Candidate's Name ....

Signature:……………………......................

Random No.						Personal No.		

535/1
PHYSICS
Paper 1
July/August 2019
2¼ hours

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of Education

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

o Write your name, signature and personal number clearly in the spaces above.

o **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.

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

o Mathematics tables and silent non – programmable calculators may be used.

   Assume where necessary:
   Acceleration due to gravity   =   10 m s^{-2}
   Specific heat capacity of water   =   4200 Jkg^{-1} K^{-1}
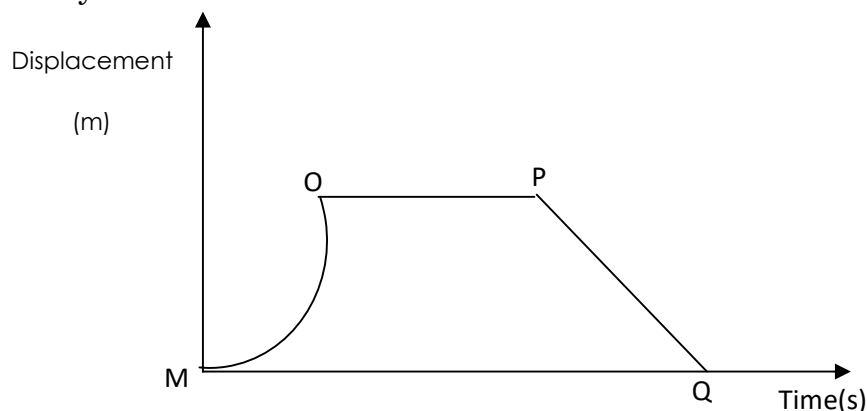   Specific heat capacity of copper   =   400 Jkg^{-1} K^{-1}

For Examiner's 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. The graph in Figure 1 describes motion of a body. Between which points is the body at rest?

Fig. 1

(A) MN   (B) NO

(C) OP   (D) PQ

2. A rainbow is an example of

(A) mirage.   (B) diffraction.
(C) dispersion.   (D) interference

3. A radioactive material decays by loss of $\dfrac{15}{16}$ of its original quantity in 2 hours.

What is its half life?
(A) 10 minutes   (B) 15 minutes
(C) 30 minutes   (D) 45 minutes

4. When a current 2.0A flows through a coil in 1minute, a total of 720J of energy is converted to heat. Calculate the resistance of the coil.

(A) 1.0 Ω   (B) 2.0 Ω

(C) 3.0 Ω   (D) 180.0 Ω

5. A body becomes negatively charged when it

(A) gains electrons.   (B) loses electrons.

(C) gains protons.   (D) loses protons.

6. A box of mass 80kg is tied at one end of a uniform piece of timber resting on two supports 1 m from each end as shown in Figure 2 below.

Fig. 2
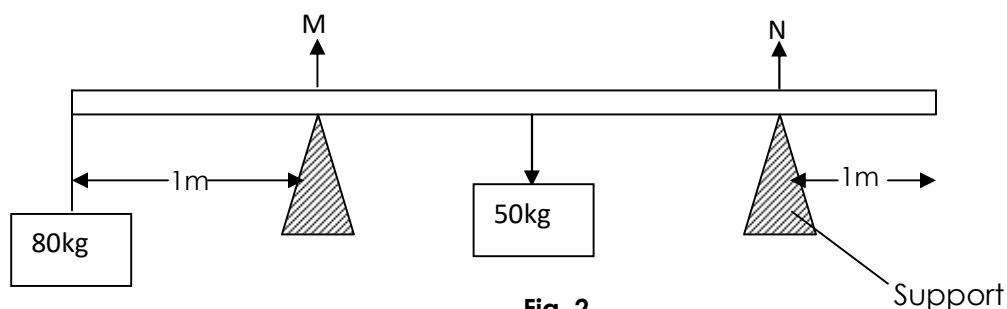
If the piece of timber is 10m long and has a mass of 50kg, find the force on each support.

