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535/1
PHYSICS
Paper 1
17th July 2014
2 ¼ hours

ENTEbbe JOINT EXAMINATION BUREAU

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 in the answer grid provided.

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

Answers to Section B must filled in the spaces provided on the question paper.

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

Acceleration due to gravity 10m/s^2
Specific heat capacity of water $4200\text{Jkg}^{-1}\text{K}^{-1}$

FOR EXAMINATION'S USE											
ONLY											
1	2	3	4	5	6	7	8	9	10	MCQ	TOTAL

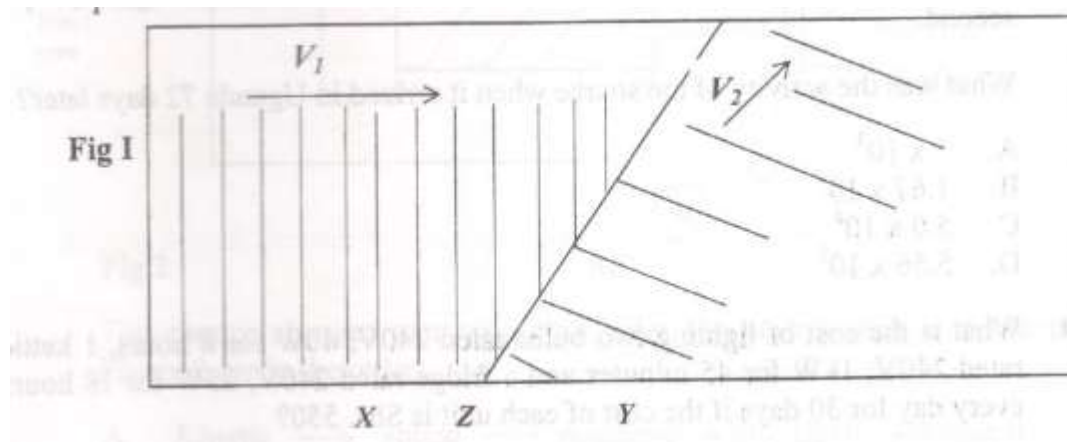
SECTION A

- An airship is floating stationary high above the ground. In this case
 - The air up thrust is equal to the airship weight.
 - The air temperature inside the airship is equal to the air temperature outside.
 - The air density outside the airship is greater than the air density inside.
 - The air up thrust is greater than the airship weight.
- A typist uses a new carbon paper under her top typing paper to keep a copy of the letter. When she holds the carbon paper close to a plane mirror, she can read the letter. This is because the mirror
 - Forms an image the same way
 - Produces an inverted image
 - Produces a laterally inverted image
 - Forms a virtual image
- One advantage of the lead acid accumulator is that
 - Its internal resistance is high
 - No chemicals are used
 - Its emf is more than $10V$
 - It can be recharged
- What is the most suitable fuse for an electric heater rated $1.5kW$ when connected to a voltage of $240V$?
 - 6A
 - 7A
 - 5A
 - 3A
- Which of the statements is correct?
 - Electrons and X - rays are deflected by magnetic fields.
 - Electrons but not X -rays are deflected by magnetic fields.
 - Electrons are deflected by magnetic fields but not by electric
 - Electrons fields. are heavy particles.
- A load of weight $100N$ falls from an aeroplane at a height. When the body moves with a constant terminal velocity of $4m/s$, the resultant force on it in Newtons is
 - 400
 - 200
 - 150
 - 100

7. A body weighs 0.52N in air. When totally immersed in water, it weighs only 0.32N, while its weight when immersed in another liquid is 0.36N. The density of the water is 1000kgm^{-3} . Calculate the density of the other liquid.

- A. 1000kgm^{-3}
- B. 1100kgm^{-3}
- C. 800kgm^{-3}
- D. 900kgm^{-3}

8. In Figure I, waves in a ripple tank travel from one point X to another Y across a plane section Z. In this case



- A. Total reflection occurs at Z
- B. The wave speed V_1 is less than that of V_2
- C. Diffraction occurs across Z
- D. The wave changes frequency as it crosses Z.

