

EXAMINATIONS COUNCIL OF ZAMBIA

Joint Examination for the School Certificate
and General Certificate of Education Ordinary Level

PHYSICS

5054/1

PAPER 1 Multiple Choice

Thursday

10 November 2005

1 hour

Additional materials:

Multiple choice Answer card

Soft clean eraser

Soft pencil (type B or HB is recommended)

Time: 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

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There are **forty (40)** questions in this paper.

Answer **all** questions.

For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in soft pencil on the answer sheet provided.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

- 1 A scientist made a clock using a copper rod and a heavy mass as a pendulum. What happens when the clock gets hot?

The pendulum clock ...

- A gains time.
 B loses time.
 C time remains the same.
 D first loses and then gains time.
- 2 A ball is dropped from a high building. It strikes the ground and bounces up until it reaches its maximum height. Which graph best represents these movements?

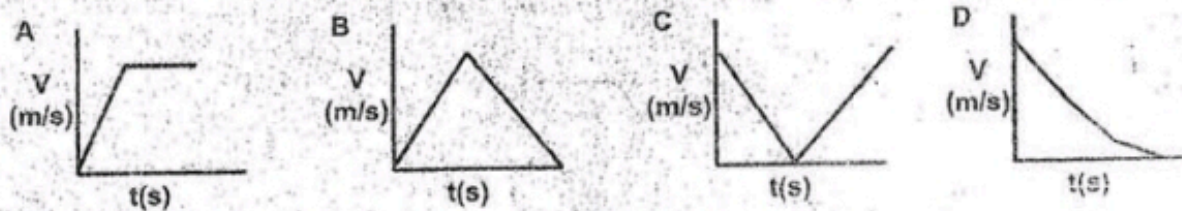


Figure 2

- 3 A dynamics trolley P is released from rest at the top of a short ramp. The trolley runs down the ramp on to a horizontal surface where it collides with another trolley Q which is at rest. The two trolleys became coupled in the collision and move off together. This is shown in figure 3.1.

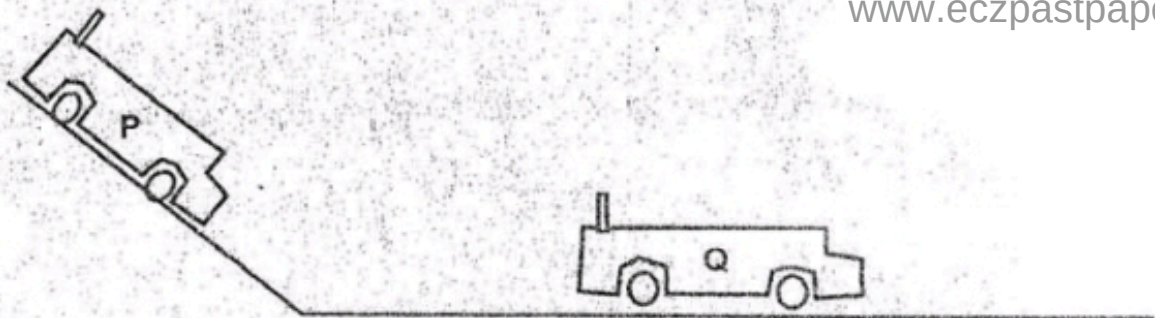
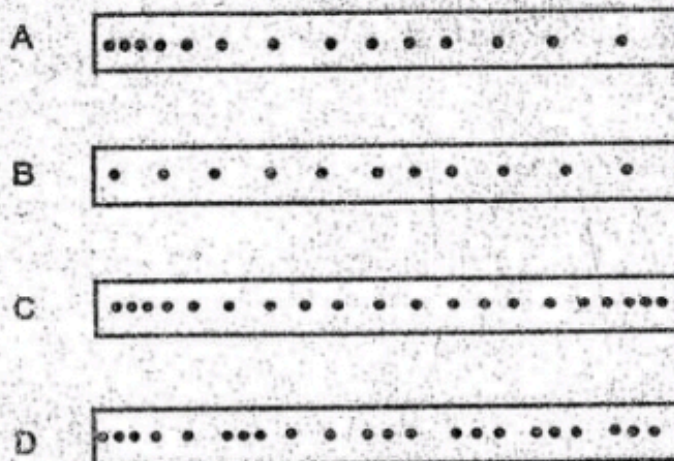


Figure 3.1

Which of the following ticker-timer tapes shows the complete motion of trolley P?



