Name .....Centre/Index No.....

Signature .....

535/1
Physics
July/August, 2023
Paper 1
2 ¼ Hours

MATIGO MOCK EXAMINATIONS BOARD

Uganda certificate of education

PHYSICS
PAPER 1
2 Hours: 15Mimutes

INSTRUCTIONS TO CANDIDATES:

- *Write your name, signature, Centre/Index number clearly in the space above*
- *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 space provided in the question paper.*
- *Acceleration due to gravity =* $10ms^{-2}$
- *Speed of sound in air =* $330ms^{-1}$
- *Specific latent heat of fusion =* $3.36 \times 10^5 Jkg^{-1}$
- *Specific latent heat of vaporization =* $2.26 \times 10^6 Jkg^{-1}$
- *Specific heat capacity of water =* $4200 Jkg^{-1}k^{-1}$
- *Speed of light in air =* $3.0 \times 10^8 ms^{-1}$

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

Turn Over

SECTION A: (40 MARKS)

1. In order to calibrate a degree Celsius thermometer the lowest fixed point can be found by placing the thermometer in;

A. Melting ice with a large quality of salt mixed in
B. Pure distilled water
C. Pure boiling water
D. Pure melting ice

2. Which energy resource doesn't derive its energy from the sun?

A. Geothermal
B. Hydroelectric
C. Oil
D. Waves

3. What must change when a body is accelerating

A. The force acting on the body
B. The mass of the body
C. The speed of the body
D. The velocity of the body

4. Which of the following doesn't affect the pressure beneath the surface of a liquid.

A. Area of the liquid surface
B. Density of the liquid
C. Depth of the liquid
D. Strength of the gravitational field

5. When two forces are combined, the size of the resultant depends on the angle between the two forces. Which of the following cannot be the magnitude of the resultant when forces of magnitude 3N and 4N are combined

A. 1N **B.** 5N **C.** 7N **D.** 8N

6. A manometer is connected to a gas supply as shown in **figure 1**.

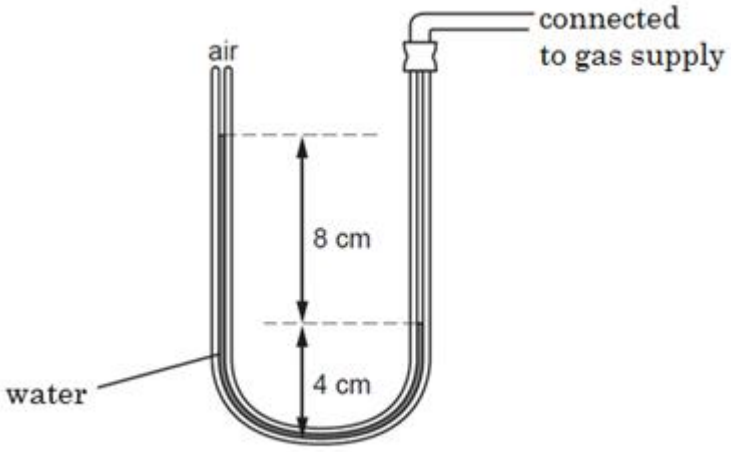


figure 1

Pressure can be measured in cm of water. What is the pressure of the gas?

A. 8 cm of water more than atmospheric pressure
B. 12 cm of water more than atmospheric pressure
C. 8 cm of water less than atmospheric pressure
D. 12 cm of water less than atmospheric pressure

7. When ice melts to become water, which force must be overcome?

A. The attraction between electrons and the nucleus
B. The attraction between the atoms in a molecule
C. The force between molecules
D. The force of gravity

8. Figure 2. shows a wave travelling on the sea. Which points are one wavelength apart?

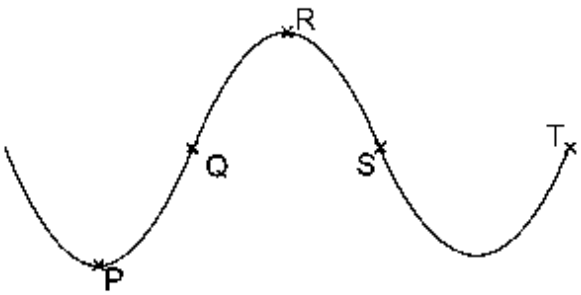


figure 2

A. P and R **B.** Q and S **C**. Q and T **D**. S and T

9. Four processes are used to charge an isolated metal sphere.

P the sphere is earthed by touching it
Q the earth connection is removed from the sphere
R a charged rod is brought close to the sphere
S the charged rod is removed

In which order should these processes be carried out to charge the sphere?

