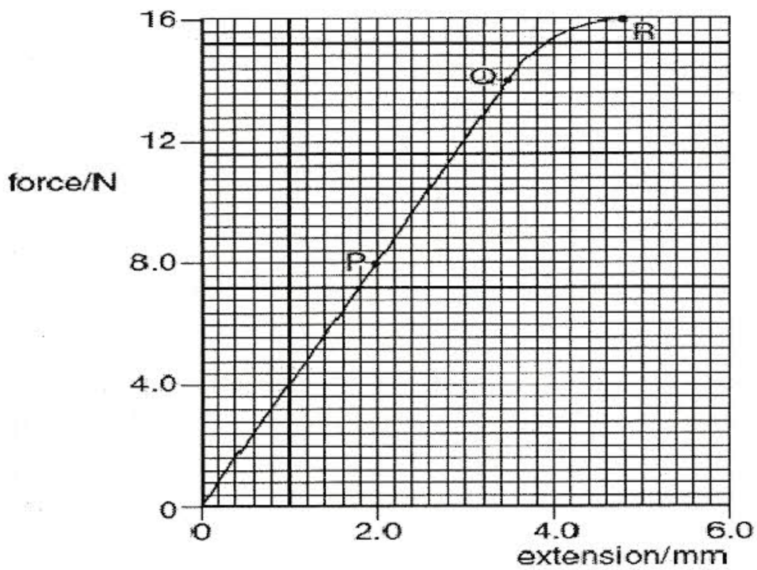
(b)In an experiment, forces are applied to a spring as shown in the fig below .a. The results of this experiment are shown in Fig. b.





The part OP of the graph shows the springs stretching according to the expression $F = kx$.

(i).Use values from the graph to calculate the value of *k* for the two springs (2mks)

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(ii) Find the value of k for a single spring (1mk)

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(c) Determine the work done in stretching the springs between point O and P (3mks)

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(d).A load of 16 N applied on a spring, compresses it so that its length is 16cm. If the springconstant for the spring is 4 N/cm, determine the original length of the spring. (3mks)

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16.(a)Define the term specific heat capacity (1mk)

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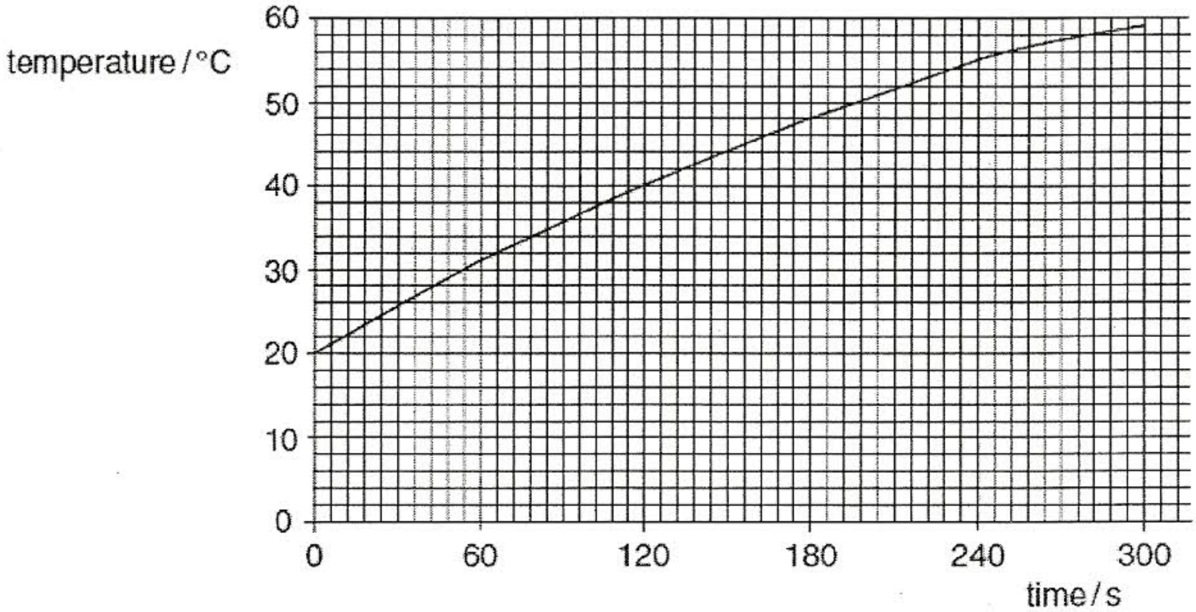
(b).Some water is heated electrically in a glass beaker in an experiment to find the specific heatcapacity of water. The temperature of the water is taken at regular intervals.The temperature-time graph for this heating is shown below.