- 4 A uniform half meter rule is freely pivoted at the 15cm mark and it balances horizontally when a body of mass 50g is hung from the 4cm mark. What is the mass of the rule?
- A 16g
B 20g
C 55g
D 75g
- 5 A man lifts 4 books of 2kg each through 5 stairways in 30s. If the stairs are of the same length and the man's mass is 50kg. Refer to **figure 5.1**.

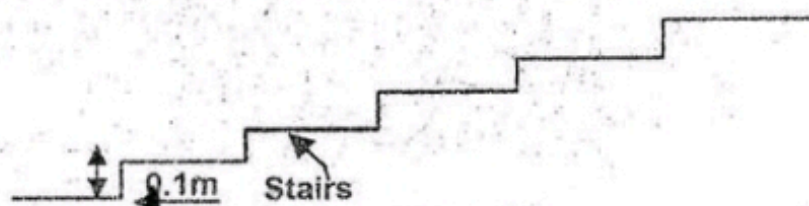


Figure 5.1

Determine the power of the man in climbing all the 5 stairs.

- A 8.8w
B 8.5w
C 9.2w
D 9.7w
- 6 In **figure 6.1** a man is moving a heavy load into the van using a small effort on an inclined plane.

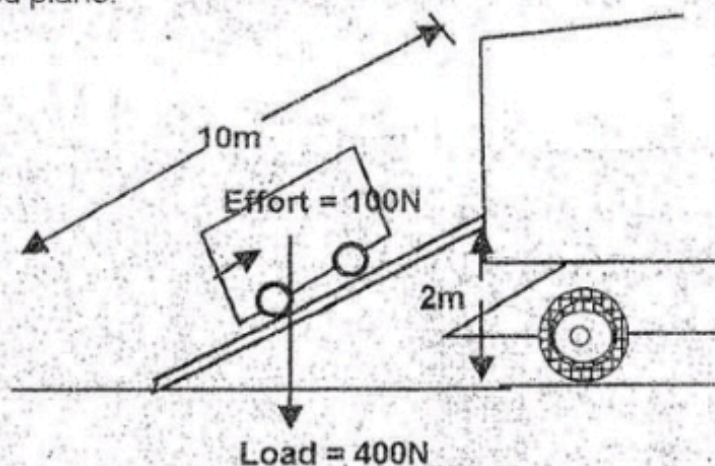


Figure 6.1

What is the efficiency of using the inclined plane?

- A 20%
B 25%
C 50%
D 80%

- 7 A simple hydraulic jack is used to lift a heavy load L as shown in figure 7.1

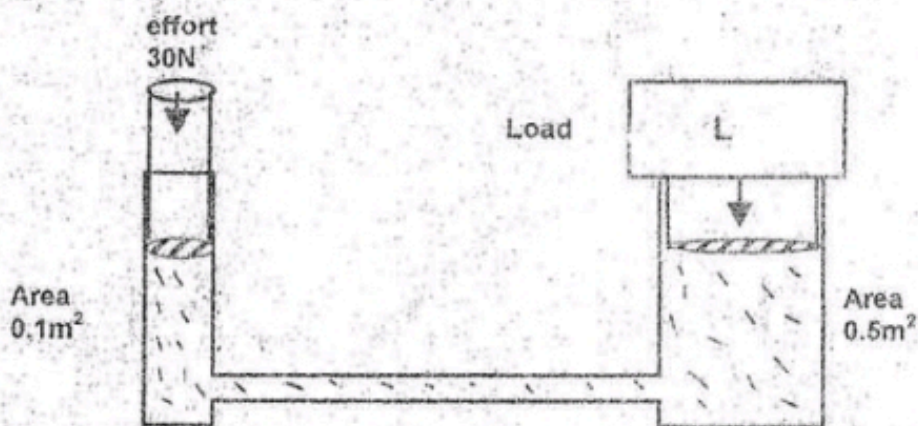


Figure 7.1

If an effort of 30N is applied through an area of 0.1m^2 and the load is placed on an area of 0.5m^2 , What is the weight of the load, L .

- A 300N
 - B 150N
 - C 100N
 - D 15N
- 8 A gas is heated in a closed container so that its volume cannot change as shown in figure 8.1.

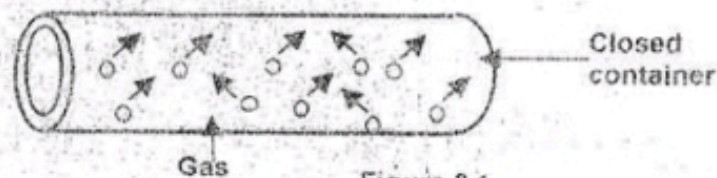


Figure 8.1

Which of the following will not happen?

