

CONVENT OF THE HOLY INFANT JESUS SECONDARY
Preliminary Examination in preparation for
the General Certificate of Education Ordinary Level 2022

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

PHYSICS

6091/01

Paper 1 Multiple Choice

15 September 2022

1 hour

Additional Materials: Multiple Choice Answer Sheet (OMR)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and index number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on 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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

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

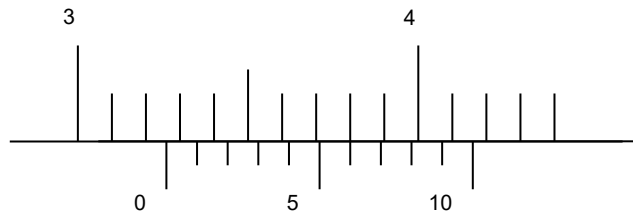
Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate

1 Which list of SI units contains only base units?

- A candela, second, kelvin, watt
- B candela, joule, metre, second
- C ampere, kelvin, second, pascal
- D ampere, metre, second, kelvin

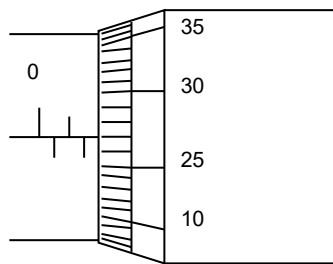
2 The diagram shows the scale of the vernier callipers that is used to measure the diameter of a coin.



What is the radius of the coin?

- A 1.63 cm
- B 1.93 cm
- C 3.26 cm
- D 3.86 cm

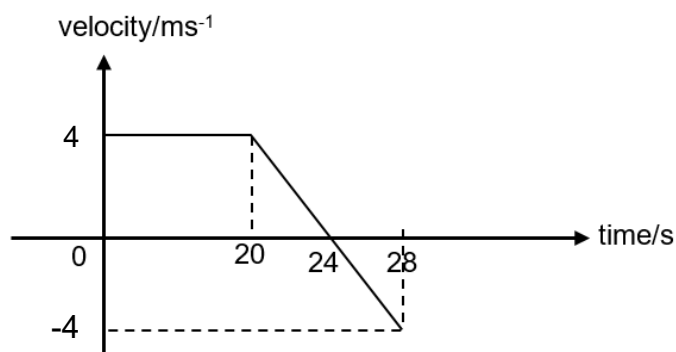
3 The diameter of a piece of wire is measured using a micrometer screw gauge. The diagram shows the enlarged view of the micrometer screw gauge reading.



What is the diameter of the wire?

- A 1.27 mm
- B 1.77 mm
- C 2.27 mm
- D 2.77 mm

4 The diagram shows the velocity-time graph of a cyclist's journey.



What is the average speed for the cyclist's entire journey?

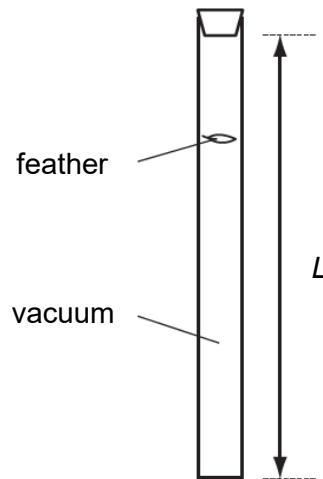
- A 2.86 m/s
- B 3.14 m/s
- C 3.43 m/s
- D 3.67 m/s

- 5 A bottle full of water has a mass of 200 g. When the same bottle is filled with liquid **X**, the mass becomes 180 g.

If the mass of the empty bottle is 100 g, what is the density of liquid **X**?
Take density of water as 1.0 g/cm^3 .

- A** 0.2 g/cm^3 **B** 0.8 g/cm^3 **C** 0.9 g/cm^3 **D** 1.2 g/cm^3

- 6 The diagram shows a laboratory experiment setup in which a feather falls from rest in a long evacuated vertical tube of length L .

