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KASSU JET EXAMINATION - 2021
Kenya Certificate of Secondary Education

232/1
PHYSICS
PAPER ONE
Jan. 2021
2 hours

Name.....Index Number...../.....

Admission Number…….Class: ……...Candidate's Signature.....Date.....

INSTRUCTIONS TO CANDIDATES

i) *Write your name, admission number and index number in the spaces provided above.*
ii) *Sign and write the date of examination in the spaces provided above*
iii) *This paper consists of **TWO** sections **A** and **B.***
iv) *Answer **ALL** the questions in section **A** and **B** in the spaces provided.*
v) *All working **MUST** be clearly shown.*
vi) *Non programmable silent calculators may be used.*
vii) *ALL numerical answers must be expressed in decimal notation.*
viii) ***This paper has 14 pages. It is the responsibility of the candidate to ascertain that all the pages are printed as indicated and that no questions are missing.***
ix) ***Candidates should answer the questions in English.***
Constant: g=10N/kg or 10m/s^2

For Examiners Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	13	
	15	15	
	16	08	
	17	09	
	18	10	

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Total Score	80	

SECTION A: (25 marks**)**

*Answer **ALL** the questions in this section in the spaces provided.*

1. **Figure 1** shows a magnified portion of the scale of a micrometer screw gauge used to measure the diameter of spherical object.

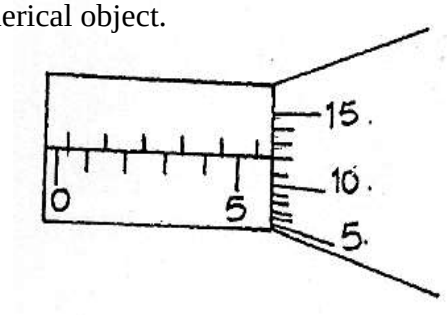

Figure 1

State the diameter of the object (1mark)

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2. **Figure 2** shows a flask fitted with a glass tube dipped into a beaker containing water at room temperature. The cork fixing the glass tube is air tight.

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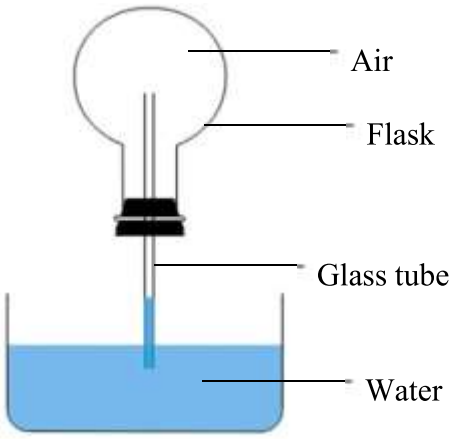

Figure 2

State with reason what is observed when the flask is held with warm hands. (2marks)

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3. 1800 cm^3 of fresh water of density 1g/cm^3 is mixed with 2200cm^3 of sea water of density 1.03g/cm^3. Determine the density of the mixture. (2marks)

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4. a) State the principle of moments. (1 mark)

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b) **Figure 3** shows a uniform meter rule balancing when a mass of 200g is hung at one end. Determine the tension T in the string (2marks)

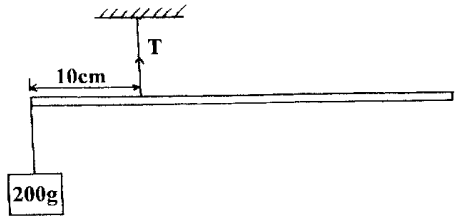

Figure 3

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5. Name two forces that determine the shape of liquid drop on a solid surface. (2marks)

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6. It was observed that when air is blown between two pieces of paper, both cling to each other. Explain. (1mark)

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7. a) State the Hooke's Law. (1mark)

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b) **Figure 4** shows identical spiral springs supporting a load of 90N. Each spring has a spring constant k = 200N/m

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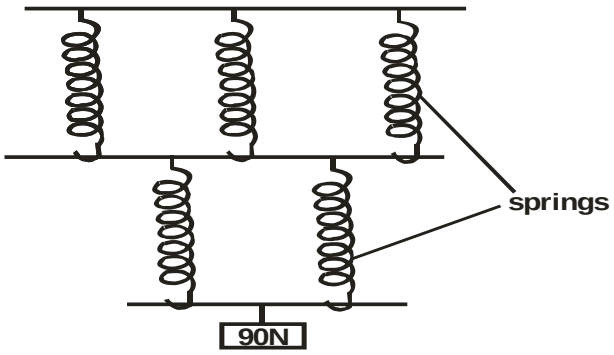

Figure 4

Determine the total extension of the system (take the weight of the cross bars and springs to be negligible) (2 marks)

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8. In an experiment to estimate the diameter of an oil molecule, an oil drop of diameter 0.05cm spreads over a circular patch whose diameter is 20cm. Determine the diameter of the oil molecule. (3marks)

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9. **Figure 5** shows a rectangular loop with two thin threads loosely tied and dipped into a soap solution.