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

10. A 24Ω resistor is to be connected in series with a 12V battery. What is the power loss in the resistor

A. 0.5W **B.** 6W **C.** 12W **D.** 24W

11. How much heat is needed to change 0.02kg of ice at 0℃ to steam at 100℃

A. 5400J **B.** 6800J **C.** 8400J **D.** 60320J

12. Which of the following occurs in the decay of a radioactive nucleus?

A. The nucleus absorbs another nucleus
B. The nucleus absorbs at least one form of radiation
C. The nucleus always splits into two equal fragments
D. The nucleus emits at least one of radiation

13. When an object is falling under gravity with terminal velocity, its speed

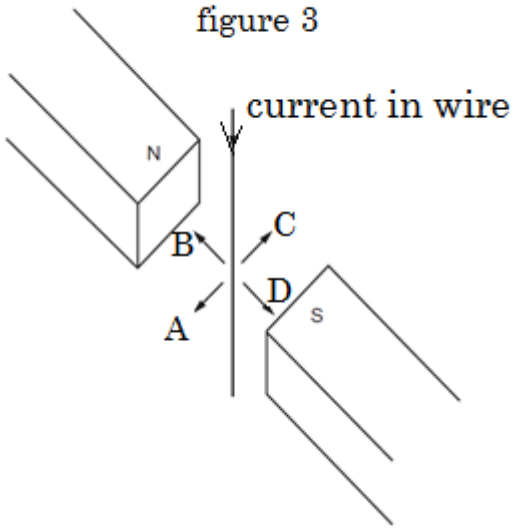
A. Decrease to a lower value
B. Decrease to zero
C. Increases
D. Stays constant

14. Which of the following groups of physical quantities consists only of scalars

A. Acceleration, force, velocity
B. Acceleration, mass, speed
C. Force, time, velocity
D. Mass, speed, time

15. A wire hangs between the poles of a magnet as shown in **figure 3**. When there is a current in the wire, in which direction does the wire move?

figure 3



16. In a fission reactor, which particle causes a Uranium 235 nucleus to split?

A. Alpha particle
B. Gamma ray
C. Neutron
D. Proton

17. What is true for real images formed by a converging lens

A. They are inverted
B. They are on the same side of the lens as the object
C. They cannot be formed on screen
D. They cannot be seen by human eye

18. A boy who weighs 50N, runs up a flight of stairs 6.5m high in 7 seconds. How much power does he develop?

A. $\frac{6.5}{50 \times 7}$ W **B.** $\frac{7 \times 6.5}{50}$ W **C.** $\frac{50}{7 \times 6.5}$W **D.** $\frac{50 \times 6.5}{7}$ W

19. Which energy changes take place when a pedaling cyclist uses a generator (dynamo) to light his bicycle lamp?

A. Chemical to kinetic to electrical to light
B. Electrical to chemical to kinetic to light
C. Kinetic to chemical to light to electrical
D. Light to electrical to kinetic to chemical

20. Ten identical steel balls, each of mass 27g are immersed in a measuring cylinder containing $20cm^3$ of water. The reading of the water level rises to $50cm^3$. What is the density of the steel?

A. $0.9gcm^{-3}$ **B.** $8.1gcm^{-3}$ **C.** $9.0gcm^{-3}$ **D.** $13.5gcm^{-3}$

21. One oscillation of a swinging pendulum occurs when the bob moves to and fro. Using a stop watch, which would be the most accurate way to measure the time for one oscillation of the pendulum that made 20 complete oscillations.

A. Time for 20 oscillations multiplied by 20
B. Time for 20 oscillations divided by 20
C. Time for 20 oscillations multiplied by 2
D. Time for 20 oscillations divided by 2

22. The engine of a car produces a driving force of 5000 N on the car. Resistive forces R also act on the car, as shown.

The car has a mass of 800kg and an acceleration of $1.0ms^{-2}$
What is the value of *R*?