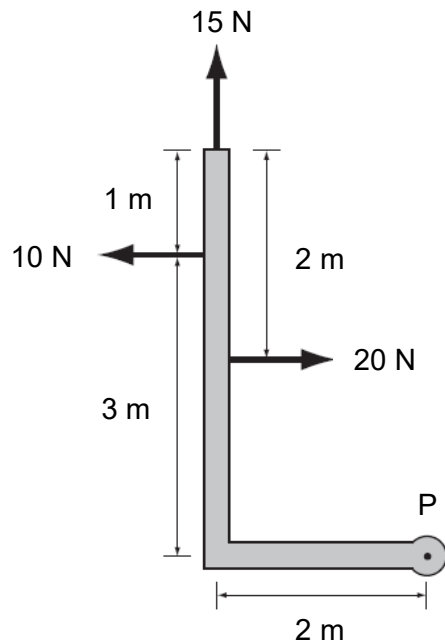


The feather took a time of t to fall from the top to the bottom of the tube.

How far will the feather have fallen from the top of the tube in $0.5t$?

- A** $0.13L$ **B** $0.25L$ **C** $0.50L$ **D** $0.75L$

- 7 An L-shaped rigid lever arm is pivoted at point P.

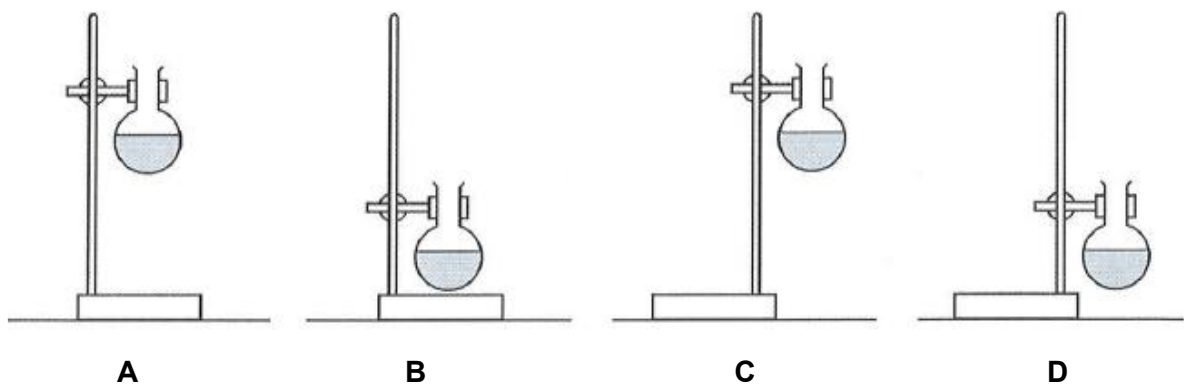


Three forces act on the lever arm, as shown in the diagram.

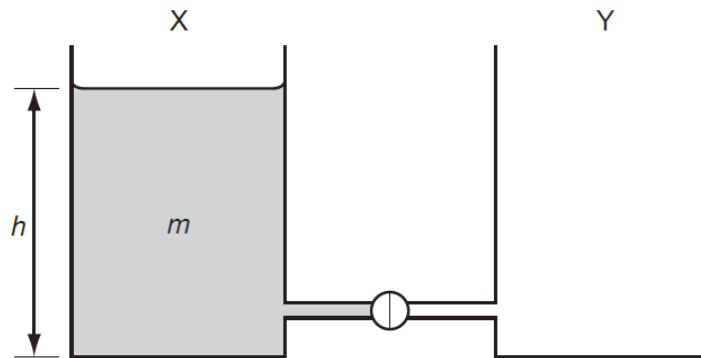
What is the magnitude of the resultant moment of these forces about point P?

- A** 20 Nm **B** 30 Nm **C** 40 Nm **D** 50 Nm
- 8 A student uses a retort stand and a clamp to hold a flask of liquid.

Which diagram shows the most stable arrangement?