- A The number of molecules will increase.
 - B The average speed of the molecules will increase.
 - C The molecules will move in all directions.
 - D The pressure of the gas will increase.
- 9 A platinum resistance thermometer measures temperature by using the change in electrical resistance of platinum with temperature. If the resistance of the platinum wire at 0°C is 10.0Ω and 10.4Ω at 100°C . Find the temperature when the resistance measured is 9.6Ω .

- A -100°C
- B 9.6°C
- C 38.4°C
- D 96°C

- 10 A diver breathes 1 litre of air at an atmospheric pressure of 100KPa in one minute. If the diver has to breathe the **same mass** of air in one minute, how much air would he need to breath if the total pressure on him under water is 400KPa?
- A $\frac{1}{2}$ litre
 B $\frac{1}{4}$ litre
 C 2 litres
 D 4 litres
- 11 The **figure 11.1** shows the rise in temperature when a certain substance was heated for 20 minutes.

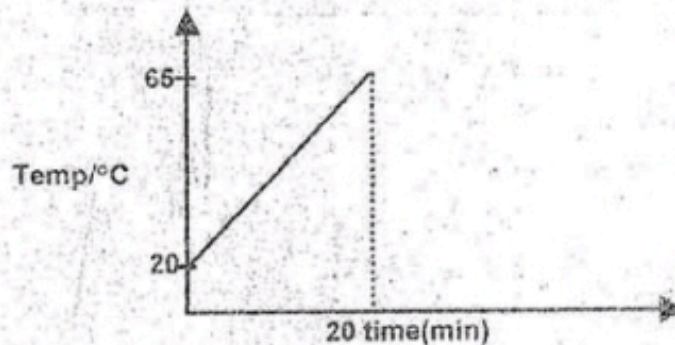


Figure 11.1

If the mass of the substance was 30g and the heat used to raise the temperature was 9180J

What is the specific heat capacity of the substance?

- A 6.8J/Kg°C
 B 6 800J/Kg°C
 C 12 393 J/kg°C
 D 12 393 000 J/Kg°C
- 12 An experiment was set up to demonstrate heat transfer as shown in figure 12.1.

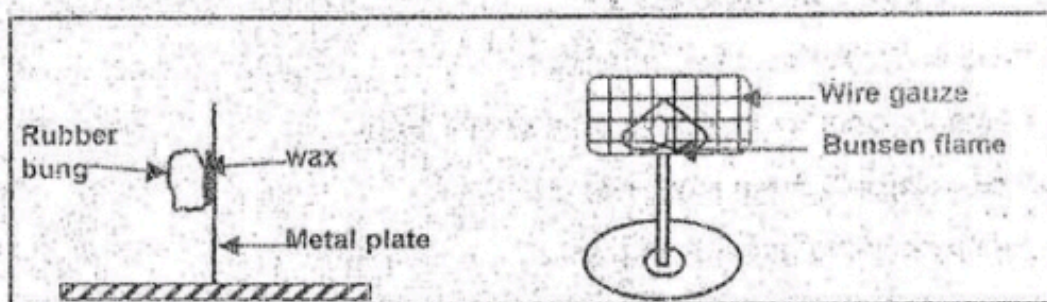


Figure 12.1

After sometime the rubber bung falls off. This happens because heat reaches the metal plate only through ...

- A radiation.
 B convection.
 C conduction.
 D radiation and convection.

- 13 An optician test card is fixed 80cm behind the eyes of a patient who looks into a plane mirror 300cm in front of him as shown in figure 13.1.

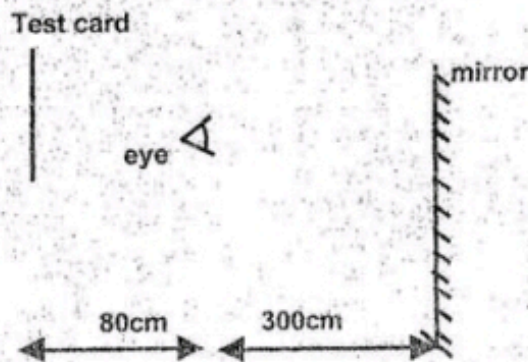


Figure 13.1

What is the distance from the patient's eyes to the image of the card?

