Candidate's name:

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Random No. | | | | | | |

Personal No. | | | |

Signature: .....

(Do not write your school/Centre Name or Number anywhere on this booklet.)

535/1

PHYSICS

Paper 1

Oct./Nov. 2017

$2\frac{1}{4}$ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Section A contains 40 objective type questions. You are required to write the correct answer A, B, C or D against each question in the box on the right hand side.

Section B contains 10 structured questions. Answers are to be written in the spaces provided on the question paper.

Mathematical tables and silent non-programmable calculators may be used.

Acceleration due to gravity, $g = 10\ ms^{-2}$

Specific heat capacity of water $= 4200\ J\ kg^{-1}\ K^{-1}$

For Examiners' Use only

Q. 41	Q.42	Q.43	Q.44	Q.45	Q.46	Q.47	Q.48	Q.49	Q.50	MCQ	Total

SECTION A : (40 MARKS)

Answer **all** *questions from this section*

1. Energy from the sun reaches the earth by
   A. interference.
   B. convection.
   C. conduction.
   D. radiation.

2. A girder which is under tension is called a
   A. strut.
   B. beam.
   C. wedge.
   D. tie.

3. Thermionic emission is the giving off of electrons from a
   A. heated metal.
   B. metal bombarded with energetic particles.
   C. metal irradiated with electromagnetic radiations.
   D. metal subjected to a strong magnetic field.

4. Which one of the following electro-magnetic radiations can cause skin burn?
   A. Cathode rays.
   B. Radio waves.
   C. Ultraviolet radiations.
   D. Infrared radiations.

5. The force which keeps a body in circular motion is called
   A. centripetal force.
   B. centrifugal force.
   C. tension force.
   D. gravitational force.

6. Gases are widely used to inflate tubes of tyres because
   A. they are easily available.
   B. they are lighter than liquids.
   C. they have no smell and they are colourless.
   D. their molecules are further apart and can be compressed.

7. Which one of the following factors affects pressure in liquids?
   A. Density of the liquid container.
   B. Acceleration due to gravity.
   C. Cross sectional area of the container.
   D. Shape of the container.

8. Which one of the following parts of a mercury thermometer should be placed in contact with a body whose temperature is being measured?

A. Bore.
B. Stem.
C. Bulb.
D. Constriction.

9. A mirage is formed as a result of

(i) refraction.
(ii) reflection.
(iii) diffraction.

A. (i), (ii) and (iii).
B. (ii) and (iii) only.
C. (i) and (iii) only.
D. (i) and (ii) only.

10. A negatively charged rod is brought near two metallic spheres in contact as shown in figure 1.

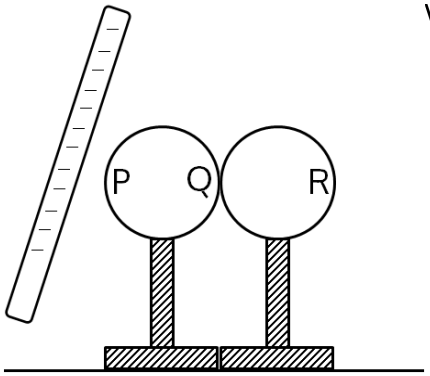

Figure 1

What is the net charge at points P, Q and R?

	P	Q	R
A.	Positive	Positive	Negative
B.	Positive	Zero	Negative
C.	Positive	Negative	Zero
D.	Negative	Positive	Negative

11. Which one of the following is a set of good conductors of heat?

A. Silver, water and rubber.
B. Copper, alcohol and silver.
C. Rubber, wood and aluminium.
D. Aluminium, copper and silver.

12. Glass tubes of different diameters are dipped in water and mercury as shown in figure 2.

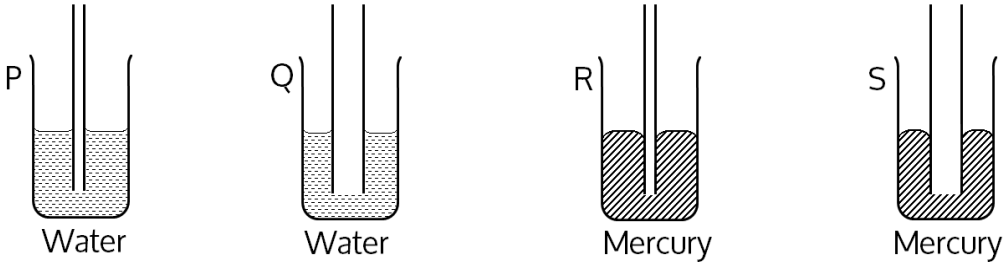

Figure 2

Which one of the following shows the correct order of heights of liquid in the tubes from the lowest to the highest?