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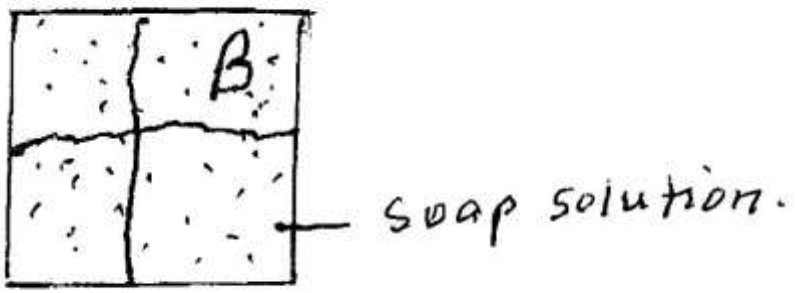

Figure 5

Draw on the side of **Figure 5** what is observed when point **B** is punctured. (1mark)

10 a)**Figure 6** shows a manometer used to measure the lung pressure of a student. Given that the atmospheric pressure is 103360Pa, determine the lung pressure of the student.

(2marks)

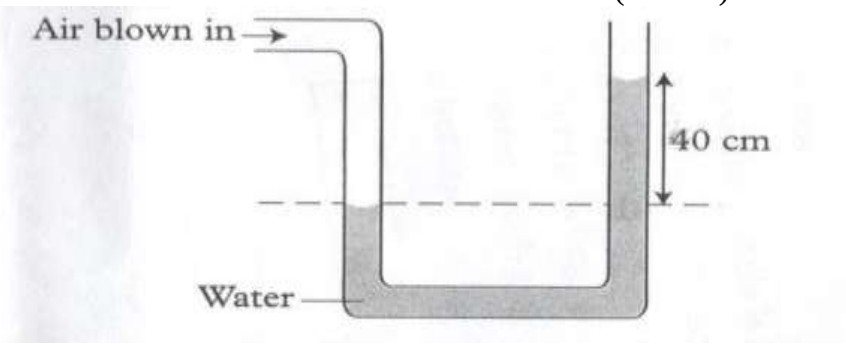

Figure 6

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b**)** State one factor affecting pressure in fluids. (1mark)

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11. Give a reason why mass of a body is constant everywhere. (1mark)

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12. A stop watch reads 08:12:84 and 09:10:72 before and after an experiment respectively. Determine the duration of the event in SI units. (2marks)

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13. Explain what thermodynamics is as a branch of physics. (1 mark)

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SECTION B: (55 m*arks*)

*Answer **ALL** the questions in this section in the spaces provided.*

14.a)Define the term work done as applied in physics. (1mark)

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b). **Figure 7** shows the cross – section of a wheel and axle of radius 6.0 cm and 1.5 cm respectively used to lift a load. Use it to answer the questions that follow.

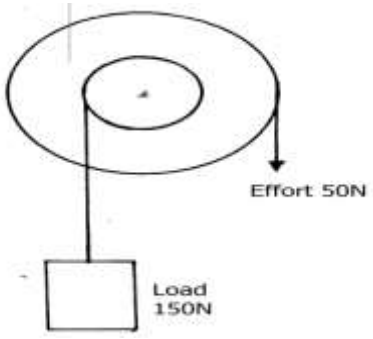

Figure 7

Determine the:

I)(i) mechanical advantage (M.A) of the system. (1mark)

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(ii) velocity ratio (V.R) of the system. (1mark)

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(iii) efficiency of the machine. (1mark)

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II) Give one reason why the above machine is not 100% efficient. (1mark)

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c) Define specific latent heat of vaporisation (1 mark)