A. 800N **B**. 4200N **C**. 5800N **D**. 8000N

23. The type of friction experienced by a body just about to start moving is called

A. Viscous drag
B. Static friction
C. Limiting friction
D. Dynamic friction

24. In a vacuum flask, which methods of heat transfer are prevented by the vacuum

A. conduction only
B. convection only
C. conduction and convection only
D. conduction, convection and radiation

25. Which of the following does **not** produce a sound wave?

A. A bell ringing under water
B. A gun fired in a room with no echoes
C. a hammer hitting a block of rubber
D. an explosion in outer space

26. How could the unit of potential difference, the volt also be written

A. $\mathbf{As^{-1}}$
B. $\mathbf{CA^{-1}}$
C. $\mathbf{CJ^{-1}}$
D. $\mathbf{JC^{-1}}$

27. Which of the following has no effect on the size of the turning effect on the coil of an electric motor

A. The size of current in the coil
B. The direction of the current in the coil
C. The number of turns in the coil
D. The strength of the magnetic field

28. Why is electricity transmitted a long power lines at very high voltages?

A. To reduce the resistance of the cable
B. So that transformers can be used
C. To make sure that the current is the same all the way along the power lines
D. To reduce loss of energy

29. The trace in figure 4 is shown on the screen of an oscilloscope when it is connected to a transformer. The scale is set at 5 V per centimeter.

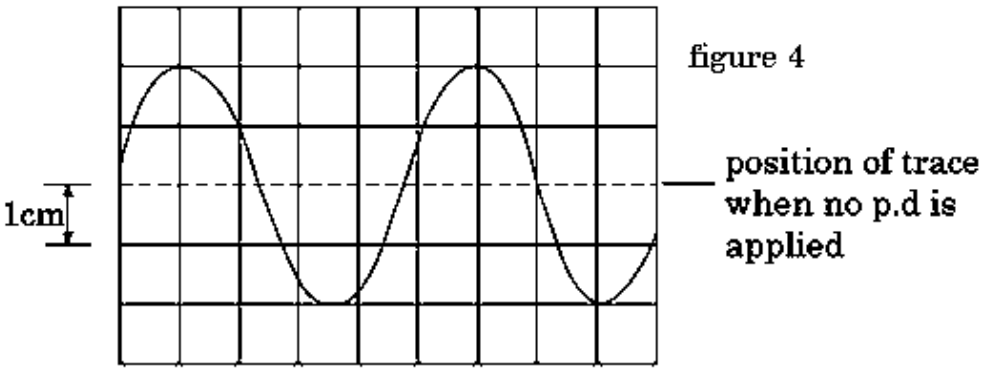


figure 4

What is the value of the peak voltage?

A. 4V **B.** 5V **C.** 10V **D.** 20V

30. The nucleus of a nitrogen atom can be represented as $^{14}_{7}N$. The nucleus of this atom consists of ……

A. 7 protons and 7 electrons
B. 7 protons and 7 neutrons
C. 14 protons and 7 electrons
D. 14 protons and 7 neutrons

31. The wavelength of a signal radio is 340cm. Determine the frequency at which this radio station broadcasts.

A. 8.82×10^{7}HZ

B. 11.3×10^{-9}HZ

C. 11.3×10^{-9}HZ

D. 8.82×10^{5}HZ

32. Which is a statement of newton's third law of motion?

A. Every force causes a reaction

B. If there is no resultant force on a body then there is no acceleration

C. The force acting on a body are always equal and opposite

D. To every action there is an equal but opposite reaction

33. A substance consists of particles that are close together and vibrating in fixed positions at random. The average speed of the particles is gradually increasing. What best describes the substance

A. A liquid being boiled to form a gas

B. A liquid being boiled to form a gas

C. A solid being heated

D. A solid being melted to form a liquid

34. Figure 5 shows a wave moving into shallower water. The wavelength of the waves is reduced because

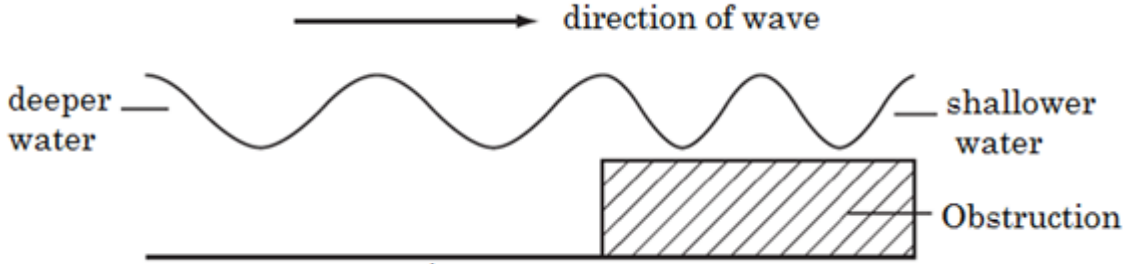


figure 5

A. Both the frequency and the speed decrease.

B. Both the frequency and the speed increase.

C. Only the frequency increases.

D. Only the speed decreases.

35. A student pushes the N-pole of a bar magnet into the end Q of a long solenoid and observes a deflection to the right on the sensitive ammeter as shown in **figure 6**.