- A 380cm
 - B 600cm
 - C 680cm
 - D 760cm
- 14 A closed cylindrical bottle contains water which is half full. The refractive index of water $\frac{4}{3}$. This is shown in figure 14.1.

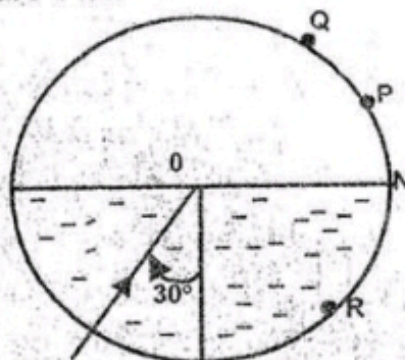


Figure 14.1

When a ray of light passes to the center O, at an angle of 30° , the light from O ...

- A is reflected back to R.
 - B grazes the surface along ON.
 - C continues through Q.
 - D is refracted through P.
- 15 A compound microscope is an instrument used for scientific research in laboratories. Select from the list A to D the pairs of lenses most suitable for this instrument.
- A Two convex lenses of focal lengths 100cm and 5cm.
 - B Two concave lenses of focal lengths 5cm and 3cm.
 - C A convex lens of focal length 5cm and a concave lens of focal length 3cm.
 - D Two convex lenses of focal length 5cm and 3 cm.

- 16 Purple light is a mixture of red and blue light. Orange paint reflects only red and yellow light. When purple light falls on an orange paint, what colour does the paint appear to be?
- A Yellow
 - B Orange
 - C Red
 - D Purple
- 17 A physics student stands some distance from a cliff. She claps her hands and half a second later hears an echo. Taking the speed of sound in air as 320m/s, how far from the cliff is she standing?
- A 80m
 - B 160m
 - C 320m
 - D 670m

- 18 Figure 18.1 shows a side view of plane water waves traveling in a glass-walled tank. The waves are produced by a horizontal metal strip vibrating to the left of A.

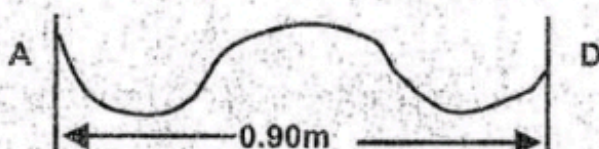


Figure 18.1

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If the crest at A takes 2 seconds to reach D. What is the frequency of the waves?

- A 0.4Hz
 - B 1.13Hz
 - C 1.33Hz
 - D 2.25Hz
- 19 The figure 19.1 shows peaks of ripples incident on a barrier. What will be the position of the point O on a wave reflected by the barrier?

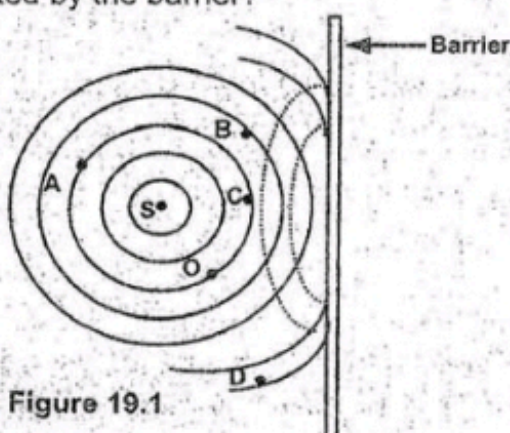


Figure 19.1

- 20 Which of the following types of radiation has the largest frequency?
- A Light
 - B Ultra-Violet
 - C Radio waves
 - D X-rays

- 21 A bar of metal **M** is suspected of being a permanent magnet. Which of the following test would best show this?
- A Suspend **M** freely and make it swing. It always comes to rest in the N-S direction.
 - B Bring one end of **M** near another magnet. Attraction occurs.
 - C Bring one end of **M** near a bar of copper. No attraction occurs.
 - D Suspend **M** freely and make it swing. It always comes to rest in the E-W direction.
- 22 Two uncharged metal spheres X and Y mounted on insulating supports are positioned so that they touch. A rod carrying a positive electric charge is brought near to them as shown in figure 22.1.