9. In which of the following can both metals be made strongly magnetic'?

- A. Nickel and Copper
- B. Cobalt and Iron
- C. Steel and Copper
- D. Steel and Brass

10. Which particle is not affected by a magnetic or electric field?

- A. Electron
- B. Proton
- C. Neutron
- D. Alpha particle

11. A heavy ball is swung in a horizontal circle of centre O with a constant speed.

The acceleration of the ball in the circle is

- A. Towards O
- B. Zero
- C. Along a tangent to the circle
- D. away from O

12. Dropped from a height, a metal block Y becomes slightly warmer after hitting the ground. This is because

- A. Y is a good conductor
- B. Y gains potential energy
- C. The molecules of Y gain kinetic energy
- D. Y has a high specific heat capacity

13. The half-life for the β -decay of thorium-234 is 24 days. The physics department at Makindye Royal College bought a sample of this thorium from China. On the day of dispatch, its activity was 4×10^5 disintegrations per second.

What was the activity of the source when it arrived in Uganda 72 days later?

- A. 5×10^3
- B. 1.67×10^4
- C. 5.0×10^4
- D. 5.56×10^3

14. What is the cost of lighting two bulbs rated 240V, 40W for 8 hours, 1 kettle rated 240V, 1kW for 45 minutes and a fridge rated 240V, 25W for 18 hours every day for 30 days if the cost of each unit is Shs.550?

- A. 11,000
- B. 33,000
- C. 40,000
- D. 2,200

13. A body of mass 4kg is acted upon by a constant force of 12N for 2 seconds.

Calculate the kinetic energy gained by the body at the end of the time.