A. R, S, Q, P.
B. S, R, Q, P.
C. Q, S, R, P.
D. P, Q, R, S.

13. The brightness of a spot on the screen of a cathode ray oscilloscope is determined by adjusting the

(i) grid potential.
(ii) anode potential.
(iii) filament current.

A. (i), (ii) and (iii).
B. (i) and (ii) only.
C. (i) and (iii) only.
D. (ii) and (iii) only.

14. Three resistors R_1, R_2 and R_3 are arranged as shown in figure 3.

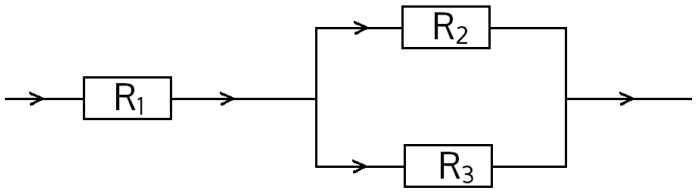

Figure 3

Which one of the following expressions represents the effective resistance of R_1, R_2 and R_3?

A. $R_1 + R_2 + R_3$
B. $\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
C. $R_1 + \frac{R_2 R_3}{R_2 + R_3}$
D. $R_1 + \frac{R_2 + R_3}{R_2 R_3}$

15. The following devices convert electrical energy to heat energy.

(i) Cooker.
(ii) Electrical iron.
(iii) Electrical fan.
(iv) Refrigerator.

A. (i), (ii) and (iii) only.
B. (i) and (ii) only.
C. (i) and (iii) only.
D. (iii) and (iv) only.

16. When an object is placed in front of a concave mirror at a distance less than the focal length of the mirror, the image formed is

A. virtual, upright and magnified.
B. virtual, upright and diminished.
C. real, upright and magnified.
D. virtual, inverted and magnified.

17. A climber on top of a high mountain may experience nose bleeding because of

A. reduction in temperature.
B. low blood pressure due to reduction of atmospheric pressure.
C. atmospheric pressure not changing.
D. excess blood pressure over atmospheric pressure.

18. One advantage of connecting cells in parallel is that

A. they supply double the current.
B. they supply half the current.
C. their life span is prolonged.
D. their internal resistance increases.

19. Which one of the following does **not** explain the increase in speed of sound in air with increase in temperature?

A. Air molecules move faster as temperature increases.
B. Air molecules move closer together as temperature increases.
C. Pressure of air increases with increase in temperature.
D. Density of air decreases with increase in temperature.

20. The loudness of sound from a loud speaker can be increased by increasing the

(i) surface area of the diaphragm.
(ii) resistance of the coil.
(iii) size of current flowing in the coil.

A. (i) only.B.
B. (i) and (ii) only.
C. (ii) and (iii) only.
D. (i) and (iii) only.

21. Figure 4 shows a uniform metre rule of weight W acted upon by forces R_1 and R_2, and pivoted at the 25 cm mark.

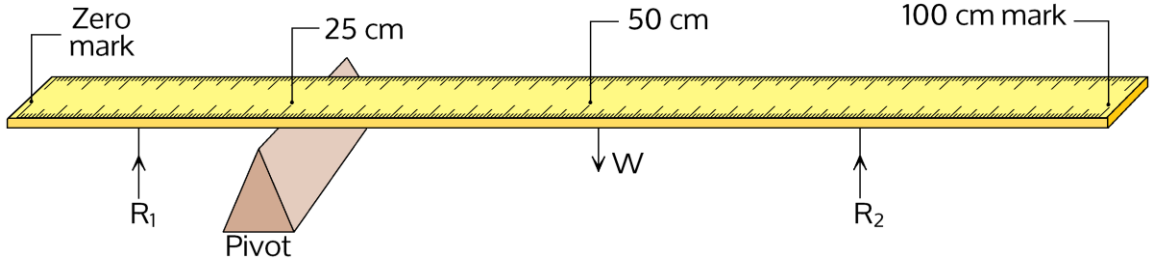

Figure 4

Identify forces which produce clockwise moments.