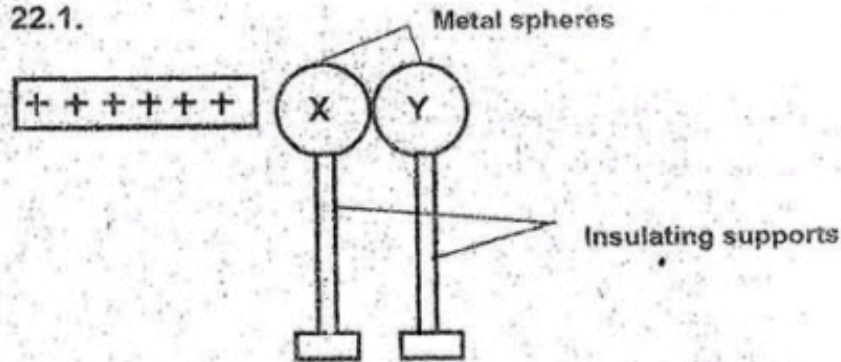


Figure 22.1

The spheres are now moved slightly apart and the charged rod is then removed which of the following is the correct pattern of charges on the two spheres?

- A
- B
- C
- D

- 23 The figure 23.1 shows an arrangement of a capacitor and a resistor connected to a 12V e.m.f in series. First the switch connects the capacitor to the e.m.f X for sometime. Then it is connected to the capacitor and the resistor at Y.

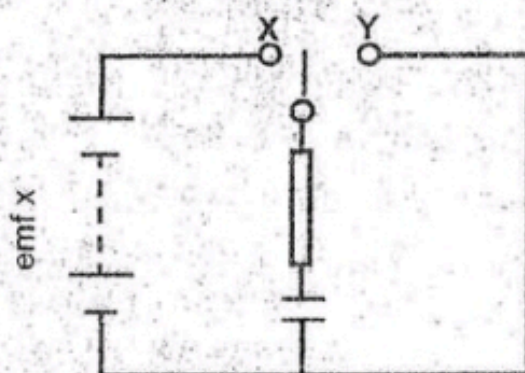
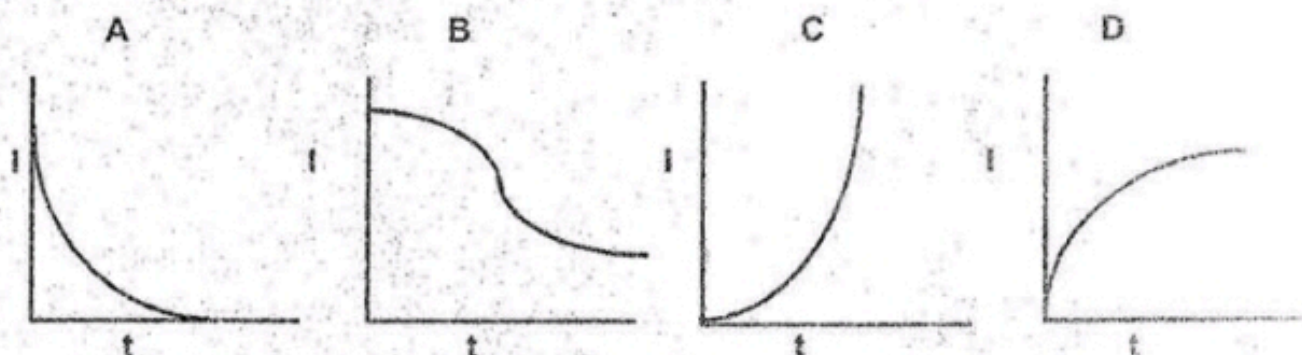


Figure 23.1

Which graph shows how the charge passes through the resistor when the switch is connected at Y?



- 24 In the circuit of figure 24.1, C is a 2V cell of negligible internal resistance. S_1 and S_2 are switches. The current taken by the voltmeter and the resistance of the ammeter can both be neglected.