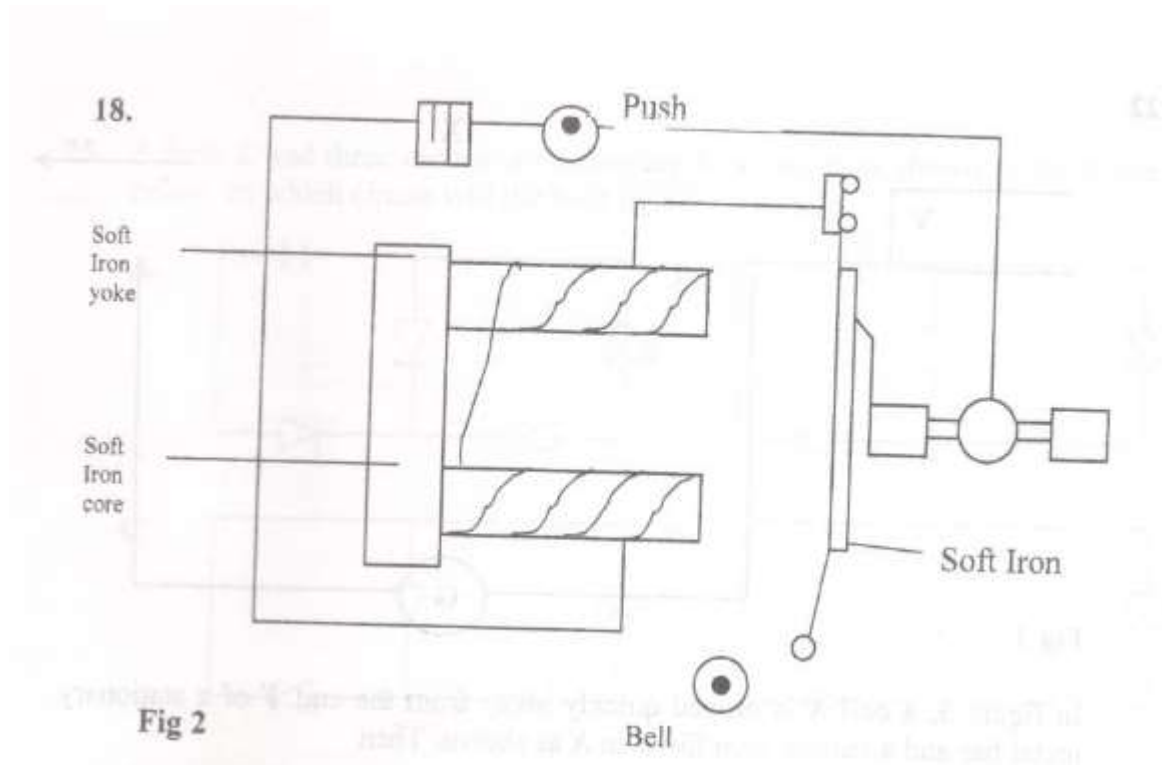
- A. 24J
- B. 90J
- C. 48J
- D. 72J

16. Telegram wires high above the ground must not break in summer or winter. If the wires are renewed in summer, they must be arranged to

- A. Sag
- B. Be exactly horizontal
- C. Curve slightly upward
- D. Be in groups of two

17. To correct short sight, a girl wears spectacles

- A. Which are converging.
- B. To help her read.
- C. To converge rays from a distant point.
- D. To diverge rays from a distant point.



The energy changes that take place after the push switch is depressed in Figure 2 are in the order

- A. Kinetic → sound → Magnetic → electrical → chemical
- B. Chemical → electrical → magnetic → kinetic → sound
- C. Chemical → electrical → kinetic → magnetic → sound
- D. Chemical → electrical → kinetic → sound → magnetic

19. In an elastic collision,

- A. Bodies move with a common velocity
- B. Kinetic energy is not conserved
- C. Kinetic energy is conserved
- D. Bodies stick together

20. A gas at constant pressure is heated so that it expands from a volume of 100cm^3 at 27°C to a volume V at 87°C . Find the value of V .

- A. 120cm^3
- B. 83.3cm^3
- C. 1080cm^3
- D. 322cm^3

21. A concave mirror has a focal length of 6cm and a real object 3cm tall is placed 15cm from the pole. Calculate the distance of the image from the pole if the size of the image is 2cm .

- A. 12cm
- B. 18cm
- C. 10cm
- D. 30cm

22.

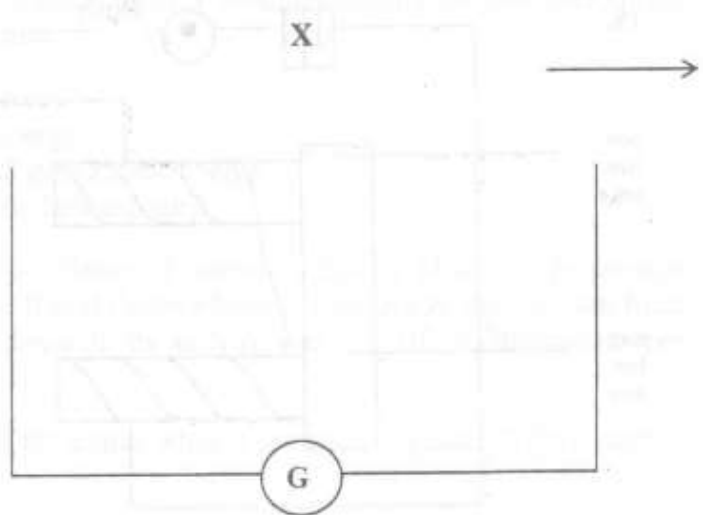
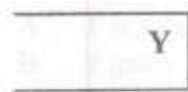


Fig 3

In figure 3, a coil X is moved quickly away from the end Y of a stationary metal bar and a current then flows in X as shown. Then

- A. The bar is not a magnet
- B. Y is a north pole
- C. The current in X is constant
- D. Y is a south pole.