	M	**N**
(A)	1150N	150N
(B)	800N	500N
(C)	150N	1150N
(D)	200N	1200N

7. A hollow glass sphere of mass 60kg floats in water such that $\frac{2}{3}$ of its volume is submerged in water of density 1gcm^{-3}. Find the volume in cm^3 of the sphere.
   (A) 20   (B) 40
   (C) 60   (D) 90

8. A notch on a material spreads more rapidly when the material is
   (A) reinforced.   (B) in tension.
   (C) pre stressed.   (D) in compression.

9. A weight of 20N stretches a spring by 0.5 cm. Calculate the extension when the applied weight is 60N.
   (A) 0.25 cm   (B) 1.5 cm
   (C) 2.0 cm   (D) 4.0 cm

10. X-rays are

   (A)   particles with a positive charge.
   (B)   particles with a negative charge.
   (C)   electromagnetic waves.
   (D)   electrons of high speed.
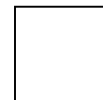
11. Which of the following is true about a standing wave?

   (i)   The wave profile does not move.

   (ii)   It is formed when identical wave travelling in the same direction with
          equal speed overlap.

   (iii) It is formed when waves of equal amplitude and speed moving in
          opposite directions overlap.

   (A)   (i) and (ii) only.   (B)   (i) only.

   (C)   (i) and (iii) only.   (D)   (ii) and (iii) only.
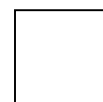
12. State the energy changes which occur when the headteacher addresses a big
    crowd of students using a microphone.
   (A)   Sound energy ⟶ Electric energy ⟶ Sound energy

   (B)   Electrical energy ⟶ Sound energy

   (C)   Chemical energy ⟶ Sound energy ⟶ Electrical energy ⟶
          Sound energy

   (D)   Chemical energy ⟶ Kinetic energy ⟶ Sound energy

13. A loud speaker rated 240V, 1.5kW works 10 hours a day in church. Find the
    daily cost running the speaker if the cost per unit electricity is shs. 380.
   (A)   570/=   (B)   2400/=
   (C)   3800/=   (D)   5700/=

14.

Mercury

M

38cm

68cm
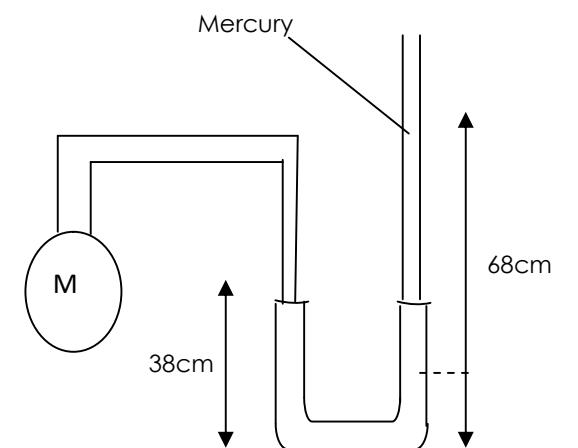
Fig. 3

In Figure 3 above, a fixed mass of dry gas is trapped in bulb M. Determine the total pressure of the gas in M, given that the atmospheric pressure is 760mm of mercury.

(A)   114cm Hg   (B)   46cm Hg
(C)   38cm Hg   (D)   30cm Hg

15.   A lens of power 4 dioptres is used to focus an object at infinity. How far the screen must be placed from the lens so that a clearly focused image is seen.

(A)   0.20cm   (B)   0.25cm
(C)   20cm   (D)   25cm

16.   Two straight conductors near each other
      (A)   always repel each other.
      (B)   repel each other when no current flows in them.
      (C)   repel each other when they carry current in opposite.
      (D)   repel each other when they carry current in the same direction.

17.   Pieces of ice of mass 0.5kg at 0^0C are mixed with 3kg of water at 0^0C. How much heat is needed to convert the mixture to water at 10^0C?
      (A)   168kJ   (B)   126kJ
      (C)   147kJ   (D)   315kJ