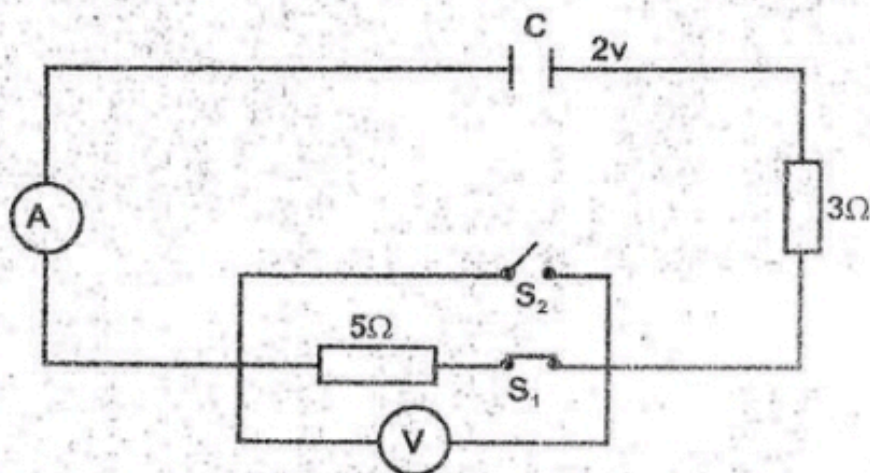


Figure 24.1

Calculate the readings of the ammeter and voltmeter when S_1 and S_2 are both closed.

Ammeter	Voltmeter
A $2/3A$	0V
B $3/2A$	0V
C $1/4A$	$5/4V$
D 0A	2V

- 25 An electric cooker has an oven rated at 3kw, a grill rated at 2kw and two rings each run at 500w. The cooker operates from 240V mains. What is the cost of operating all the parts for 30 minutes if electricity costs K65.00 per unit?

A K179.00
 B K195.00
 C K16,412.00
 D K32,663.00

- 26 The figure 26.1 shows some features of an electrical supply system from a generating station to a small transformer in a musical system at home.

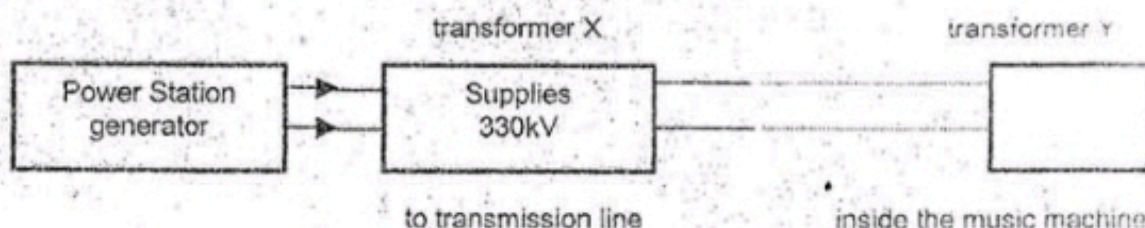


Figure 26.1

What are the transformers X and Y called?

X	Y
A Step-down	Step-down
B Step-up	Step-up
C Step-up	Step-down
D Step-down	Step-up

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- 27 A coil of wire rotates at a steady speed about an axis at O perpendicular to a uniform magnetic field as shown in the diagram below.

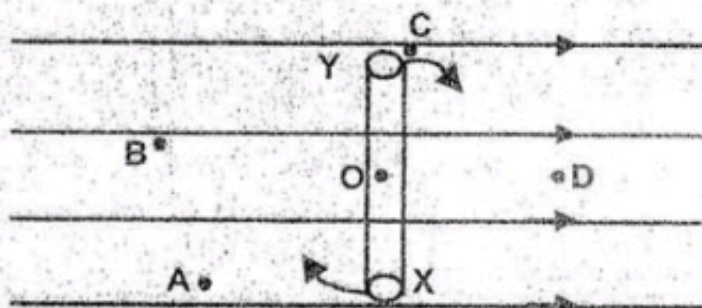
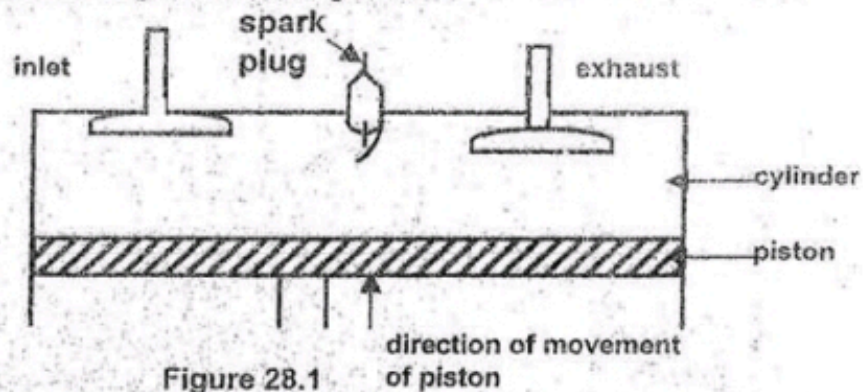


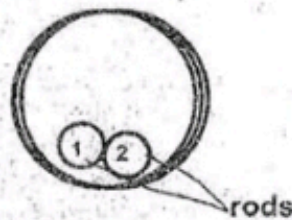
Figure 27.1

The induced e.m.f in the coil is greatest when the side Y of the coil is moving past which point?