23.

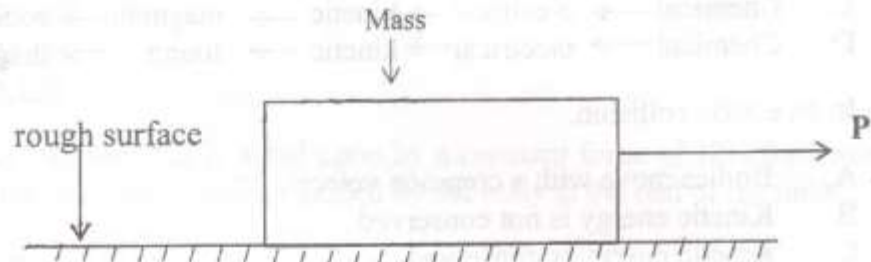


Fig 4

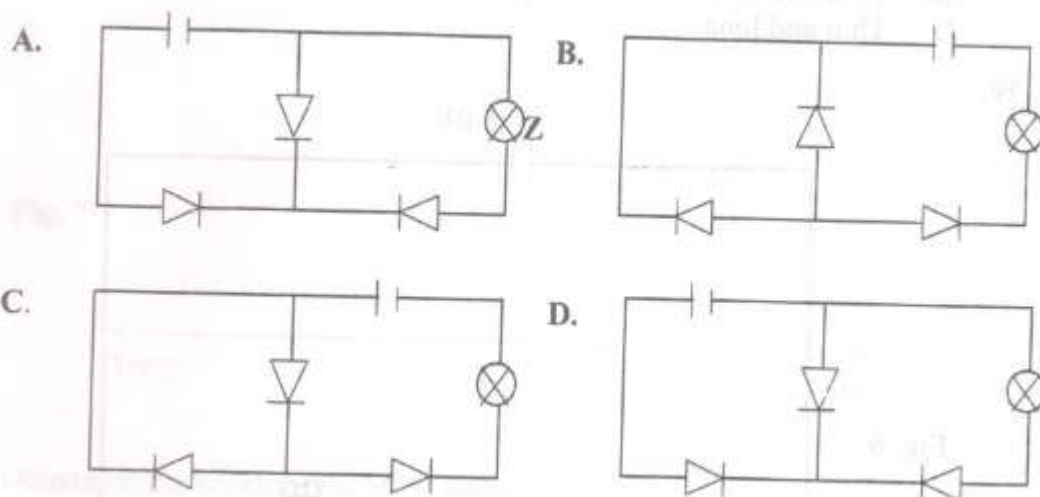
Figure 4 shows a constant force P , acting on a mass placed on a horizontal surface. Which of the following statements about the mass is correct?

- A. It moves to the left if frictional force is greater than P
- B. Momentum is constant if P is equal to frictional force
- C. Velocity is constant if P is greater than frictional force
- D. Acceleration is constant if P is equal to frictional force