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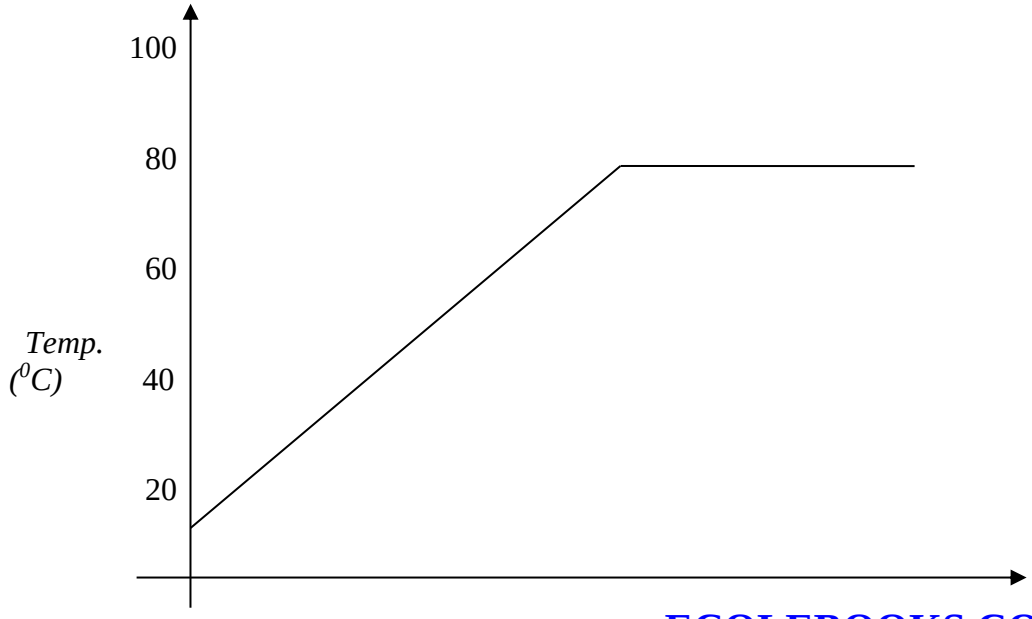
d) 1200g of a liquid at 10^0C is poured into a well-lagged calorimeter. An electric heater rated 1.5 KW is used to heat the liquid. **Figure 8** shows the variation of temperature of the liquid with time.



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0 1 2 3 4 5 6 7 8

Time (min)

Figure 8

Use **figure 8** to answer the following questions:

(i)State the boiling point of the liquid (1 mark)

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(ii) Determine the amount of heat given out by the heater to heat the liquid to the boiling point. (2 marks)

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(iii)Determine the specific heat capacity of the liquid. (2marks)

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iv) If 20g of the liquid vapour was collected by the end of the 8^{th} minute, determine the specific latent heat of vaporization of the liquid. (2 marks)

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15.a) **Figure 9** shows a velocity –time graph for the motion of a certain body.

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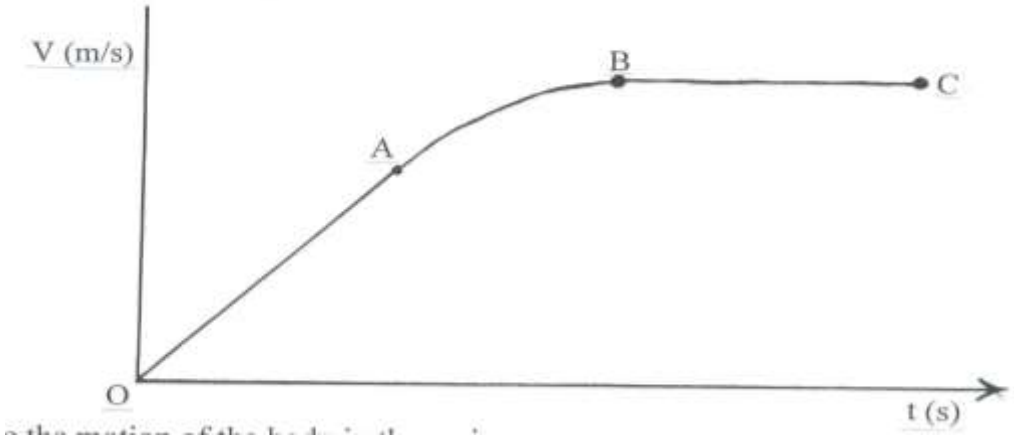

Figure 9

Describe the motion of the body in the region:

(i) OA: (1mark)

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(ii) AB: (1mark)

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(iii) BC: (1mark)

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(b) A car moving initially at 25m/s decelerates at 4 m/s^2.

(i) Determine the time taken for the car to stop (2marks)

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(ii) Sketch the velocity – time graph for the motion of the car up to the time the car stopped. (1mark)

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c) A ball is projected vertically upwards with initial velocity of 80m/s. Determine the time taken to reach maximum height. (2marks)

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d) A bullet of mass 80g moving with a velocity of 20m/s penetrates a sand bag and it's brought to rest in 0.05 seconds. Determine average retarding force of the sand. (2marks)

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e) (i) State the principle of conservation of linear momentum (1 mark)

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(ii) A bullet of mass 60g is fired horizontally with a velocity of 200 m/s into a suspended stationary wooden block of mass 2940g. Determine:

(a) Common velocity of both the bullet and the block, if the bullet embedded into the block. (2 marks)

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(b) Height to which the block rises. (2 marks)

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16. a) Explain why bodies in circular motion undergo acceleration even when their speed is constant. (1mark)

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b) A particle moving along a circular path of radius 5cm describes an arc of length 2cm every second. Determine:

(i)Its angular velocity. (1mark)

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(ii)Its periodic time. (2marks)