Use the graph to find
(i).the temperature rise in the first 120 s (1mk)

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(ii)The experiment is repeated in an insulated beaker. This time, the temperature of the water increases from 20 °C to 60 °C in 210 s. The beaker contains 75 g of water. The power of the heater is 60 W. Calculate the specific heat capacity of water. (3mks)

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(c)Water has a very high specific heat capacity.Suggest why this might be a disadvantage when using water for cooking. (1mk)

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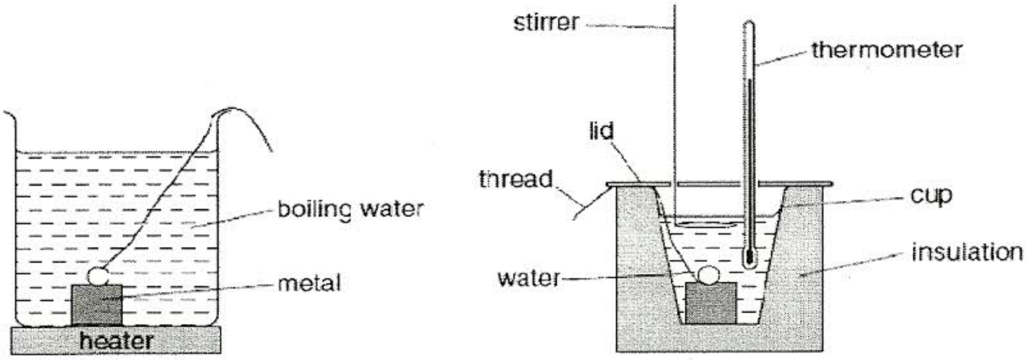
(d)The figure illustrates an experiment to measure the specific heat capacity of some metal.



The piece of metal is heated in boiling water until it has reached the temperature of the water. It is then transferred rapidly to some water in a well-insulated cup. A very sensitive thermometer is used to measure the initial and final temperatures of the water in the cup.
specific heat capacity of water = 4200 J / (kg K)
The readings from the experiment are as follows.
-mass of metal = 0.050 kg
-mass of water in cup = 0.200 kg
-initial temperature of water in cup = 21.1 °C
-final temperature of water in cup = 22.9 °C
(i) Calculate the temperature rise of the water in the cup and the temperature fall of the piece ofmetal. (1mk)
temperature rise of water = ...
temperature fall of metal = ...

(ii).Calculate the thermal energy gained by the water in the cup. (3mks)

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(iii) Assume that only the water gained thermal energy from the piece of metal.Making use of your answers to **(d)(i)** and **(d)(ii)**, calculate the value of the specific heat capacity of the metal. Give your answer to 3 significant figures (3mks)

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17.(a).Give a reason why bodies in circular motion undergo acceleration even when their speed is constant (1mk)

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(b).Define the term angular velocity (1mk

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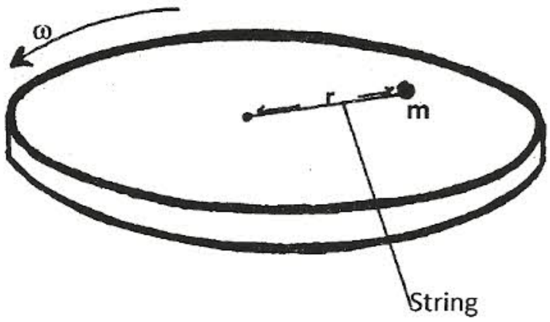
(c). The figure shows a body of mass m attached to the centre of a rotating table with a string whose tension can be m easured. (the device for measuring tension is not shown in the figure)