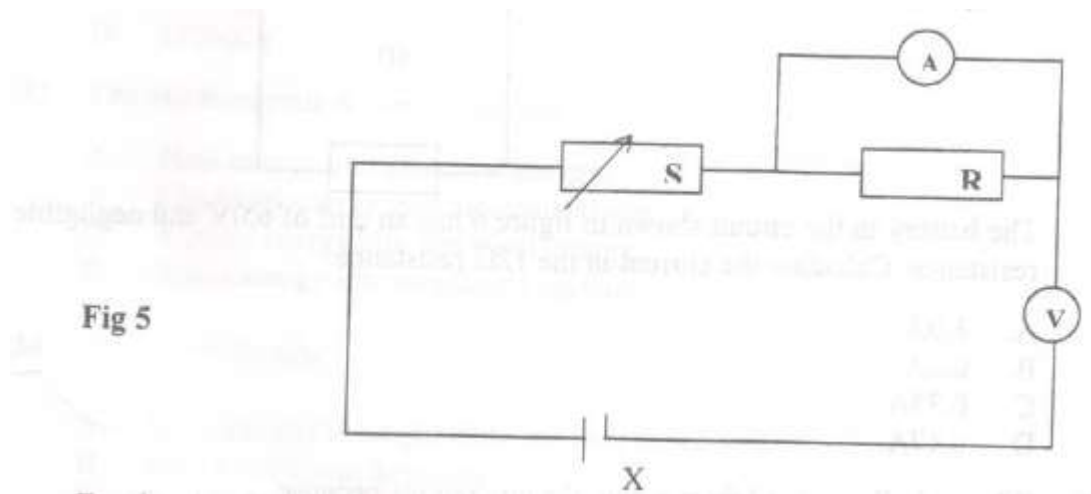
24. A source produces a sound wave which travels a distance of 1280m in 4s. If the frequency of the wave is 250Hz. Find its wave length.

- A. 1.28 m
- B. 5.12 m
- C. 1000 m
- D. 320 m

25. A bulb Z and three diodes are connected in a circuit as shown in the figure below. In which circuit will the bulb light?



26. A girl wrongly arranges the circuit in Figure 5 to measure the resistance R of a hair dryer: V = voltmeter, A = Ammeter, S = rheostat, X = battery.



For the circuit to work correctly,

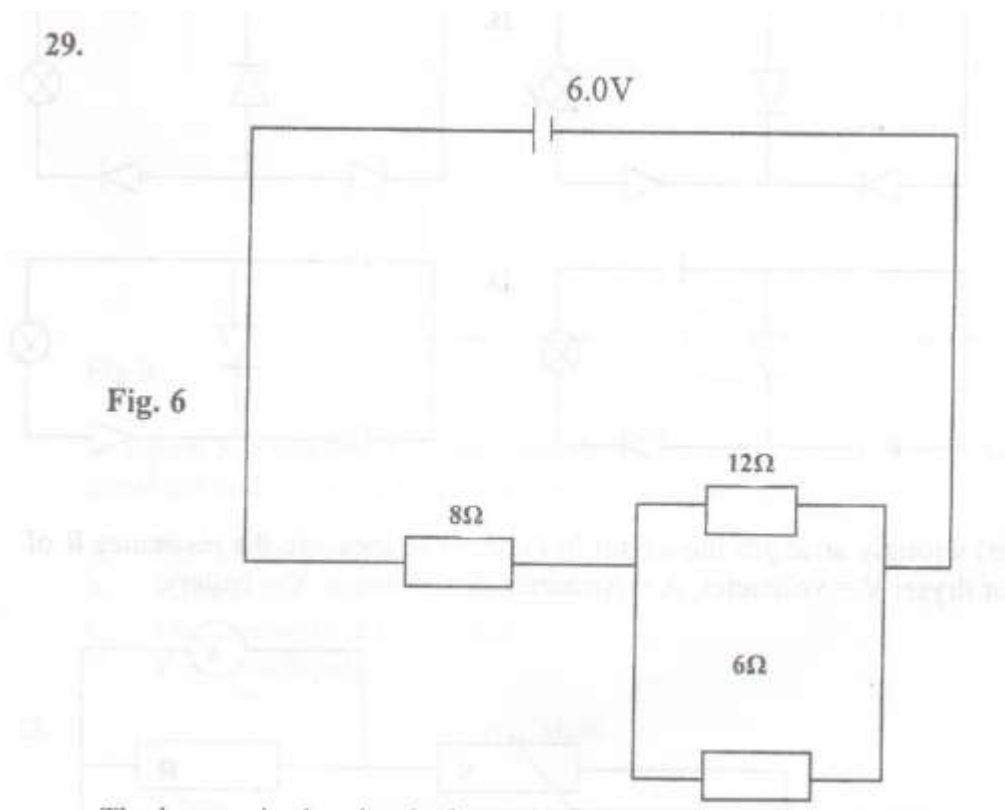
- A. Move X nearer V
- B. Change positions of S and R
- C. Make S large
- D. Interchange A and V