A. R_1 and R_2.
B. R_1 and W.
C. R_2 and W.
D. R_1, R_2 and W.

22. Telephone receivers reproduce the same voice of a person online because

(i) similar sound waves are transmitted.
(ii) the diaphragm vibrates with the same frequency.
(iii) the magnetisation of the electromagnets varies.

A. (i) and (ii) only.
B. (i) and (iii) only.
C. (ii) and (iii) only.
D. (i), (ii) and (iii).

23. A copper rod XY is placed in a magnetic field as shown in figure 5.

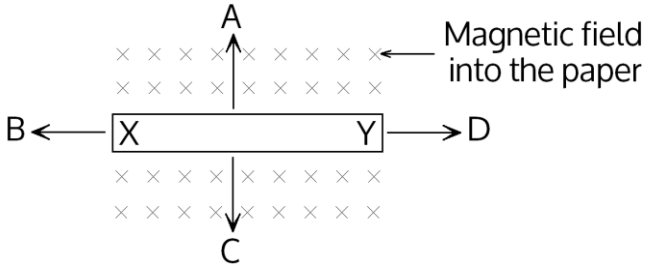

Figure 5

If current flows through the rod from X to Y, in which direction will the force on the rod act?

A. Upward.
B. To the left.
C. Downward.
D. To the right.

24. A 10 kg bag is raised from a height of 0.5 m to a height of 2 m in 2 s. Find the power expended in lifting the bag.

A. 100 W.
B. 75 W.
C. 10 W.
D. 7.5 W.

25. State what happens to the atomic number and mass number of a radioactive nuclide decaying by emission of an alpha particle followed by a beta particle.

A. Mass number reduces by 4 and atomic number reduces by 1.
B. Mass number increases by 4 and atomic number increases by 1.
C. Mass number reduces by 3 and atomic number reduces by 2.
D. Mass number increases by 3 and atomic number increases by 2.

26. A spring of length 15 cm extends to 23 cm when a 0.2 kg mass is suspended from it. The spring constant is

A. $\left(\frac{0.2}{0.08\times10}\right)\text{Nm}^{-1}$
B. $\left(\frac{0.2\times0.08}{10}\right)\text{Nm}^{-1}$
C. $\left(\frac{0.2\times10}{0.08}\right)\text{Nm}^{-1}$
D. $\left(\frac{0.08\times10}{0.2}\right)\text{Nm}^{-1}$

27. White light is incident onto two filters as shown in figure 6.

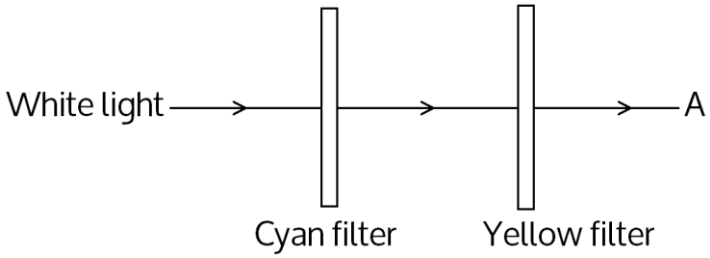

Figure 6

What is the colour at A?

A. Red.
B. Blue.
C. Green.
D. Cyan.

28. The cost of running a deep freezer in 30 days is Shs 12,000. If the cost per unit is Shs 500, find the power rating of the freezer.

A. 12000 W.
B. $\frac{12000\times1000}{30\times24\times500}$ W
C. $\frac{30\times24\times500}{12000}$ W
D. $\frac{30\times24\times500}{12000\times1000}$ W

29. A stone is projected vertically from the ground with a velocity of 25.0 ms^{-1} . Find the maximum height the stone attains.

A. 31.25 m
B. 62.50 m
C. 150.00 m
D. 625.00 m

30. Figure 7 shows two waves produced by two strings vibrating at the same frequency.

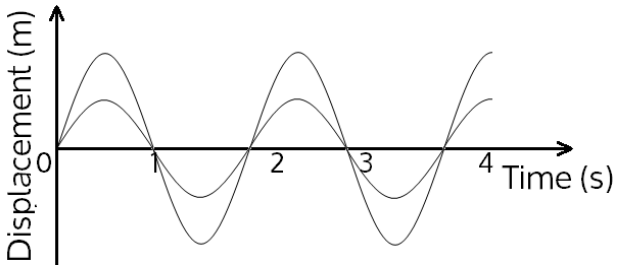

Figure 7

The notes produced by the two strings are of

A. different quality.
B. the same quality.
C. different loudness.
D. the same loudness.

31. A metal rod extends by 0.2 cm when its temperature is raised by 5 ^{0}C. If the heat capacity of the rod is 400 J K^{-1}, what is the extension produced when 1600 J of heat are absorbed by the rod?