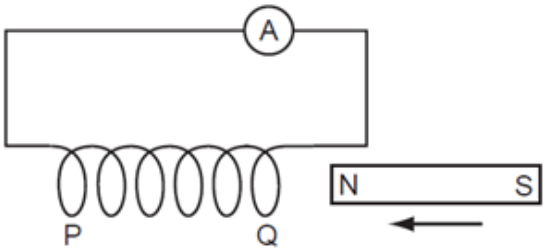


figure 6

What will produce a deflection in the same direction?

A. pulling the N-pole out of end Q
B. pulling the S-pole out of end P
C. pushing the N-pole into end P
D. pushing the S-pole into end P

36. The ability of the eye lens to vary it's focal length is referred to as

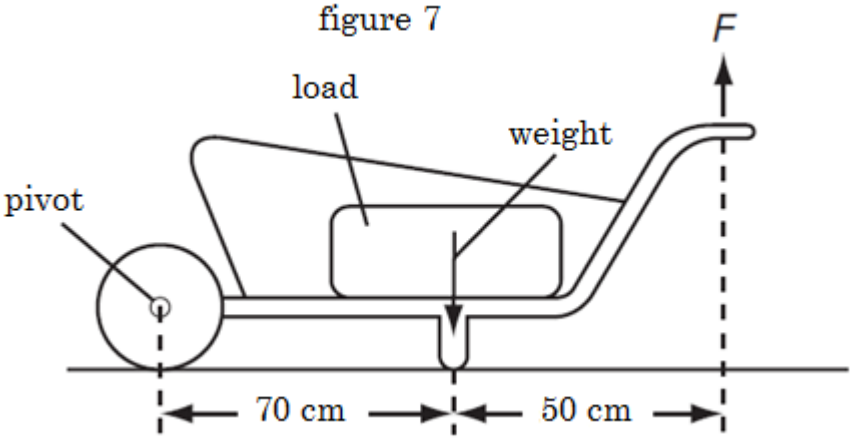
A. Myopia
B. Vision
C. Accommodation
D. Dispersion

37. An electric cooker is rated 240V, 3300W. the best fuse to use is

A. 11A **B.** 13A **C.** 15A **D.** 20A

38. A load is to be moved using a wheelbarrow as in **figure 7**. The total mass of the load and wheelbarrow is 60 kg.

figure 7



What is the size of force F needed just to lift the loaded wheelbarrow?

A. 350 N **B.** 430 N **C.** 600 N **D.** 840 N

39. Which one of the following properties is not true about elasticity of a spring of the same wire?

A. A thicker wire makes a stronger spring
B. A narrower spring is stronger than a wide one
C. The extension is inversely proportional to the length
D. The elastic limit is the load when the spring first doesn't return to its original length.

40. Loud speakers of a moving coil type can be used in the following except;

A. Generators
B. Public address system
C. Radio
D. Record player

SECTION B: (40 MARKS)

41. (a)(i) What is **resonance** (1 mark)

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(ii) State **two** conditions for a stationary wave to occur (1 mark)

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(b) A tuning fork of frequency 125Hz was used to determine the speed of sound in air. Calculate the wavelength of the sound produced by the tuning fork (2 marks)

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42. (a) Define the term **latent heat of vaporization** (1 mark)

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(b)(i) Steam from boiling water is passed through 3.0kg of water at 20℃. After this process the mass of water was found to be 3.08kg what is the new temperature of water (2 marks)

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(ii) State **two** ways through which heat loss can be minimized in the colorimeter experiments (1 mark)

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43. (a) Distinguish between **reflection** and **refraction** as applied to light (2 marks)

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(b) Draw a ray diagram to show the formation of the image when the object is placed between the convex lens and its principal focus (2 marks)

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44. (a) A rod of sulphur held in the hand and rubbed with a cloth becomes charged. A metal rod rubbed in the same way does not become charged. Explain these two effects

(i) Effect 1 (2 marks)

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(ii) Effect 2 (2 marks)

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45. (a) What is meant by;

(i) Atomic number? (1 mark)

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(ii) Mass number? (1 mark)

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(b) State any **two** radiations emitted by a radioactive nuclide (2 marks)

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46. Figure 8 shows a ray of light PQR passing along a simple optical fibre to its end at R.

