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LITTORAL PHYSICS TEACHERS' ASSOCIATION (LIPTA)

REGIONAL MOCK EXAMINATION

GENERAL CERTIFICATE OF EDUCATION

0580 PHYSICS 1

MARCH 2022 **ORDINARY LEVEL**

Centre Number	
Centre Name	
Candidate Identification Number	
Candidate Name	

One and a half Hours

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.

1. USE A SOFT HB PENCIL THROUGH OUT THE EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the examination begins

3. Check that this question booklet is headed 'Ordinary level – 0580 Physics 1'.
4. Insert the information required in the spaces.
5. Insert the information required in the answer sheet using your HB pencil: **Candidate Name, Exam Session, Subject Code, Centre Number** and **Candidate Number**. Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.

How to answer the questions in this examination.

6. Answer **ALL** the **50 questions** in this examination. All questions carry the same mark.
7. Calculators are allowed.
8. Each question has FOUR suggested answers; A, B, C and D. Decide which answer is correct. Find the question number on the answer sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen. For example if C is the correct answer, mark C as shown below.

[A] [B] [C] [D]

9. Mark only one answer for each question. If you mark more than one answer, you will score zero for that question. If you change your mind about an answer, erase the first mark carefully, and then mark your new answer.
10. Avoid spending too much time on any question. If you find a question difficult, move on to the next question. You can come back to this question later.
11. Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.
12. Mobile phones are NOT allowed in the examination room.
13. **You must not take this booklet and answer sheet out of the examination room**
14. You may find the following constants useful.
    Acceleration of free fall, $g = 10\ m/s^2$
    The speed of light in a vacuum, $c = 3 \times 10^8\ m/s$
    The charge on an electron, $e = -1.6 \times 10^{-19}\ C$

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SECTION 1
(40 Questions)

Directions:
Each of the questions or incomplete statements in this section is followed by four suggested answers. Select the best answer for each question.

Questions 1 – 40

1. An example of a base unit is
   A. watt
   B. volt
   C. coulomb
   D. ampere

2. *Figure 1* shows a fish at rest in a pond.

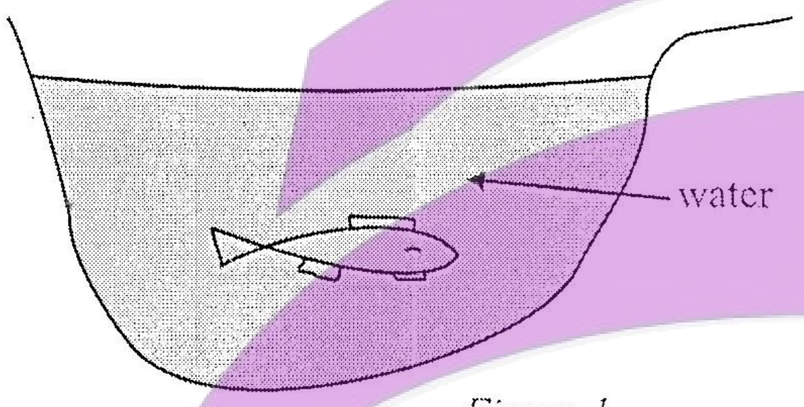

Figure 1

The pressure exerted by the water on the fish depends on
   A. the density of the fish
   B. the mass of the fish
   C. the upthrust on the fish
   D. how deep the fish is in the water

3. A spring extends by 2.0 cm when a force of 160 N is applied to it. The force which will produce an extension of 7.0 cm is
   A. 700 N
   B. 625 N
   C. 560 N
   D. 400 N

4. A rock of mass 5 kg rolls down a gentle-sloping hill at a constant speed of 10 m s^{-1}. The kinetic energy of the stone is
   A. 250 J
   B. 500 J
   C. 750 J
   D. 875 J

5. For any machine with an efficiency of 70%,
   A. load is less than effort
   B. energy output is less than energy input
   C. velocity ratio is less than mechanical advantage
   D. mechanical advantage is always less than 1

6. The image formed by a plane mirror is always
   A. larger than the object
   B. upside down
   C. virtual
   D. smaller than the object

7. *Figure 2* shows a ray of light incident onto an air-glass boundary. The critical angle of the glass is 43°.