- 28 The figure 28.1 shows the cylinder of a four-stroke petrol engine. If the spark plug has just fired, what is wrong with the diagram?



- A Spark plug is small
 - B Both inlet valve and exhaust valve must be open
 - C Exhaust valve is open
 - D Inlet valve is closed
- 29 Figure 29.1 shows an end of two rods 1 and 2 placed together in a long solenoid.



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When a direct current is passed round the solenoid the rods ...

- A become magnetized and attract each other
 - B stay the same
 - C become magnetized and stay the same
 - D become magnetized and move apart
- 30 A 6V 12W bulb operates from a transformer connected to a 240V a.c supply. There are 8000 turns on the primary coil. What is the current in the primary coil in Amperes?
- A 33
 - B 20
 - C 0.5
 - D 0.05

- 31 Figure 31.1 shows a circuit in which the current I in an electronic component is measured as the potential difference V applied is changed.

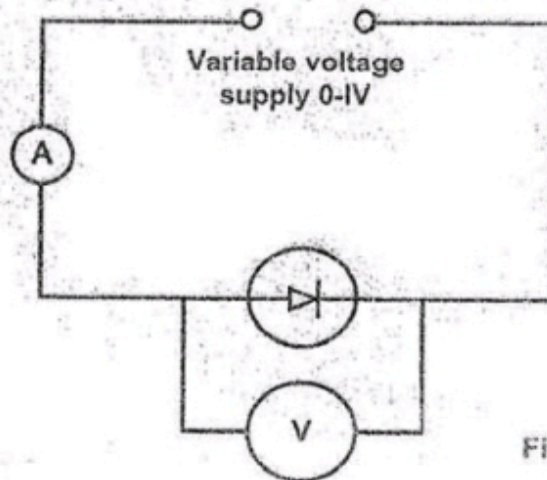
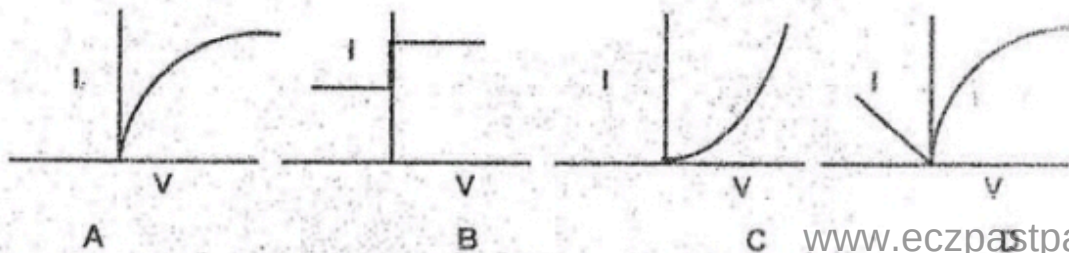


Figure 31.1

The experiment is repeated when the direction of the component is reversed. Which graph shows the component's behaviour of the Current I and voltage V ?



- 32 The figure 32.1 is a transistor circuit found in electronics equipment.

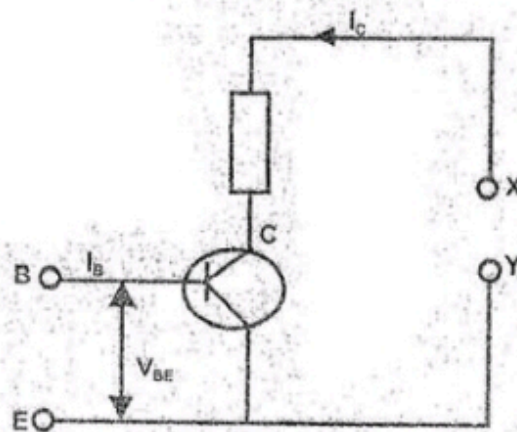


Figure 32.1

Which one of the following statements about the circuit is **not** true?

- A X must be connected to supply negative(–) and Y to the positive (+) supply.
- B The collector current I_c is zero until base current I_b flows.
- C I_b is zero until the base-emitter potential difference V_{BE} is +0.6V.
- D A small I_b can switch on and control a large I_c .