27. A car engine exerts a force of 1500N in moving 2000m in 4 minutes. Calculate the power developed by the engine.

- A. 750000w
- B. 12500w
- C. 50000w
- D. 15000w

28. The note from a plucked guitar will have a low pitch if the string is

- A. Thick and long
- B. Thick and slack
- C. Thin and short
- D. Thin and long



The battery in the circuit shown in figure 6 has an emf of 6.0V and negligible resistance. Calculate the current in the 12Ω resistance.

- A. 1.0A
- B. 0.5A
- C. 0.33A D 0.17A

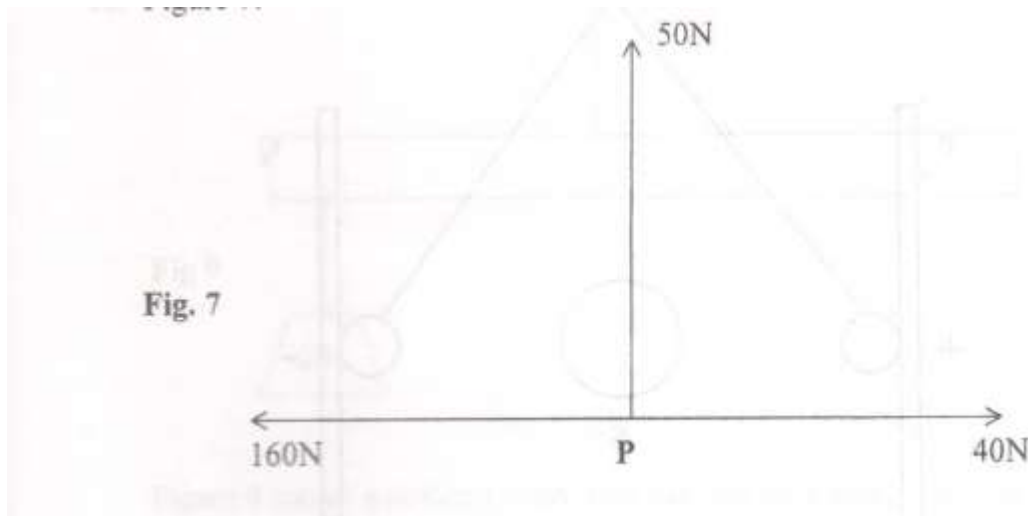
30. When a bullet is fired from a gun, the gun recoils because

- A. The gun is heavier than the bullet
- B. Of inertia
- C. Total momentum is conserved.
- D. The potential energy of the two remains constant.

31. An oil drop of volume $7 \times 10^{-2} \text{ cm}^3$ is dropped on the surface of clean water. If it spreads to form a circle of radius 7cm, find the number of molecules in the oil drop.

- A. 4.500×10^{-4}
- B. 1.424×10^9
- C. 2.273×10^{-4}
- D. 1.424×10^{10}

32. Forces of 40N, 50N and 160N act on a body of mass 13kg at **P** as shown in Figure 7.



Determine the acceleration of the body. A.

- A. 10 Nkg^{-1}
- B. 130 Nkg^{-1}
- C. 12 Nkg^{-1}
- D. 120 Nkg^{-1}

33. The electrophorus is used to convert

- A. Heat energy into electrical energy.
- B. Electrical energy into mechanical energy.
- C. Kinetic energy into electrical energy.
- D. Static energy into an electric current.

34. Pressure in liquids

- A. Increases as the height from the base is reduced.
- B. Acts in only one direction
- C. Is reduced as the area of the base is increased
- D. Is transmitted equally throughout.