A. 0.05 cm
B. 0.16 cm
C. 0.25 cm
D. 4.00 cm

32. A step-down transformer gives a current of 2 A at 12 V. If the primary voltage is 240 V, find the primary current.

A. $\left(\frac{240\times2}{12}\right)$ A
B. $\left(\frac{240}{12\times2}\right)$ A
C. $\left(\frac{12\times2}{240}\right)$ A
D. $\left(\frac{12}{240\times2}\right)$ A

33. When a wave is refracted,

(i) its frequency decreases.
(ii) its velocity changes.
(iii) its frequency remains constant.
(iv) its wavelength remains constant.

A. (i) and (iv) only.
B. (i), (ii) and (iii) only.
C. (ii) and (iii) only.
D. (ii), (iii) and (iv) only.

34. A radioactive nuclide $^{235}_{92}$X decays by emission of an alpha particle. Find the number of neutrons in the daughter nuclide formed.

A. 141
B. 231
C. 142
D. 143

35. A car of mass 400 kg travelling at $30\ ms^{-1}$ is brought to rest in 15 s by a constant braking force. Calculate the force.

A. 6000 N
B. 800 N
C. 450 N
D. 200 N

36. Figure 8 shows a graph of force against extension for three different materials X, Y and Z.

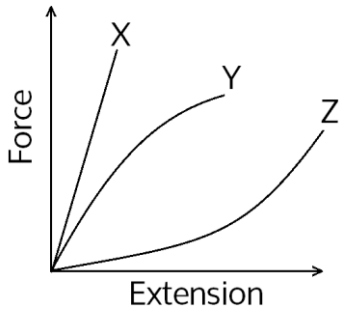

Figure 8

Which of the following identifies the materials correctly?

	X	Y	Z
A.	Copper	Glass	Rubber
B.	Rubber	Copper	Glass
C.	Glass	Rubber	Copper
D.	Glass	Copper	Rubber

37. What is the minimum force that breaks a rod of cast iron of a rectangular cross-section 4 cm by 1 cm, when a tensile stress of $2\times10^{8}\ Nm^{-2}$ is applied?

A. $\left(\frac{4\times10^{-4}}{2\times10^{8}}\right)N$
B. $\left(\frac{4\times10^{0}}{2\times10^{8}}\right)N$
C. $\left(\frac{2\times10^{8}}{4\times10^{-4}}\right)N$
D. $2\times10^{8}\times4\times10^{-4}\ N$

38. In figure 9, the total current in the circuit is measured by connecting an ammeter in position

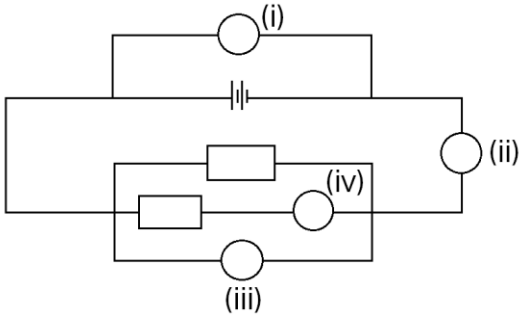

Figure 9

A. (i)
B. (ii)
C. (iii)
D. (iv)

39. A ray of light is incident at 40^{0} to the normal in air and is refracted at 35^{0} in some transparent medium. Find the refractive index of the medium.

A. 0.89
B. 0.94
C. 1.07
D. 1.12

40. A force of 10 N acts on a body of mass 2.0 kg originally at rest. If the force acts on the body for a period of 5.0 s, find the final velocity of the body.

A. 25.0 ms^{-1} B. 20.0 ms^{-1}

C. 4.0 ms^{-1} D. 1.0 ms^{-1}

SECTION B : (40 MARKS)

Answer **all** *questions in this section. All workings* **must** *be shown clearly in the spaces provided.*

41. (a) State one use of the following:

(i) X – rays, (01 mark)

.....