18.   Which of the following shows the correct distribution of change on a positively charged hollow sphere?
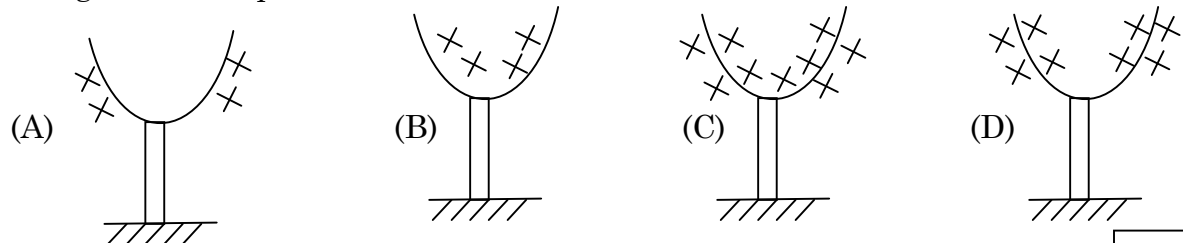
Fig. 4

19. Two cells each of emf 2V and negligible internal resistance are connected as shown in Figure 5 below.
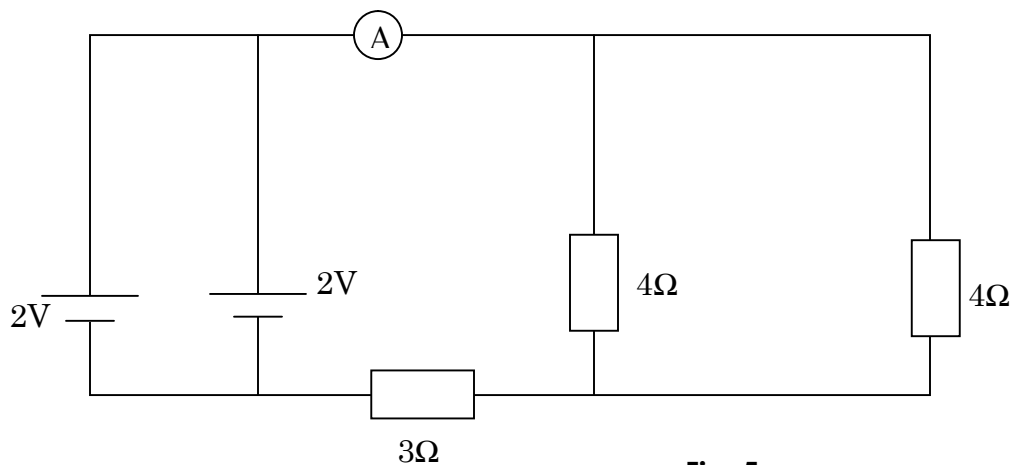
Fig. 5

What is the reading of the ammeter?
(A)   0.18A   (B)   0.36A
(C)   0.40A   (D)   0.80A

20. The eclipse of the sun takes place when the shadow of the
(A)   earth falls on the moon.   (B)   sun falls on the moon.
(C)   moon falls on the sun.   (D)   moon falls on the earth