The tension **T**, on the string was measured for various values of angular velocity, **ω**. The distance rfrom the centre was maintained at 30cm. The results are as shown below :

Angular velocity ω(rad $^{-1}$)	2.0	3.	4.0	5.0	6.0
Tension T (N)	0.04	0.34	0.76	1.30	1.96

i) Plot the graph of T (y – axis) againstω^2 (5mks)

ii) From the graph, determine the mass, **m**, of the body given that

$$T = m\omega^2 r - C \quad \text{Where } C \text{ is a constant}$$ (3mks)

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iii) Determine the constant **C** and suggest what it represents in the set (2mks)

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18.(a) State the law of floatation (1mk)

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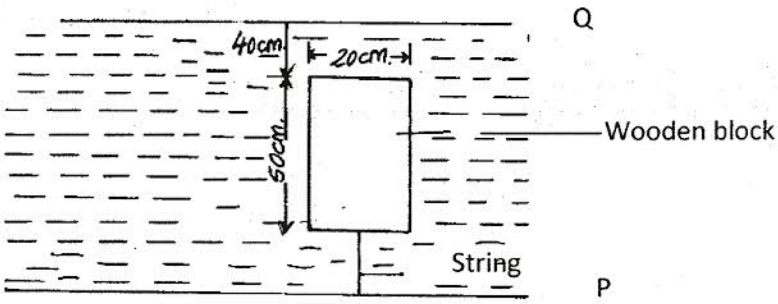
(b).The diagram in the figure below shows a wooden block of dimensions 50cm by 40cm by 20cm held in position by a string attached to the bottom of a swimming pool. The density of the block is $600kgm^{-3}$



(i) State the three forces acting on the block and write an equation linking them when the block is stationary. (3mks)

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(ii) Calculate the pressure on the bottom surface of the block. (3mks)

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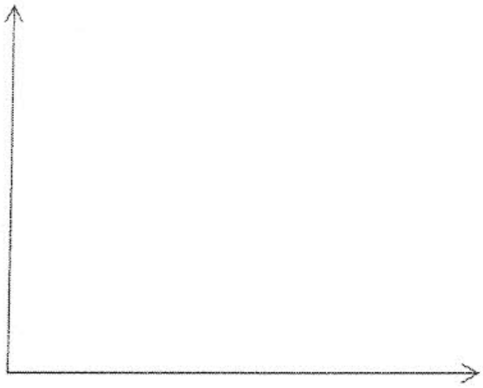
(iii) Sketch on the space below to show how the pressure on the block changes between P and Q. (2mks)

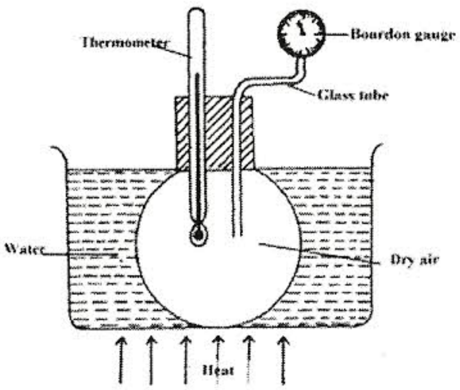


(iv) Calculate the tension on the string. (3mks)

19.(a) State the pressure law (1mk)

(b) Use the kinetic theory of matter to explain how a gas exerts pressure (2mks)

(c).The figure below shows a set up that may be used to verify Pressure law.



i).State the measurements that may be taken in the experiment. (2 mks)

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iii).A car tyre is at an air pressure of 4.0×10^5 Pa. at a temperature of 27 ^{0}C. While it is running, the temperature rises to 75 ^{0}C. What is the new pressure in the tyre?

(Assume the tyre does not expand) (3 mks)

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