- 33 Which of the following statements best defines Lenz's law of electromagnetic induction?
- A The direction of induced current is always such as to oppose the change producing it.
 - B The direction of the induced current is always in the same direction as the change producing it.
 - C The induced current is perpendicular to the change producing it.
 - D The strength of the induced current is inversely proportional to the rate of change of the flux linked with the circuit.

- 34 A piece of metal has a volume of 15cm^3 and a mass of 45g . What is its density in kilograms per cubic metre (Kg/m^3)?

- A 0.33
- B 3.00
- C 300
- D 3000

- 35 Figure 35.1 shows three 6V lamps connected to 12V supply of negligible internal resistance. The current through the battery is 2.00A .

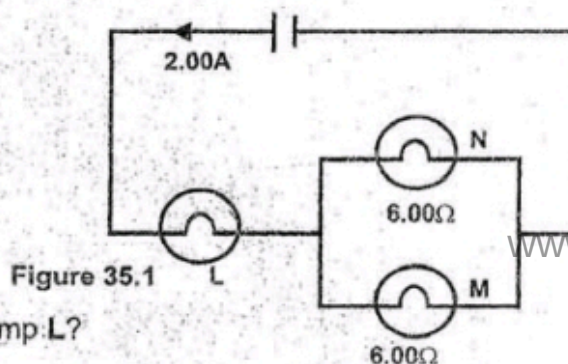


Figure 35.1

What is the resistance of lamp L?

- A 6.00Ω
- B 3.00Ω
- C 1.50Ω
- D 0.75Ω

- 36 A Beam of electrons moving from the cathode to the screen in a cathode ray oscilloscope form a bright spot at the center of the screen as shown in figure 36.1.

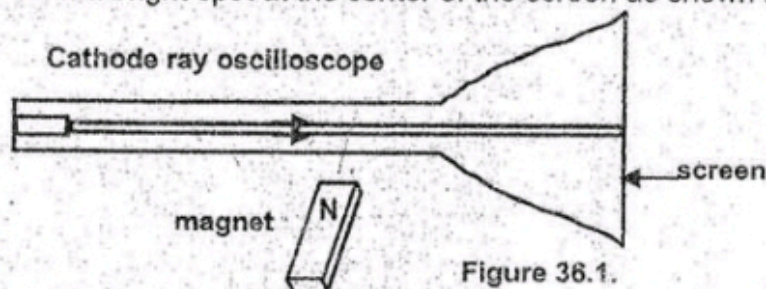


Figure 36.1.

When the north pole of a magnet is brought near the beam with the field going into the page. In what direction is the beam deflected?

- A Upwards
- B Downwards
- C Out of page
- D Inside page

- 37 A computer system has a microprocessor. Which one of the statements below defines a microprocessor?
- A Peripheral device
 - B Control and arithmetic unit on a chip
 - C Short computer program
 - D Big and very fast core store.
- 38 A computer is a machine which automatically accepts, processes and output data. The Figure 38.1 shows the stages through which information can be processed.

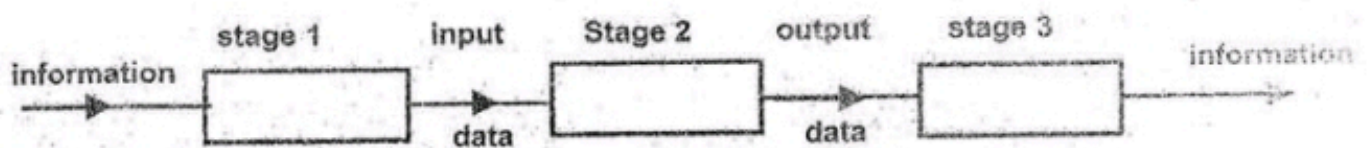


Figure 38.1

Which of the following is the correct order of functions taking place in stages 1 to 3

- | | Stage 1 | Stage 2 | Stage 3 |
|---|----------|----------|----------|
| A | decoding | process | encoding |
| B | decoding | encoding | process |
| C | encoding | process | decoding |
| D | encoding | decoding | process |
- 39 An atom contains protons, neutrons and electrons. If the mass of a proton is 2000 units, the respective masses of an α - particle (alpha) and β - particle (Beta) are ...
- A 2000 and 1.
 - B 4000 and 2
 - C 8000 and 1
 - D 12000 and 4
- 40 A certain substance is radioactive. If $15/16^{\text{th}}$ of the radioactive atoms of the substance decay in 8 minutes, determine the half-life of the substance.
- A 32 minutes
 - B 16 minutes
 - C 4 minutes
 - D 2 minutes