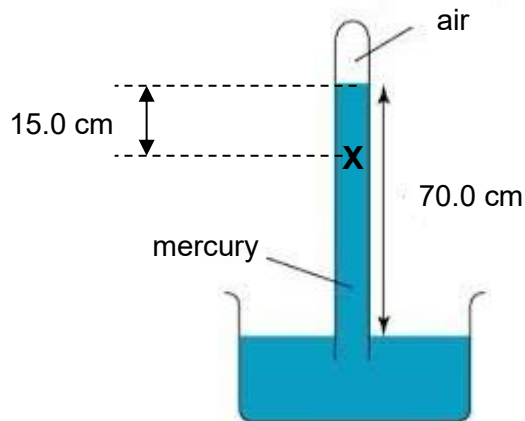
- 9 The diagram shows two identical vessels X and Y connected by a short thin pipe with a tap. At the beginning, X is filled with water of mass m to a depth h , and Y is empty.



When the tap is opened, water flows from X to Y until the depths of water in both vessels are equal.

How much gravitational potential energy is lost by the water during this process?
(acceleration due to gravity, $g = 10 \text{ m/s}^2$)

- A** 0 J **B** $\frac{1}{4} (mgh) \text{ J}$ **C** $\frac{1}{2} (mgh) \text{ J}$ **D** $mgh \text{ J}$
- 10 The diagram shows a barometer containing some air in the space above the mercury column. The height of mercury column is 70.0 cm. X is a point 15.0 cm below the surface of the mercury in the tube. The atmospheric pressure is 76.0 cmHg.

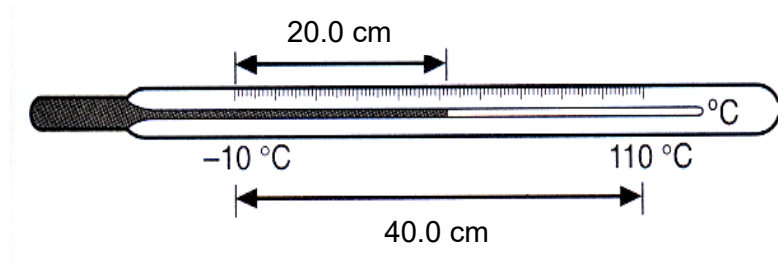


What is the pressure at point X in the mercury?

- A** 85.0 cmHg **B** 55.0 cmHg **C** 21.0 cmHg **D** 15.0 cmHg

[Turn over

- 11** The diagram below shows a mercury-in-glass thermometer.
The distance between -10°C and 110°C is 40.0 cm .



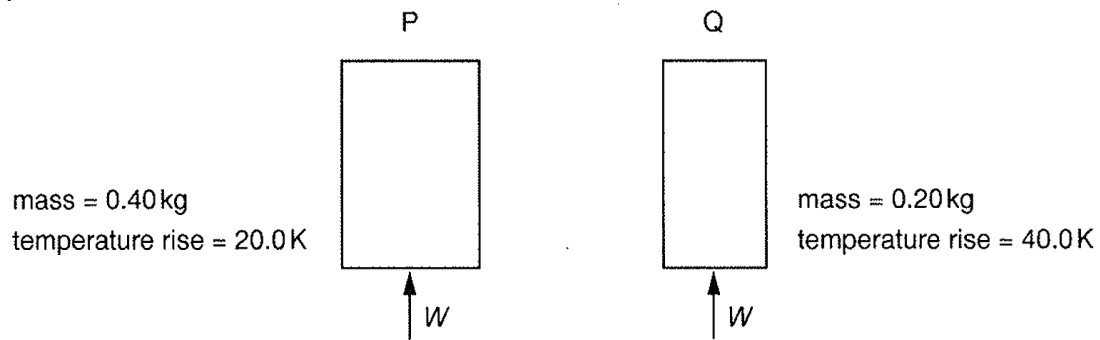
What is the temperature when the mercury thread is 20.0 cm long?

- A** 45°C **B** 50°C **C** 55°C **D** 60°C
- 12** Heat capacity is the energy required to raise the temperature of the object by 1°C .
What does this energy do?
- A** It increases the internal potential energy of the solid molecules.
B It increases the vibration among the solid molecules.
C It increases the average size of the solid molecules.
D It increases the forces of attraction between the solid molecules.
- 13** 0.10 kg of ice at its melting point is dropped into 0.80 kg of water at 15°C .
The specific heat capacity of water is $4200\text{ J/kg}^{\circ}\text{C}$ and the specific latent heat of fusion of ice is $336\,000\text{ J/kg}$.