21. Which two points are in phase?
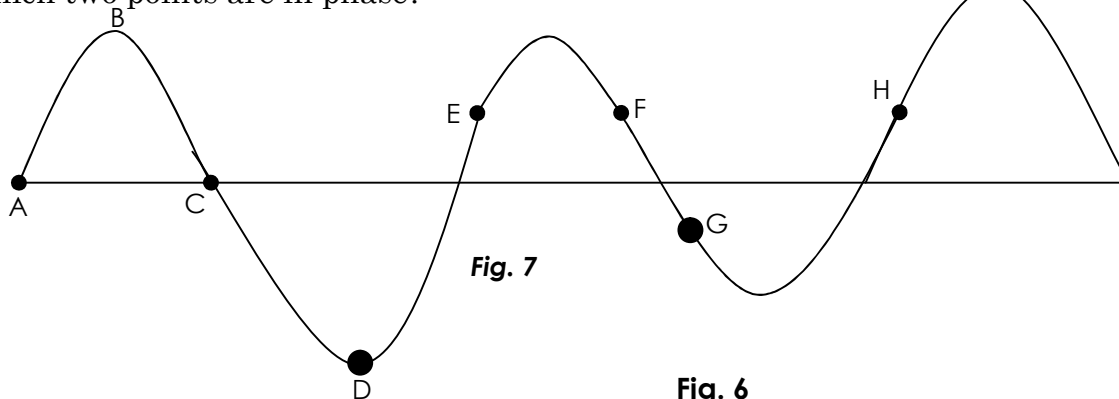
Fig. 7

Fig. 6

(A)   A and G   (B)   B and D
(C)   C and E   (D)   E and H

22. A ray of white light is incident on yellow filter as shown in Figure 7.
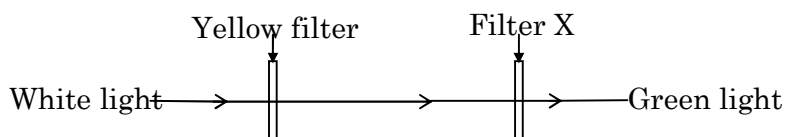
Fig. 7

If green light is observed after filter X, then X is either green or
(A)   magenta.   (B)   red.
(C)   cyan.   (D)   white.

23. A sensitive thermometer is one which
(A)   is sensitive to heat.
(B)   can record big changes in temperature.
(C)   can record small changes in temperature.
(D)   has a large bore.

24. Which of the following would not increase the sensitivity of a moving coil galvanometer?
(A)   winding more turns of wire on the frame.
(B)   using a wire of higher resistance.
(C)   using a stronger magnet.
(D)   using a spring which is less stiff.

25. A stone rests at a point 10m high. If its released from its position of rest, its kinetic energy just before landing will be

(A)   0.1J   (B)   10J
(C)   100J   (D)   1000J

26.
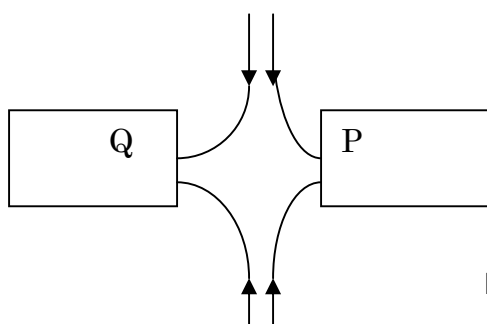
Fig. 8

Name the poles of Q and P of the bar magnets shown in Figure 8 above.

	Q	P
(A)	North	North
(B)	South	South
(C)	North	South
(D)	South	North

27. Determine the force that is required to give a mass of 500,000mg an acceleration of 2×10^{-2} m s^{-2}.
(A) 0.01N   (B) 10N
(C) 100N   (D) 10,000N
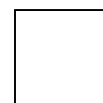
28. Figure 9 shows a cone resisting on a table. If it has a radius of 500mm and a mass of 400Dg, find the pressure it exerts on the table.
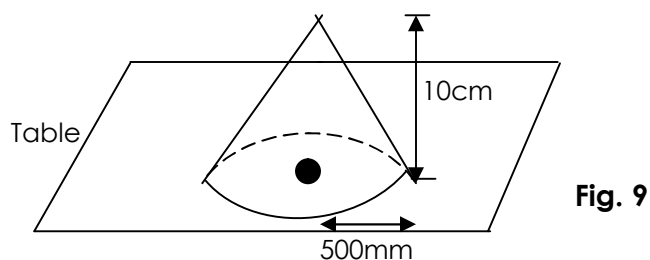
Fig. 9

(A) $\dfrac{0.25\pi}{4 \times 10} Nm^{-2}$ (B) $\dfrac{4 \times 10}{25\pi} Nm^{-2}$

(C) $\dfrac{25\pi}{4 \times 10} Nm^{-2}$ (D) $\dfrac{4 \times 10}{0.25\pi} Nm^{-2}$
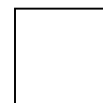
29.
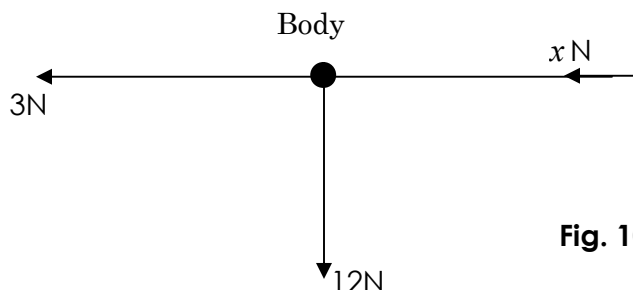
Fig. 10

From Figure 10 above, find the value of x if the magnitude of the resultant force is 13N.