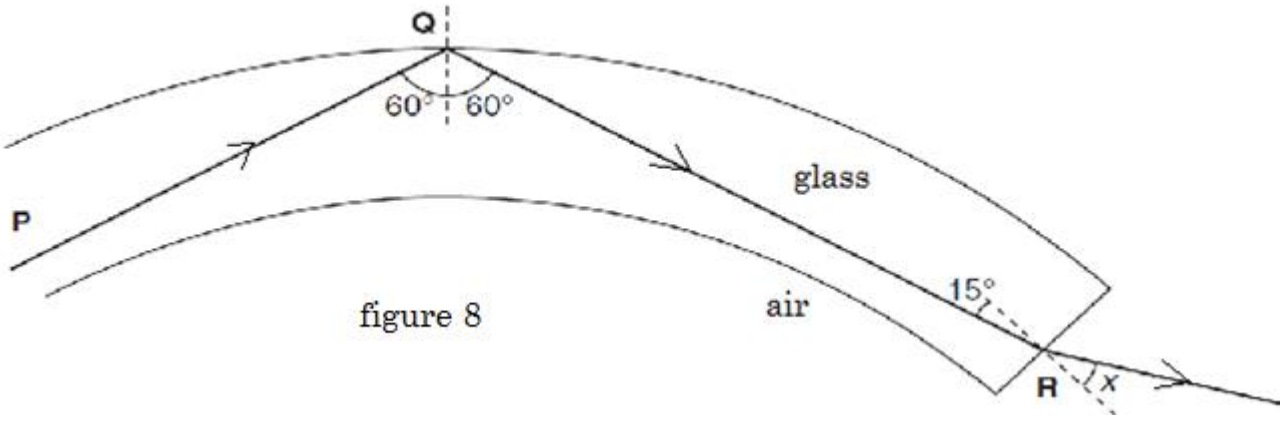

figure 8

(a) Explain why the ray **PQ** does not leave the optical fibre at **Q.** (1 mark)

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(b) The refractive index of glass is 1.5. The ray QR makes an angle of 15° with the normal to the glass surface at R. Calculate the angle x, shown on **Fig. 8** (2 marks)

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(c) State **one** advantage of optical fibres rather than copper wires for carrying telephone communications. (1 mark)

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47. An experiment to show charging by induction uses a metal sphere mounted on an insulated support. The sphere is initially uncharged and is shown in **Figure 9.**

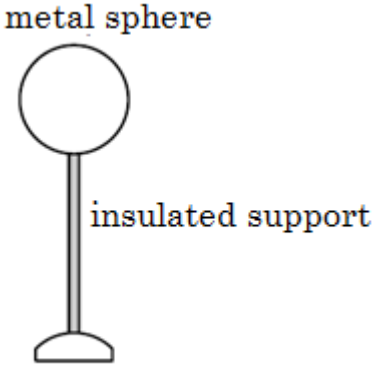

figure 9

(a) A negatively charged rod is brought near the sphere, as shown in **Figure10.**

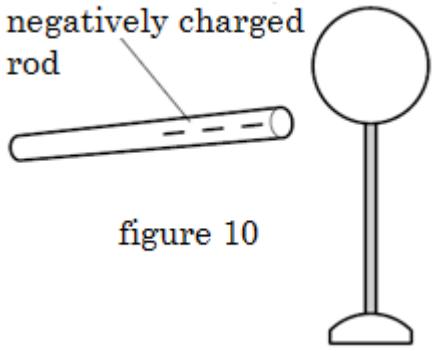

figure 10

(i) State and explain the movement of electrons in the sphere that occurs as the rod is brought near. (1 mark)

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(ii) On Fig. 10, draw the charges on the metal sphere. (1 mark)

(b) The metal sphere is now touched at point A by a wire connected to earth, as shown in Fig.11. On Fig. 11, draw the charges on the metal sphere. (1 mark)

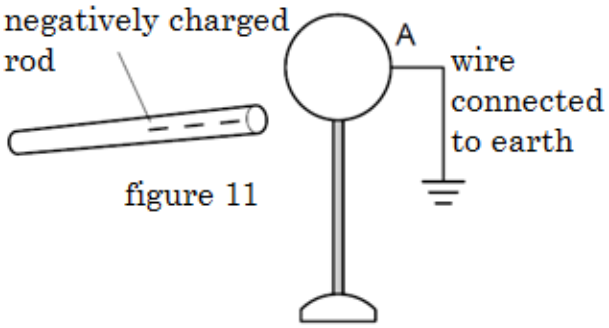

figure 11

(c) The wire connected to earth is removed. Then the negatively charged rod is also removed, as shown in Fig.12. On Fig.12, draw the charges on the metal sphere. (1 mark)