What is the final temperature of the mixture?

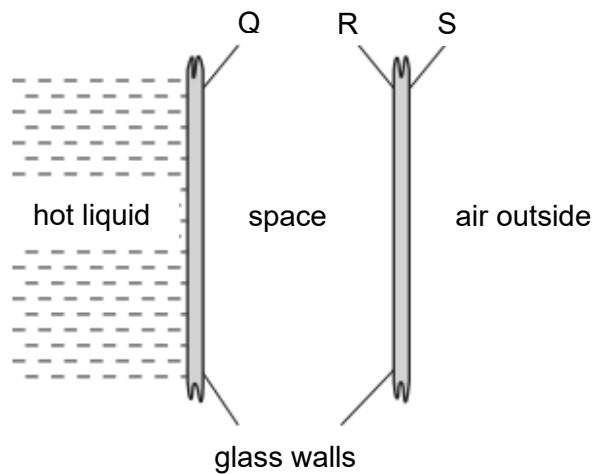
- A** 12.4°C **B** 8.8°C **C** 4.4°C **D** 2.4°C

- 14 The diagram represents two blocks, P and Q. Each of them received the same amount of energy, W . The mass of P is twice the mass of Q. The temperature rise of Q is 2 times the temperature rise of P.



Which statement about P and Q is correct?

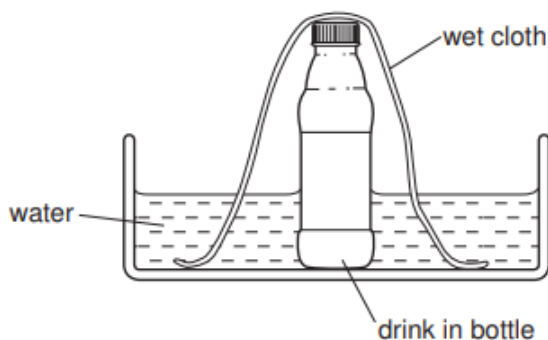
- A The heat capacity of P is half the heat capacity of Q.
 - B The heat capacity of P is twice the heat capacity of Q.
 - C The specific heat capacity of P is half the specific heat capacity of Q.
 - D The specific heat capacity of Q is half the specific heat capacity of P.
- 15 A student uses a double-walled glass vessel to contain a hot liquid.



Which reduces the heat loss by radiation?

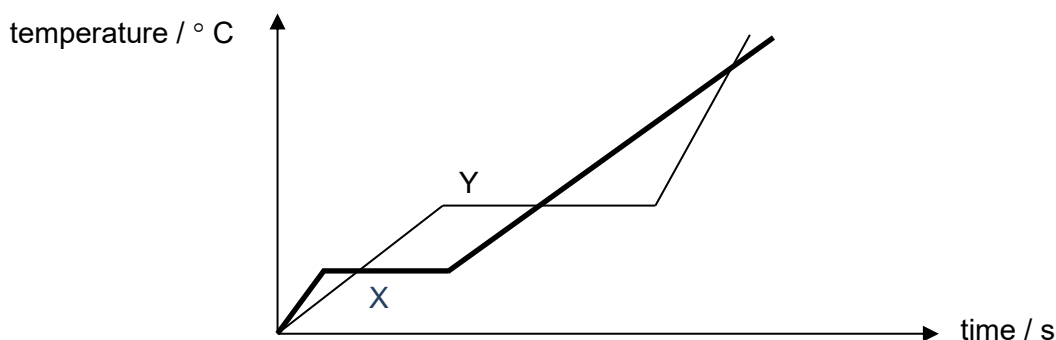
- A a vacuum in the space between the walls
- B painting surface Q black
- C painting surface R black
- D painting surface S white

- 16 On a hot day, the drink in a bottle can be kept cool by standing the bottle in a bowl of water and placing a wet cloth over it.



Why is the drink kept cool?