(ii) Cathode rays. (01 mark)

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(b) Figure 10 shows the structure of an X –ray tube.

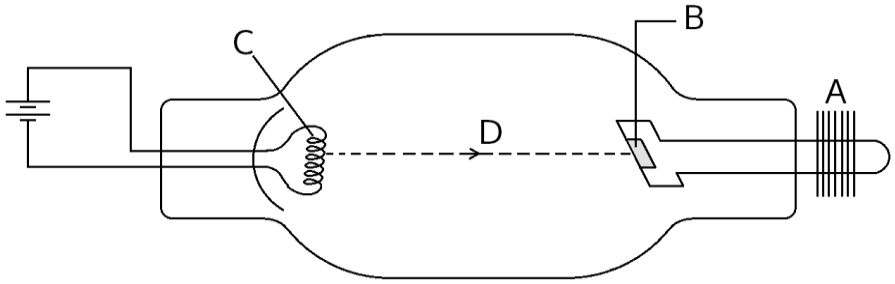

Figure 10

Name the parts labelled (02 marks)

A .....

B .....

C .....

D .....

42. (a) Explain why it is dangerous to overload vehicles with goods on the roof-rack. (01 mark)

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(b) A uniform metre rule of weight 0.8 N is loaded by suspending 1 N weight 10 cm from 0.0 cm mark.

(i) Sketch the diagram for the set-up. (01 mark)

(ii) Determine where the loaded metre rule will balance. (02 marks)

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43. (a) State the laws of reflection of light. (02 marks)

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(b) Figure 11 shows the sun, moon and earth in a straight line leading to an eclipse.

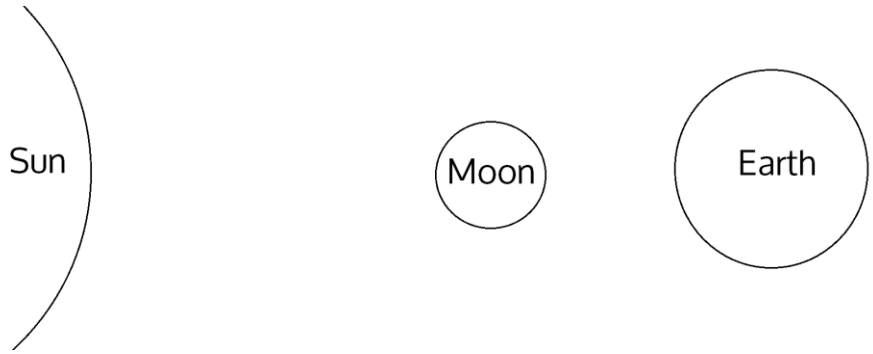

Figure 11

(i) Name the eclipse. (01 mark)

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(ii) Draw light rays in figure 11 to show how the eclipse is formed. (01 mark)

44. (a) What is meant by efficiency of a machine? (01 mark)

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(b) An effort of 200 N is use to lift a load of 640 N using a pulley system as shown in figure 12.

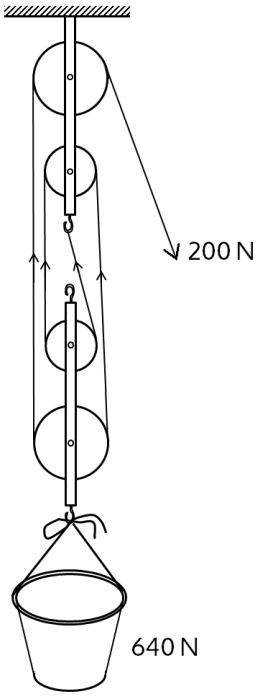

Figure 12

Find the efficiency. (03 marks)

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45. (a) Define frequency as applied to wave motion. (01 mark)

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(b) Figure 13 shows a wave profile of a radio wave.