35. A fixed mass of gas at a pressure $2.40 \times 10^5 \text{ Nm}^{-2}$ had a volume of 800 cm^3 . If the gas is compressed to a volume of 240 cm^3 at a constant temperature, what will be the final pressure?

- A. $4.608 \times 10^{10} \text{ Nm}^{-2}$
- B. $7.200 \times 10^4 \text{ Nm}^{-2}$
- C. $8.000 \times 10^5 \text{ Nm}^{-2}$
- D. $9.000 \times 10^5 \text{ Nm}^{-2}$

36.

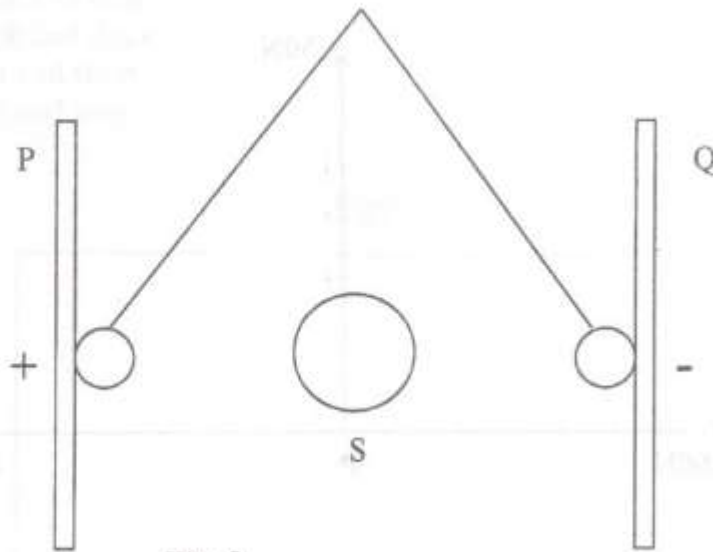


Fig. 8

In Figure 8, two vertical plates P and Q have a large positive and negative charge respectively. When a small conducting sphere S , with a positive charge, is suspended between P and Q , it swings to Q and then keeps oscillating from Q to P and back. This is because

- A. P has greater charge than Q
- B. S is always repelled from P and attracted by Q
- c. S is always attracted by P and repelled by Q
- D. S receives a similar charge from P and Q each time it touches the plates.

37. The half - life of an element is 48 hours. What fraction of the atoms has disintegrated in 144 hours?

- A. $7/8$
- B. $1/8$
- C. $3/4$
- D. $1/2$

38. All these cause heating up of the transformer **except**:

- A. The resistance of the coils
- B. Eddy currents in the core
- C. Hysteresis in the core
- D. Leakage of magnetic flux.

39. A beam of wood 10m long is used as a rump to raise a load of mass 1000kg to a height of 4m. If an effort of 4500N is used, determine the work input.

- A. $1000 \times 10 \times 10$
- B. $1000 \times 10 \times 4$
- C. 4500×10
- D. 4500×4

40.