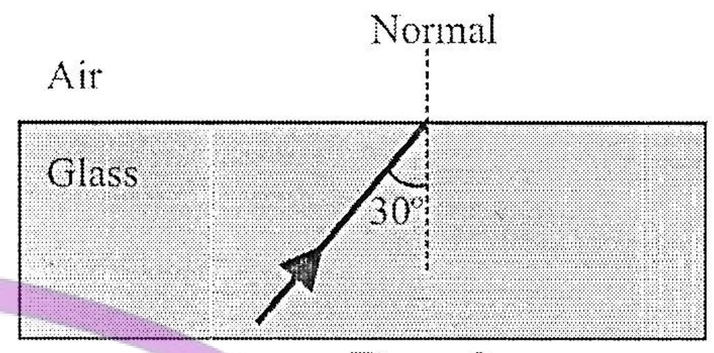

Figure 2

What happens to the ray of light?
   A. It emerges into the air and bends away from the normal
   B. It emerges into the air and bends towards the normal
   C. It emerges into the air and continues along the same path
   D. It is completely reflected into the glass

8. A convex lens with a focal length of 12 cm forms the image of an object which is placed 24 cm in front of the lens. The image formed is
   A. virtual
   B. erect
   C. on the same side of the lens
   D. having the same size as the object

9. Which of the following forces is responsible for the floating of a plastic cup in water?
   A. Upthrust
   B. Normal reaction
   C. Weight
   D. Drag force

10. The velocity of a moving object is equal to
   A. The area under its displacement-time graph
   B. The slope of its velocity-time graph
   C. The area under its velocity-time graph
   D. The slope of its displacement-time graph

11. Which row correctly states whether momentum and kinetic energy are conserved during an inelastic collision in which no external forces are acting?

	Momentum	**Kinetic energy**
A.	Conserved	Conserved
B.	Not conserved	Conserved
C.	Conserved	Not conserved
D.	Not conserved	Not conserved

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12. Which of the following features of a clinical thermometer permits a reading to be taken any time after measurement?
A. Short range
B. Constriction
C. Length of the liquid column
D. Narrow bore of the capillary tube

13. A block of copper of mass 2.0 kg is supplied with 5460 J of heat energy. Given that the specific heat capacity of copper is 390 J kg K^{-1}, the temperature of the block will increase by
A. 5 °C
B. 7 °C
C. 14 °C
D. 15 °C

14. *Figure 3* shows a thick copper plate that is very hot. One side is black, and the other side is shiny. A student places her hands at the same distance from the plate as shown.

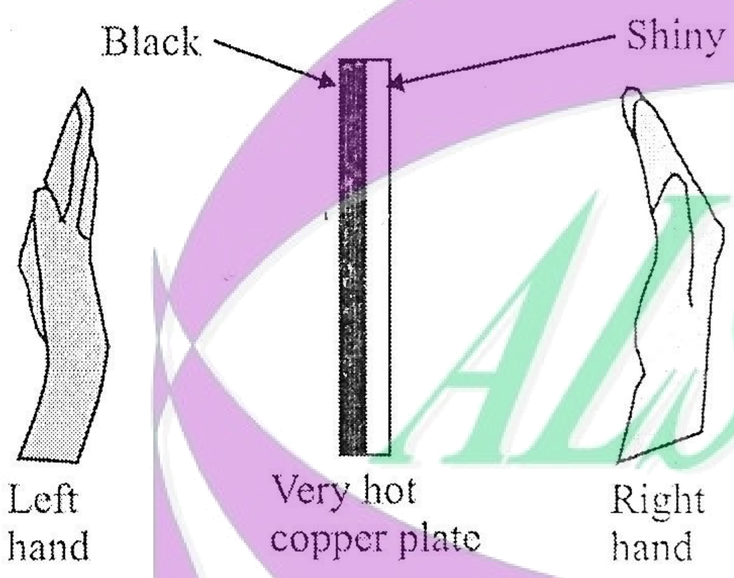

Figure 3

The left hand feels warmer than the right hand because
A. the black side is hotter than the shiny one
B. the shiny side radiates more heat
C. the shiny side is cooling faster than the black one
D. the black side radiates more heat