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c) A stone of mass 150g is tied to the end of a string 80cm long and whirled in a vertical circle at 2rev/s. Determine the maximum tension in the string. (3marks)

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(d) State **one** factor affecting centripetal force (1mark)

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17.a) State the Archimedes' principle. (1 mark)

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b)The weight of a stone in air is 8.5N. When fully immersed in paraffin of density 0.8g/cm³ its weight is 7.3N. Determine the;

(i) up thrust in the paraffin. (1 mark)

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(ii) volume of the stone. (2 marks)

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c**) Figure 10** shows rectangular metal block of density 12,500kgm^{-3} and dimensions 30cm x 20cm x 20cm suspended inside a liquid of density 1200kgm^{-3} by a string attached to appoint above the liquid. The three forces acting on the block are; the tension T, on the string, the weight W, of the block, and the up thrust, U, due to the liquid.

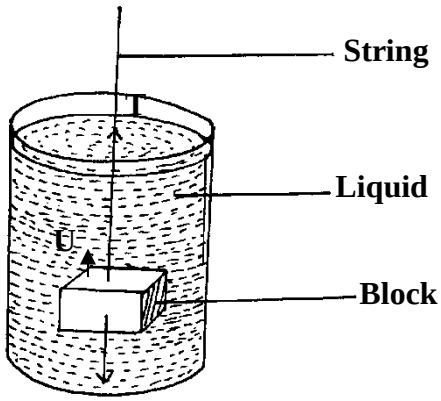

Figure 10

(i) Write an expression relating **T**, **W** and **U** when the block is in equilibrium inside the liquid. (1 mark)

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(ii) Determine the weight, **W**, of the block (1 mark)

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(iii) Determine the weight of the liquid displaced by the fully submerged block (2 marks)

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(iv) Hence determine the tension, T, in the string (1 mark)

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18.a) **Figure 11** shows a set-up that may be used to verify pressure law.

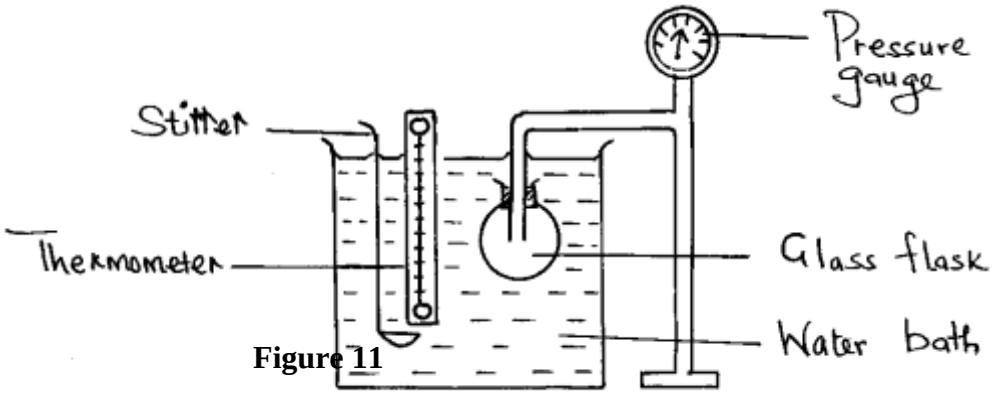

Figure 11

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

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ii)Explain how the measurements in (i) above may be used to verify pressure law. (2 marks)

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b)A column of air 26cm long is trapped by mercury thread 5.0cm long as shown in **figure11 (a)** . When the tube is inverted as in **figure11 (b)** the air column becomes 30cm long. Determine the value of atmospheric pressure (2 marks)

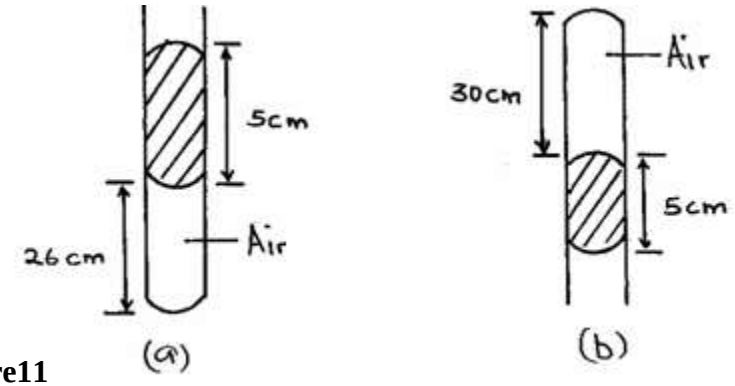

Figure11

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c)A steel cylinder of capacity 0.45m³ contains nitrogen at a pressure of 40,000Pa when the temperature is 17°C. Determine the pressure of nitrogen if it is allowed to flow into another cylinder of capacity 8.5m³ with the temperature reduced to -23°C. (2 marks)

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

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