- A Cold air cannot escape from the bottle.
 - B The cloth conducts the heat from the bottle to the water.
 - C The drink cannot evaporate from the bottle.
 - D Water evaporates from the cloth and cools the drink.
- 17 Equal masses of two solids X and Y are heated successively in a well-lagged calorimeter. Thermal energy is supplied to both of them at the same rate. The temperature-time graph for the process is shown.

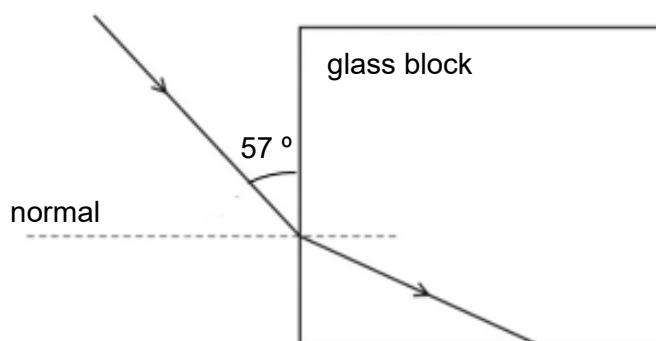


Which statement about the temperature-time graph is **incorrect**?

- A Solid X has a lower specific latent heat of fusion than solid Y.
 - B Liquid X has a higher specific heat capacity than liquid Y.
 - C Solid X has a higher specific heat capacity than solid Y.
 - D Melting point of solid X is lower than melting point of solid Y.
- 18 The melting point and the boiling point of a pure material X is -20°C and 120°C respectively.
- Which physical quantity does **not** change as the material is heated from 0°C to 110°C ?

- A density of liquid X
- B kinetic energy of particles in X
- C internal energy of material X
- D specific heat capacity of material X

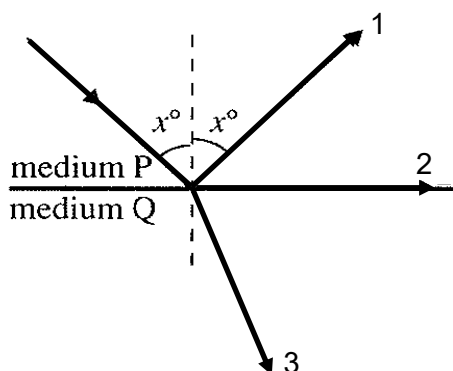
- 19 The diagram shows a light ray passing from air into a glass block of refractive index 1.5.



What is the angle of refraction in the glass and critical angle of the glass?

	angle of refraction / °	critical angle / °
A	21	42
B	21	60
C	34	42
D	34	60

- 20 The diagram shows a ray of light travelling from medium P into medium Q. Medium P has a refractive index lower than medium Q.

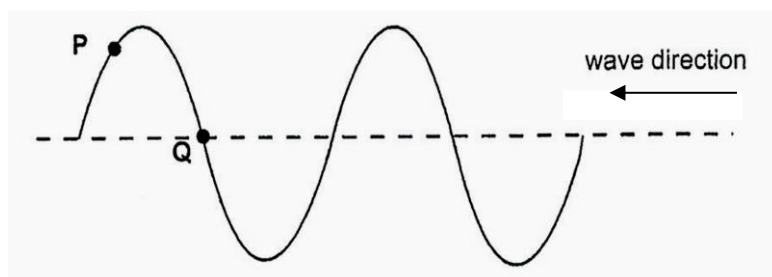


Which rays is/are possible outcome(s)?