15. Which row describes what happens to the mass and the density of a solid when it is heated?

	Mass	Density
A.	remains the same	decreases
B.	increases	remains the same
C.	increases	increases
D.	remains the same	remains the same

16. *Figure 4* shows wave two crests of an ocean wave.

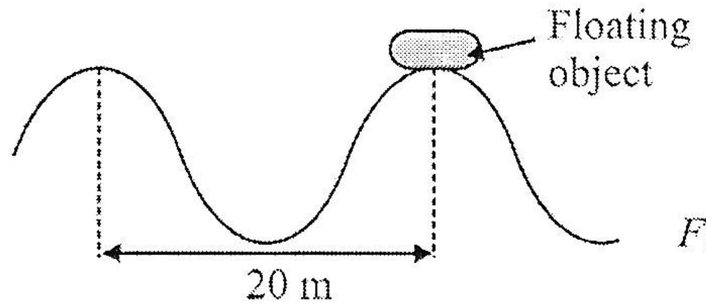

Figure 4

If the floating object moves up and down at a period of 5.0 s, the speed of the ocean wave is
A. 0.25 m s^{-1}
B. 2.0 m s^{-1}
C. 4.0 m s^{-1}
D. 100 m s^{-1}

17. The siren of an ambulance is adjusted in such a way that the pitch of the sound it produces increases without affecting its loudness. How are the amplitude and frequency affected?

	Amplitude	Frequency
A.	Higher	The same
B.	The same	Higher
C.	Higher	Lower
D.	The same	Lower

18. Which of the following electromagnetic waves has a frequency that is lower than the frequency of visible light?
A. Radio wave
B. Ultraviolet radiation
C. X-rays
D. Gamma radiation

19. If a glass rod is rubbed vigorously with dry cloth, the rod becomes
A. positively charged because it loses electrons
B. positively charged because it gains electrons
C. negatively charged because it loses electrons
D. negatively charged because it gains electrons

20. *Figure 5* shows a circuit with two resistors connected in series with a 12 V battery.

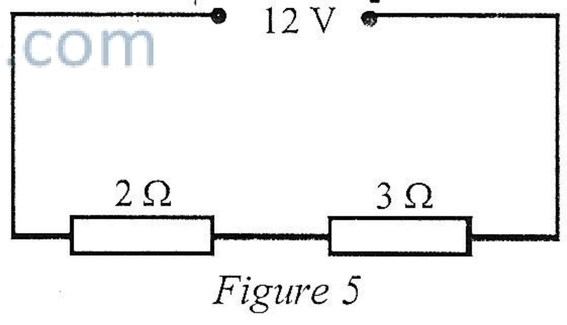

Figure 5

The current flowing in the circuit is
A. 60 A
B. 16 A
C. 10 A
D. 2.4 A

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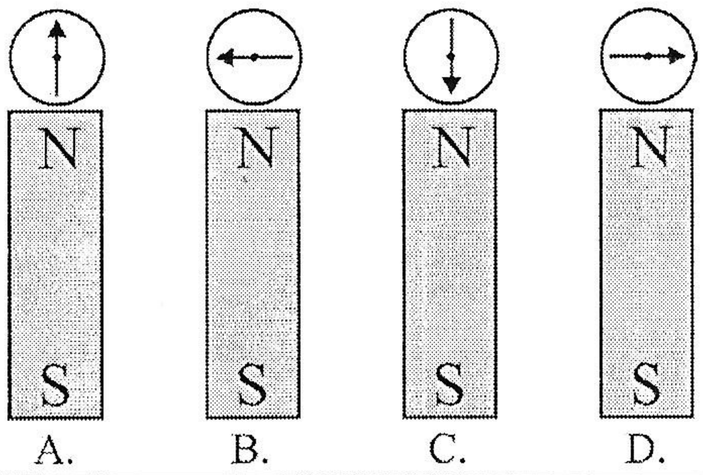
21. A small magnetic compass is placed beside the North pole of a bar magnet. Which of the following diagrams shows the correct direction of the compass needle?