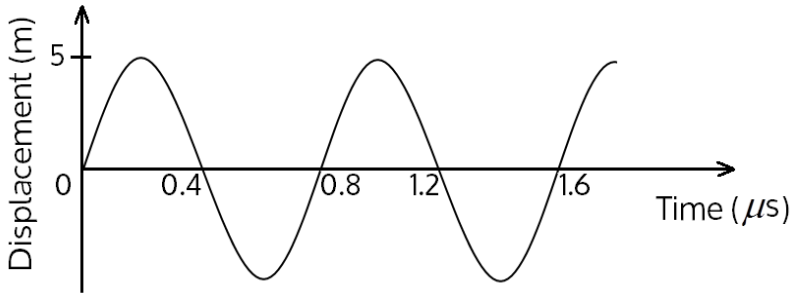

Figure 13

(i) Determine the amplitude of the wave. (01 mark)

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(ii) Find the frequency of the wave. (02 marks)

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46. (a) (i) What is a vector quantity? (01 mark)

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(ii) Give two examples of scalar quantities. (01 mark)

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(b) A block of mass 5 kg is pulled from rest on a horizontal surface and attains a velocity of 10 ms^{-1} over a distance of 4 m. Find the resultant force on it. (02 marks)

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47. (a) State the fundamental law of electrostatics. (01 mark)

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(b) When a charged glass rod is brought near a gold leaf electroscope, the leaf diverges but falls again when the rod is removed. Explain the observations. (02 marks)

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(c) State any two precautions that should be observed when working with an electrostatic device. (01 mark)

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48. (a) (i) State Boyle's law. (01 mark)

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(ii) Give one reason why real gases do not obey Boyle's law. (01 mark)

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(b) The graph in figure 14 shows how the volume of a fixed mass of a gas varies with pressure at constant temperature.

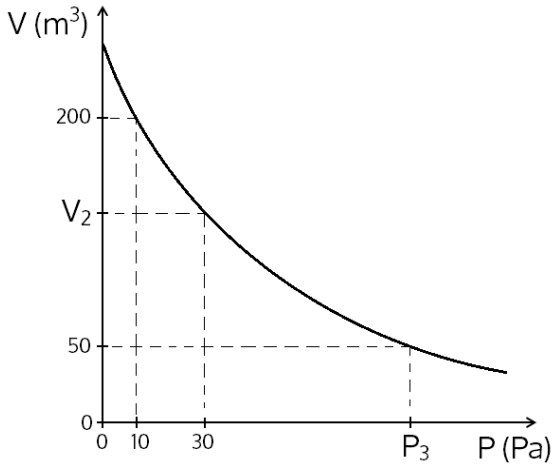

Figure 14

Calculate the value of V_2. (01 mark)

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49. (a) What is meant by volume of a body?

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(b) Figure 15 shows the displacement method of measuring the volume of a piece of wood.

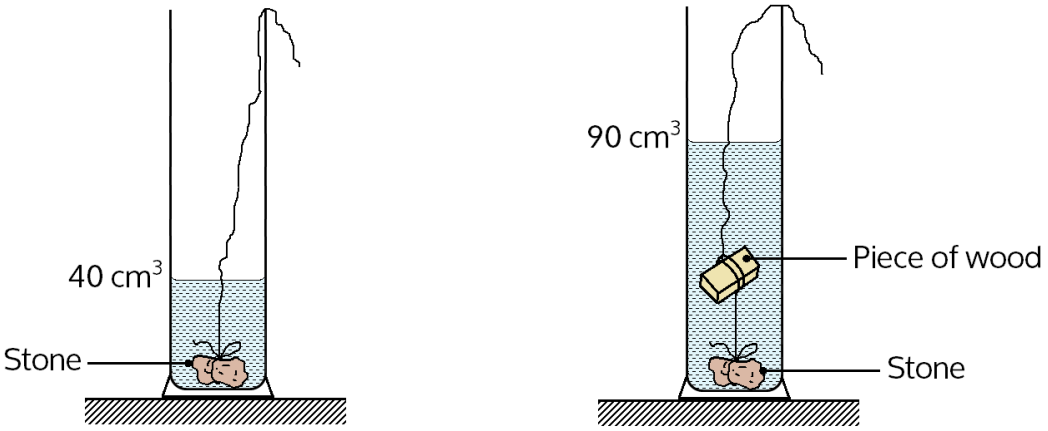

Figure 15

Find the density of the wood if the piece has a mass of 40 g. (03 marks)

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50. (a) State two factors which affect the resistances of a metal conductor. (01 mark)

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(b) Explain why cells should never be left connected in parallel. (01 mark)

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(c) The filament of a lamp is rated 120 V, 30 W. Calculate the resistance of the filament. (02 marks)

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END