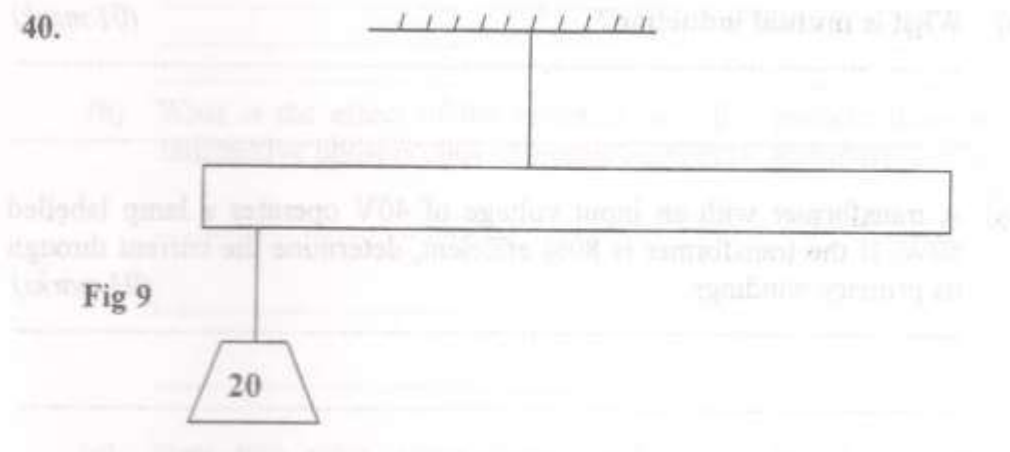


Figure 9 shows a uniform metre rule hanging on a string which is fixed at the 40 cm mark. A mass of 20 g is hung at the 10 cm mark. Find the mass of the metre rule?

- A. 100g
- B. 80g
- C. 60g
- D. 120g

ANSWER GRID FOR SECTION A

1		6		11		16		21		26		31		36	
2		7		12		17		22		27		32		37	
3		8		13		18		23		28		33		38	
4		9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

SECTION B

41. (a) What is **mutual induction**?

(01 mark)

(b) A transformer with an input voltage of 40V operates a lamp labelled 80W. If the transformer is 80% efficient, determine the current through its primary windings.
(03 marks)

42. (a) What is meant by **uniform acceleration**?

(02 marks)

(b) A ticker - timer vibrates at a frequency of 250Hz. The distance between three consecutive dots is 4.8 cm.

Find

(i) The time that elapses between consecutive dots. (01 mark)

(ii) The average speed of the tape. (02 marks)

43. (a) 'What do you understand by the term atomic number?' (01 mark)

(b) What is the effect of the emission of a β - particle from an atom of radioactive phosphorous of atomic number 15, and mass number 32?

(01 mark)

(c) State two safety precautions which should be taken when handling radioactive materials
(2 marks)

44. (a) (i) What is diffusion?

(01 mark)

(ii) State one way of increasing the rate of diffusion of a given gas.

(01 mark)

(b) State two factors that determine the strength of materials.

(02 marks)

45.(a) Sketch a ray diagram to show the formation of an image by the projection lens
10 a projector lantern. *(02 marks)*

(b) A projection lantern is used to give an image of a slide 5 cm x 5 cm on a screen. The image is 120 cm wide on the screen which is 75 cm from the projecting lens. Where must the slide be placed and what is the focal length of the lens required? (02 marks)

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46. (a) Define the term **specific heat capacity**? (01 mark)

(b) 500g of water at a temperature of 80°C is mixed with another liquid of mass 500g. Find the temperature of the mixture if the original temperature of the liquid was 20°C.

(Specific heat capacity of liquid = $2500 \text{ JKg}^{-1} \text{ K}^{-1}$) (03 marks)

47. (a) State Ohm's law. (01 mark)

(b) A 10Ω resistor is connected to a battery of internal resistance 5Ω . The p.d across the terminals of the battery is 2V. Find

(i) The current flowing (1 1/2 marks)

(ii) The emf of the battery (1 1/2 marks)

48. (a) State Charles' Law. (01 mark)

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(b) A gas has a volume of 218 cm^3 at s.t.p. at what pressure will its volume rise to 22 cm^3 if the temperature is increased to 25°C . (01 marks)

49. (a) State Archimedes principle. (01 mark)

(b) A spring balance reads 12.0 N when a metal block is suspended from it and 10.0 N when the block is completely immersed in water.

Calculate the up thrust of the block, the mass of water displaced and the volume of the block.

(03 marks)

50. State two factors which determine the magnitude of the e.m.f induced in a conductor at right angles across a magnetic field. (01 mark)

(b) A galvanometer reads $0.05A$ at full scale deflection and has a resistance of $2\ \Omega$. Calculate the resistance that should be connected in series with it in order to convert it to voltmeter that reads $15V$ at full scale deflection,

(03 marks)

END