22. *Figure 6* shows a straight current-carrying conductor placed between two magnetic poles.

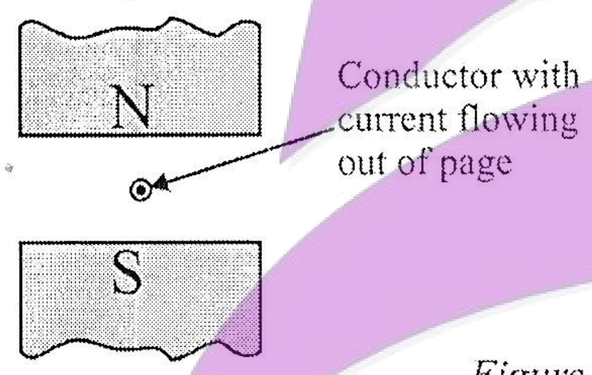


Figure 6

What is the direction of the force on the conductor if current flows through it as shown?
A. Up
B. Down
C. Right
D. Left

23. In a research laboratory, the activity of a certain radioisotope sample is measured to be 24 Bq. If the radioisotope has a half-life of 15 days, then after 45 days, the activity of the sample will be
A. 12 Bq
B. 3 Bq
C. 8 Bq
D. 6 Bq

24. Which of the following is an isotope of the aluminium nuclide $^{27}_{13}\text{Al}$?
A. $^{27}_{14}\text{J}$
B. $^{29}_{13}\text{K}$
C. $^{28}_{12}\text{L}$
D. $^{27}_{12}\text{M}$

25. *Figure 7* shows the path of the radiation from a source as it moves through an electric field. The source emits alpha particles, beta particles and gamma radiation

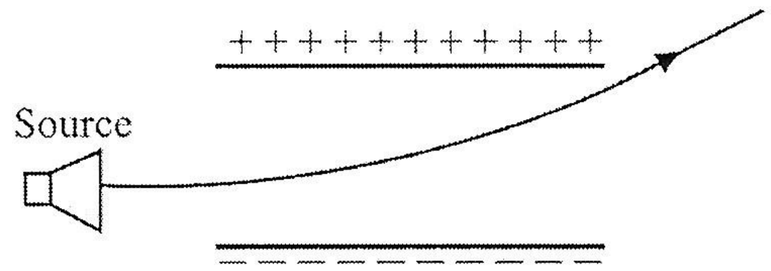
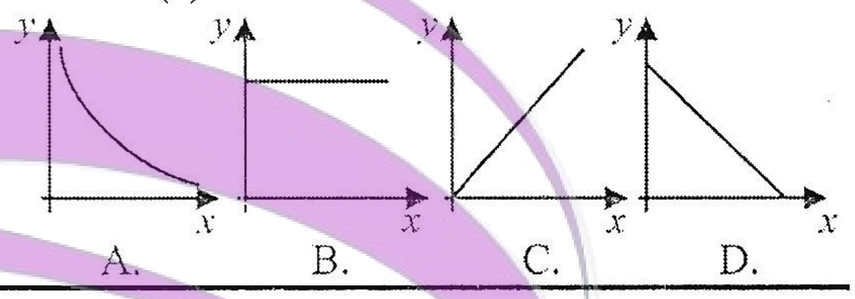


Figure 7

The radiation whose path is shown on the diagram is made up of
A. Alpha particles and beta particles
B. Beta particles only
C. Alpha particles only
D. Gamma radiation only

26. Which of the following graphs shows how the mass of a block (y) of copper varies with its volume (x)?



27. A student of mass 60 kg runs up a flight of 40 stairs in 120 seconds. If the height of one stair is 25 cm, the average power of the student is
A. 100 W
B. 25 W
C. 30 W
D. 50 W

28. A form three student observed that when a triangular glass prism is used to focus sunlight onto a wall, different colours of light are observed. This phenomenon is referred to as
A. reflection
B. refraction
C. dispersion
D. diffraction

29. *Figure 8* shows a ray of light moving from a glass block into air.