- A** 3 only
- B** 1 and 3 only
- C** 2 and 3 only
- D** 1, 2 and 3

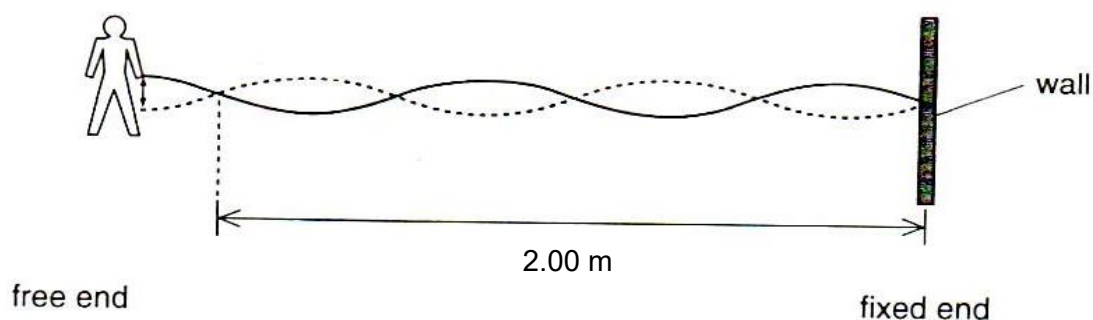
[Turn over

- 21 The diagram shows a wave on a string with two points P and Q marked. The wave is moving in the direction shown.



What will happen next?

- A P will move to the left.
 B P will move up.
 C Q will not move.
 D Q will move up.
- 22 The diagram shows waves set up in a rope by a student moving the free end up and down at a steady rate.



What is the wavelength of the wave shown, and what will be the wavelength when the student halves the frequency at which the end is moved up and down?

	wavelength as shown	wavelength when frequency is halved
A	0.50 m	1.00 m
B	0.50 m	0.50 m
C	1.00 m	1.00 m
D	1.00 m	2.00 m

- 23 Microwaves, visible light and ultraviolet are all part of the electromagnetic spectrum.

What is the correct order of increasing frequency?

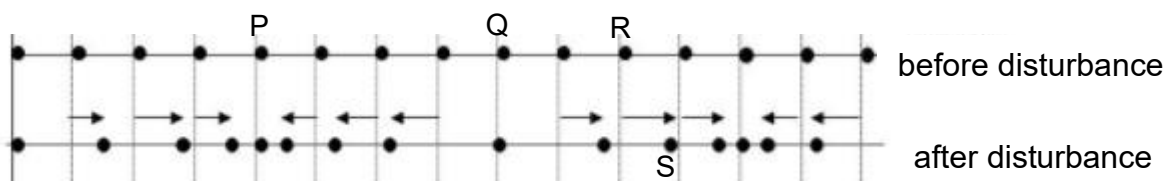
	lowest	—————▶	highest
A	microwaves	visible light	ultraviolet
B	microwaves	ultraviolet	visible light
C	visible light	ultraviolet	microwaves
D	visible light	microwaves	ultraviolet

- 24 When ultrasound travels from water into air, what happens to its frequency, wavelength and speed?

	frequency	wavelength	speed
A	remains the same	reduced	reduced
B	remains the same	increased	increased
C	remains the same	increased	reduced
D	increased	increased	increased

- 25 The diagram shows the positions of air particles before and after they were disturbed by a vibrating guitar string.

Points P, Q and R are positions of some air particles at rest before the disturbance while Point S is the new position of R after the disturbance.



Which option correctly shows the lengths associated with PQ and RS?

	PQ	RS
A	half a wavelength	an amplitude
B	a wavelength	an amplitude
C	half an amplitude	half a wavelength
D	an amplitude	half a wavelength

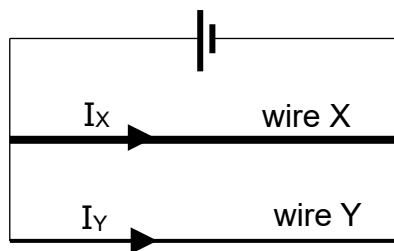
[Turn over

- 26 The earth wire is always fitted to the metal casing of an appliance as a protective device.

The earth wire protects _____

- A the live wire.
- B the cable connecting the appliance.
- C the person using the appliance.
- D the fuse in the plug.