(A)   1N   (B)   2N

(C)   4N   (D)   5N

30. A transformer has 200 turns on the primary coil and 20turns on the secondary coil. What is the output voltage if the input in the primary coil is 240V?

(A)   12V   (B)   24V

(C)   120V   (D)   2400V

31. A ray of light travels from medium A to B as shown in Figure 11 below.
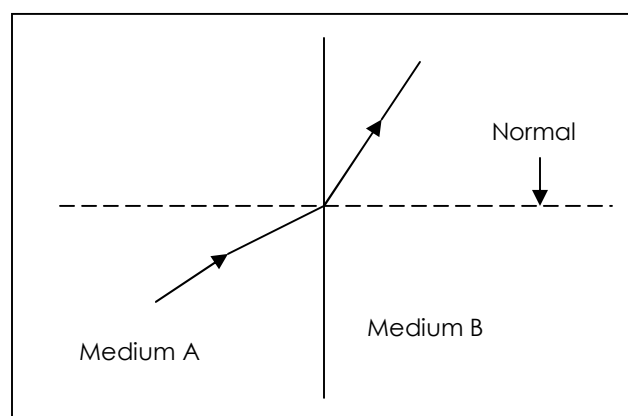
Fig. 11

Which of the following statements is true?

(A)   Medium A is denser than medium B.

(B)   Light travels slower in medium B than in medium A.

(C)   Medium A is less dense than medium B.

(D)   Light travels slower in A than in B.

32. A bimetallic strip operates on the principle that metals

(A)   are heat controllers.

(B)   are good heat conductors.

(C)   have different rates of expansion.

(D)   have the same rate of expansion.

33. The strongest audible frequency presenting a musical note is called

(A)   overtone.   (B)   harmonic

(C)   fundamental.   (D)   quality

34.
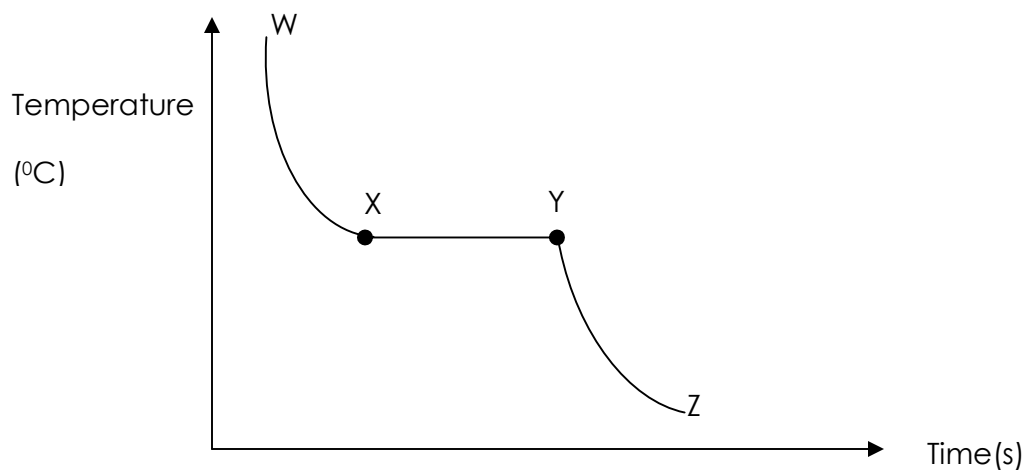
Fig. 12

The graph in Figure 12 shows a cooling curve of a pure substance. The substance is all in solid state between

(A)   W and X   (B)   W and Z
(C)   X and Y   (D)   Y and Z
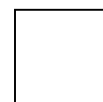
35.   In Figure 13 below, three slides of projectors each with a colour filter red, green and blue in a dark room are projected on a white screen.
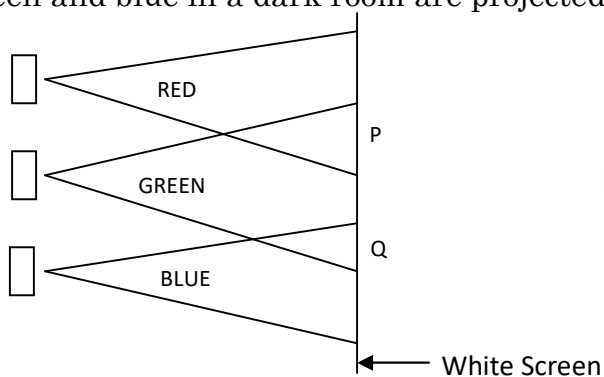
Fig. 13

What are the colours of P and Q?