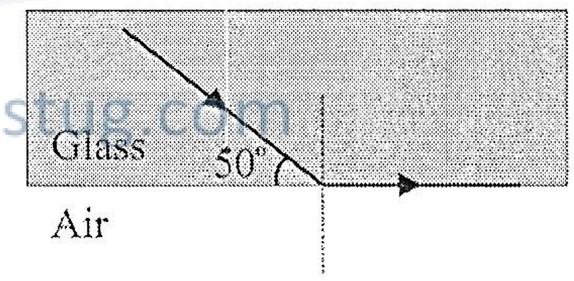


Figure 8

The refractive index of the glass is
A. $\sin 50^o$
B. $\dfrac{1}{\sin 50^o}$
C. $\sin 40^o$
D. $\dfrac{1}{\sin 40^o}$

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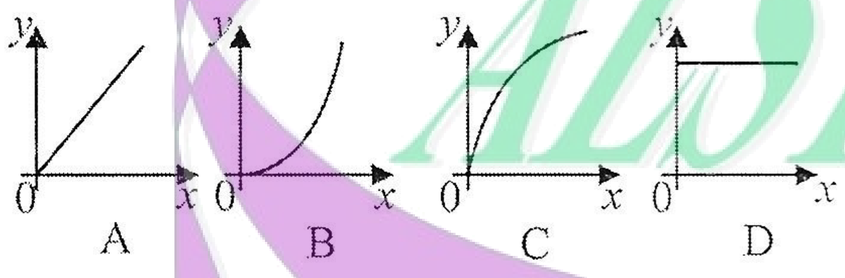
30. Which of the following can produce an image that is virtual and larger than the object?
A. Convex lens
B. Plane mirror
C. Concave lens
D. Plane mirror and concave lens

31. A bag of cement has a mass of 20 kg on earth where the acceleration due to gravity is 10 m s^{-2}. If the bag of cement is taken to the moon where the acceleration due to gravity is 1.6 m s^{-2}, its mass will become
A. 32 kg
B. 3.2 kg
C. 20 kg
D. 200 kg

32. A car accelerates uniformly at 2 m s^{-2} from rest. After 10 s, the distance covered by the car will be
A. 20 m
B. 40 m
C. 50 m
D. 100 m

33. Which of the following graphs shows how the displacement (y) varies with time (t) for an object that is moving at a constant velocity?



34. *Figure 9* shows the forces acting on a box of mass 2 kg.

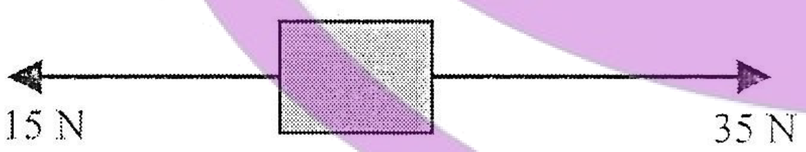


Figure 9

The acceleration of the box is
A. 40 m s^{-2}
B. 25 m s^{-2}
C. 20 m s^{-2}
D. 10 m s^{-2}

35. The mercury column of a liquid-in-glass thermometer has a length of 4 cm at 0 °C and 16 cm at 100 °C. The fundamental interval of the thermometer is
A. 100 °C
B. 12 cm
C. 20 cm
D. 0 °C

36. J kg^{-1} is the SI unit of
A. specific heat capacity
B. heat capacity
C. specific latent heat
D. latent heat

37. Which of the following will cause an increase in the resistance of a copper wire?
A. Decrease in length
B. Decrease in temperature
C. Increase in cross-sectional area
D. Decrease in cross-sectional area