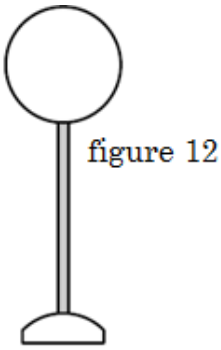

figure 12

48. (a) What is a transformer (1 mark)

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(b) Fig.13, Shows high voltage cables used to transmit electrical energy.

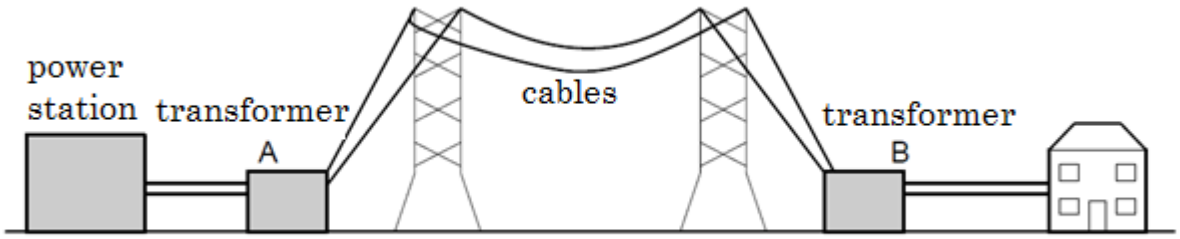

figure 13

(i) State the purpose of transformer B. (1 mark)

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(ii) In the space below, draw a labelled diagram to show the structure of transformer B. (2 marks)

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49. (a) State **Ohm's** law (1 mark)

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(b) Figure 14 below shows two resistors that are connected with a battery of E.m.f 4V and negligible internal resistance. Find the current through a 3Ω resister (3 marks)

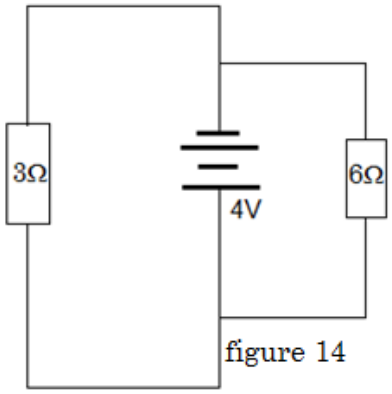

figure 14

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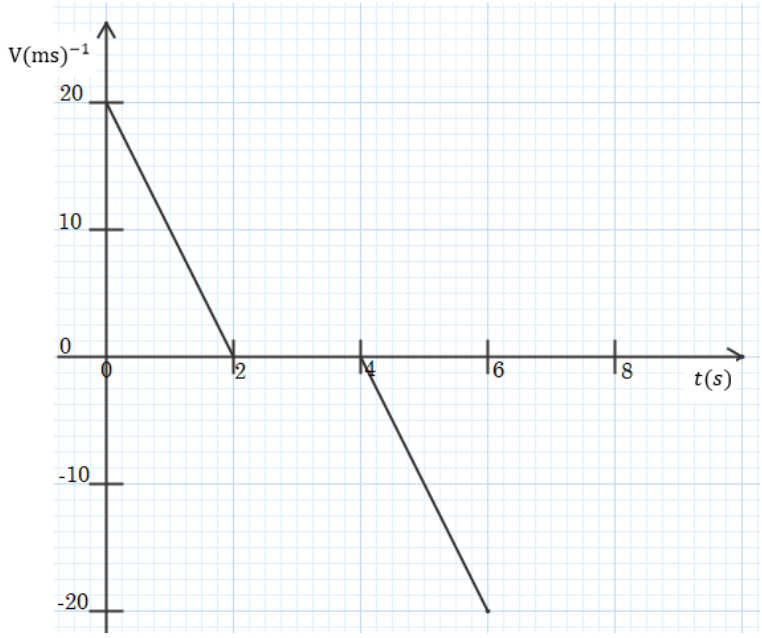
50. Below is a velocity time graph of a body



(i) Describe the motion of the body. (02 marks)

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(ii) Calculate the total displacement covered. (02 marks)

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