	P	Q
(A)	Magenta	Yellow
(B)	Crayon	Yellow
(C)	Yellow	Crayon
(D)	Yellow	Magenta
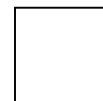
36. A column of air 26.25 cm long in a closed tube resonates to a surrounding tuning fork at the open end. If the velocity of sound in air is 336m s⁻¹. What is the frequency of the fork?
(A)   88 Hz   (B)   320 Hz
(C)   640 Hz   (D)   1280 Hz

37. A saturated vapour is obtained when
(A)   vapour is in with liquid.
(B)   vapour is in dynamic equilibrium with its liquid.
(C)   vapour obeys Boyle's law.
(D)   liquid is vaporizing.

38. Alternating current is preferred to direct current for transmission of power because
(A)   it can be rectified.   (B)   it is easier to generate.
(C)   it is expensive.   (D)   it is safer.

39. An alpha particle is incident on a nuclide X and produces a nuclide Y and two β-particles. The reaction is presented by

$$^{88}_{37}X + {}^{4}_{2}He \qquad\qquad {}^{x}_{y}Y + 2\beta$$

Which one of the following is correct?

(A) $x = 92,\ y = 37$ (B) $x = 92,\ y = 40$
(C) $x = 92,\ y = 35$ (D) $x = 92,\ y = 41$

40. Which of the following are all brittle materials?
(A)   Leather, rubber, thread.
(B)   Clay, glass, wood.
(C)   Glass, cast iron, stone.
(D)   Rubber, polyster, copper wire.

SECTION B (40 Marks)
Write your answers in the spaces provided.

41. (a) Distinguish between a **strut** and a **tie**.   (1 mark)

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....

(b) (i) Define *reinforced concrete*. (1 mark)

....

....

(ii) State two advantages of reinforced concrete that makes it a desirable building material. (2 marks)

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42. (a) Define the following terms:

(i) *Total internal reflection* (1 mark)

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(ii) *Critical angle* (1 mark)

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(b) With the help of a ray diagram, show how a convex lens can be used as a magnifying glass. (2 marks)

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43(a) State;

(i)   *Lenz's law of electromagnetism*.   (1 mark)

....

....

(ii)   *Faraday's law of electromagnetism*.   (1 mark)

....

....

(b)
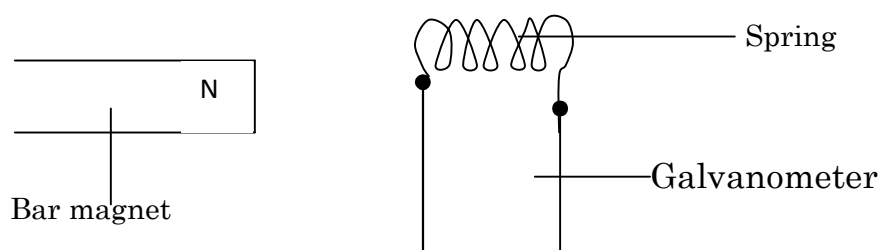
Fig. 14

Figure 14 above shows a spring connected to a galvanometer and placed near the north pole of a bar magnet.

(i)   State what is observed when the spring is moved towards and away from the
        pole of the magnet.   (1 mark)
....

....

(ii)   How can you increase on the effect in b (i) above?   (1 mark)

....

....

44(a)
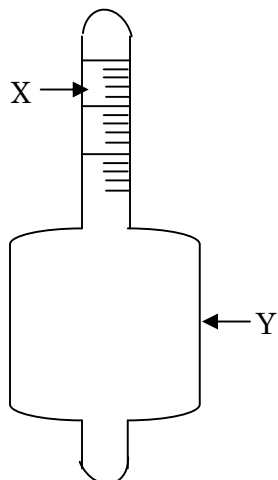
Fig. 15

The diagram in Figure 15 shows a hydrometer. Give a reason for the shape of the parts labelled. (2 marks)

(i)   X

....