38. When a wave moving on the surface of water hits a hard surface projected above the water, the amplitude reduces as a result of
A. decrease in wave energy
B. change of wave source
C. increase in wave speed
D. change in wave direction

39. A guitar string produces a sound with a frequency of 150 Hz when a tension of 50 N is applied on the string. If the tension in the string is increased to 200 N without changing its length, the frequency of the sound produced will be
A. 600 Hz
B. 422 Hz
C. 300 Hz
D. 38 Hz

40. A negatively charged object is brought near the cap of a negatively charged electroscope. The leaf of the electroscope
A. rises further because electrons are pulled away from the leaf and plate
B. rises further because electrons are pushed towards the leaf and plate
C. falls because electrons are pushed towards the leaf and plate
D. falls because electrons are pulled away from the leaf and plate

SECTION 2
(10 Questions)

Directions:
These groups of questions deal with practical situations. Each situation is followed by a group of questions. Select the best answer for each question.

Questions 41–43 are based on the hydraulic machine in *figure 10* in which an effort of 160 N applied on the smaller piston of area A_1 is used to raise a load of 800 N on the larger piston of area A_2.

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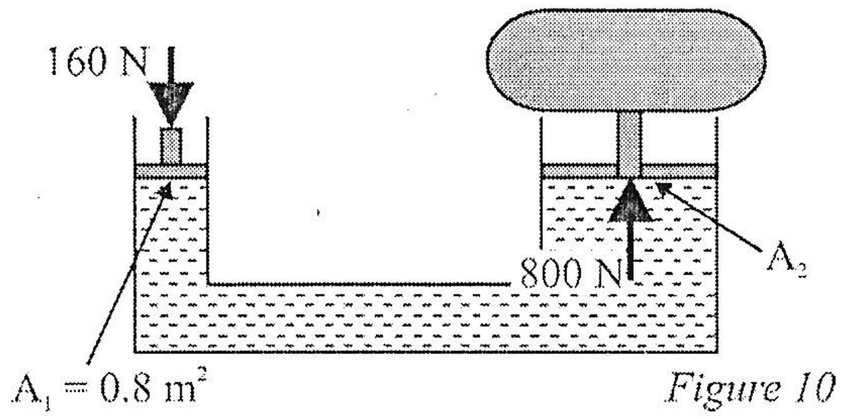


Figure 10

41. The above machine works based on
    A. Archimedes principle
    B. Pascal's principle
    C. Principle of moment
    D. Momentum principle

42. The mechanical advantage of the machine is
    A. 5
    B. 0.2
    C. 2.0
    D. 128

43. The area of the larger piston is
    A. 0.2 m^2
    B. 2 m^2
    C. 4 m^2
    D. 8 m^2

Questions 44 – 47 are based on *figure 11* which shows an iron rod, XY, placed in a magnetic field and connected to a galvanometer using a copper wire.