....

(ii)   Y

....

....

(b)   State *two* applications of density measurements. (2 marks)

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45 (a) What is meant by the term *standing wave*? (1 mark)

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(b)   Figure 16 below shows plane waves approaching two narrow gaps on a barrier.

Fig. 16
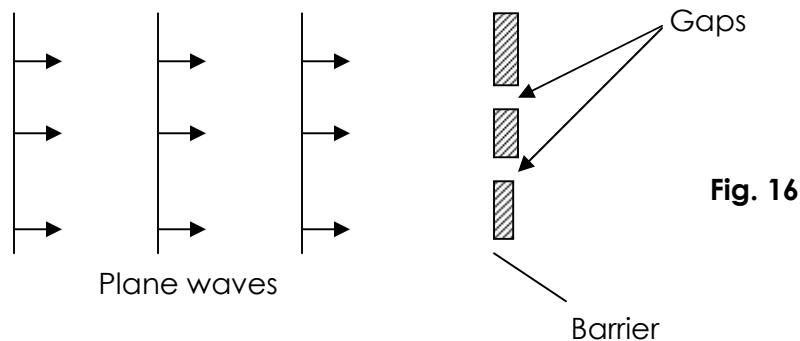
(i)   Show on the diagram, the appearance of the waves after the barrier.

(1 mark)

(ii)   What is the effect of combining the two gaps to form a very small gap?

(2 marks)

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46(a) The specific heat capacity of water is $4200Jkg^{-1}K^{-1}$. What is meant by the above statement?   (1 mark)

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(b)   State **two** reasons why water is used in the cooling system of a car engine?

(2 marks)

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(c)   What is the use of a vacuum in a thermos flask?   (1 mark)

....

47.   A symbol $^{237}_{93}Np$ denotes a neptunium nucleus.

(a)   What is the meaning of;   (2 marks)

        (i)   237

....

....

        (ii)   93

....

....

(b)   Write down a balanced nuclear equation showing the decay of $^{237}_{93}Np$ to a
        nuclide Y by emission of an alpha particle and gamma rays.   (2 marks)

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48(a)   State *two* ways of increasing stability of a body.   (1 mark)

....

....

(b)

Fig. 17

Figure 17 above shows a beam of weight, **W** suspended on a string balancing with a mass of weight 0.5N hang at **B**. Calculate the tension, **T** in the string.

(3 marks)

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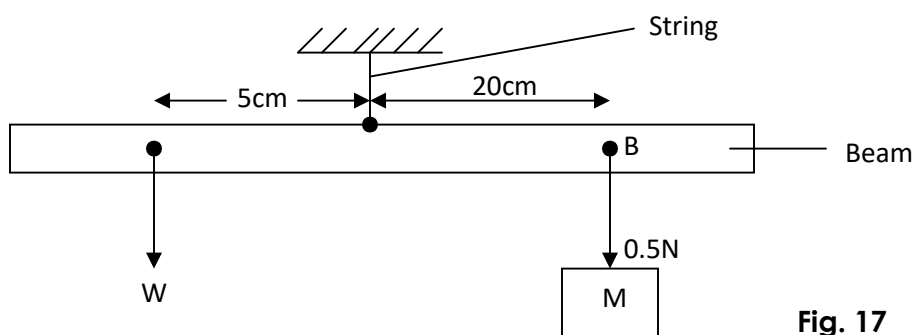..

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49.   A spherical metal ball is dropped into a liquid in a tall container.

(a)   Sketch a graph to show the variation of velocity of the ball with time.

(2 marks)

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(b)   Explain the features of the graph.   (2 marks)

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50(a) State the principle of ***conservation of linear momentum***.   (1 mark)

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(b)   A car of mass 1 tonne moving at $25ms^{-1}$ collides with a stationary car of mass 500kg. After collision, the first car continues to move in the same direction with a velocity of $20ms^{-1}$. Calculate the velocity of the second car after collision and state its direction.   (3 marks)

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END