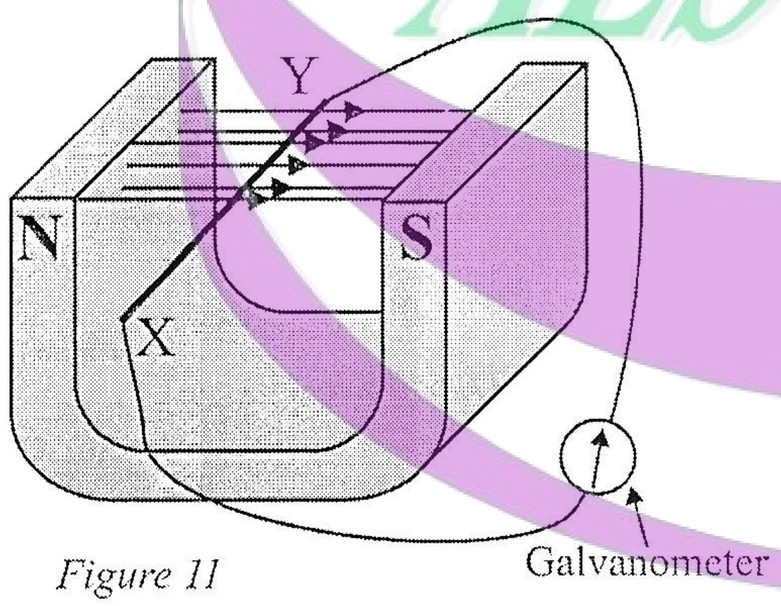


Figure 11

44. The centre-zero galvanometer can be made to deflect to one direction by moving the iron rod
    A. towards the south pole
    B. towards the north pole
    C. up and down
    D. upwards

45. The deflection of the galvanometer due to the movement of the rod is an example of
    A. electromagnetic induction
    B. Law of conservation of momentum
    C. motor effect
    D. Fleming's Left-hand rule

46. The direction of the current produced in the rod as it is moved in the field can be determined using
    A. Fleming's Left-hand rule
    B. Fleming's Right-hand rule
    C. Maxwell's corkscrew rule
    D. Right-hand grip rule

47. Which of the following laws relates the speed at which the conductor is moved to the size of the current produced in the conductor?
    A. Maxwell's corkscrew rule
    B. Lenz's Law
    C. Fleming's Right-hand rule
    D. Faraday's Law

Questions 48 – 50 are based on *figure 12* which shows a set-up used by a student to investigate how the current through a copper wire varies with the potential difference across it.

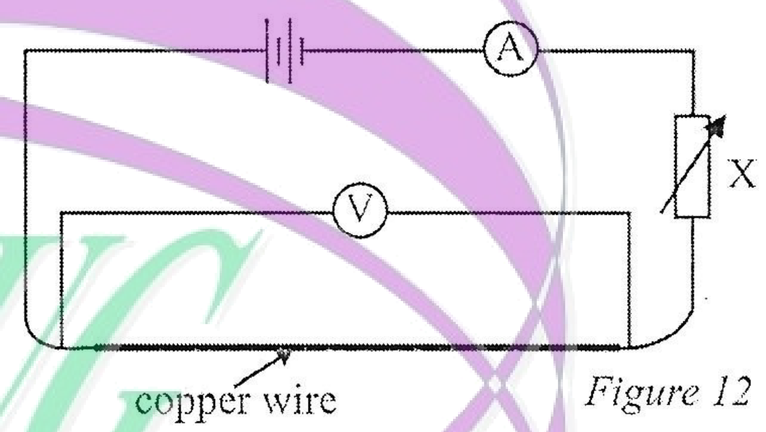
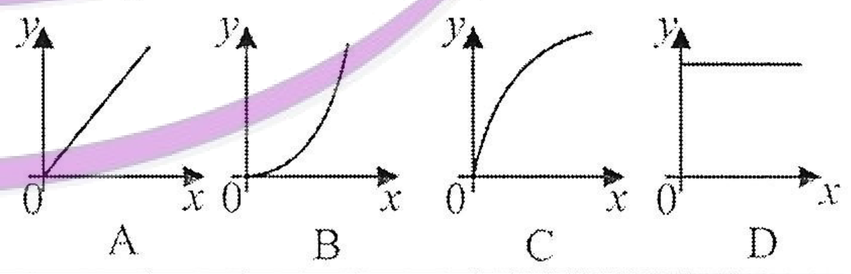


Figure 12

48. The circuit component labelled X is used to
    A. increase the p.d. across the copper wire
    B. prevent overheating of the circuit
    C. vary the current in the circuit
    D. ensure that current flows in one direction

49. Which of the following graphs shows how the reading of the ammeter (y) varies with the reading of the voltmeter (x)?



50. The ratio $\frac{\text{reading of voltmeter}}{\text{reading of ammeter}}$ gives
    A. charge flowing in the circuit
    B. electromotive force
    C. power dissipated by the copper wire
    D. electrical resistance of the copper wire

END!!!!!

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