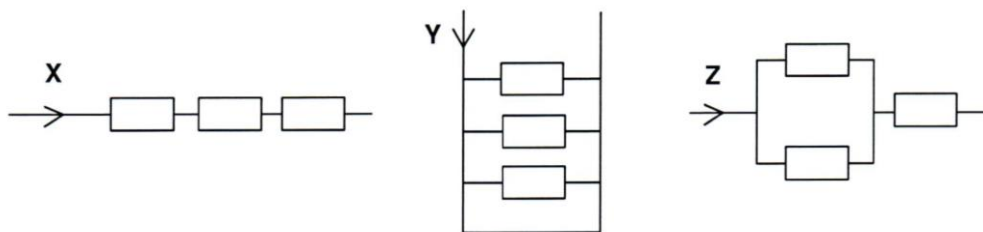
- 27 Two resistance wires X and Y, are connected across a dry cell. Both wires are made of the same material and of the same length. However, wire Y has a diameter that is half that of wire X. Currents I_X and I_Y flows through resistors X and Y respectively.



What is the ratio of $I_X:I_Y$?

- A 1:4
- B 1:2
- C 2:1
- D 4:1

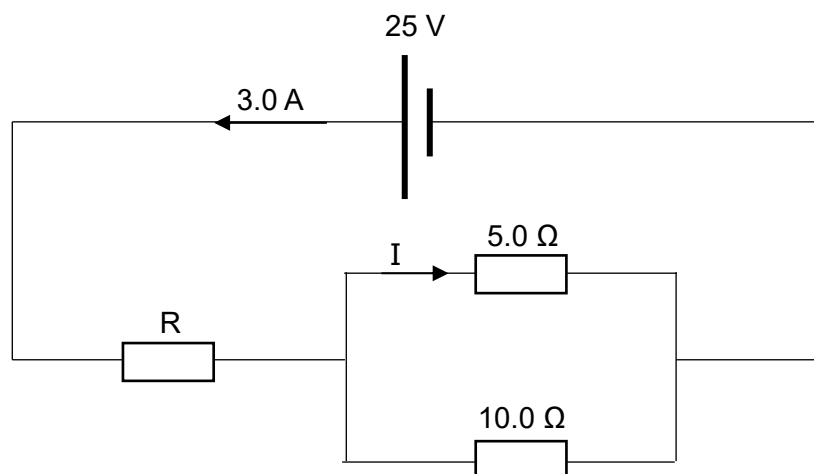
- 28 Three identical resistors are wired up to the mains of the electrical supply in three ways shown below.



What is the decreasing order of the magnitude of current drawn from the mains supply of these arrangements?

- A Z, Y, X
- B Y, Z, X
- C X, Z, Y
- D Z, X, Y

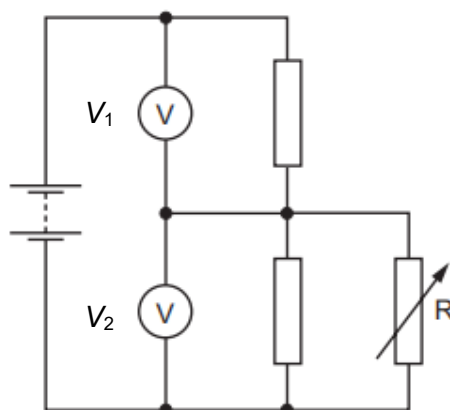
- 29 A dry cell of 25 V is connected to 3 resistors.



Which row correctly shows current I in the $5.0\ \Omega$ resistor and the value of R ?

	I/A	R/Ω
A	1.0	8.3
B	1.0	5.0
C	2.0	5.0
D	2.0	8.3

- 30 The circuit diagram shows a variable resistor R connected in parallel to the lower half of potential divider.



The resistance of R increases.

What happens to the two voltmeter readings?

	V_1	V_2
A	decreases	decreases
B	decreases	increases
C	increases	increases
D	increases	decreases

[Turn over

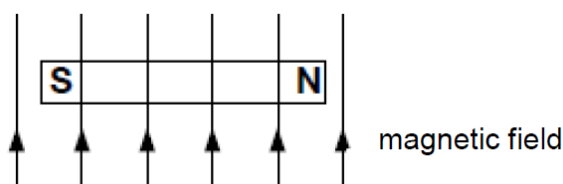
- 31 Which row shows the correct colour code for wiring an electric appliance to a 13 A three-pin plug?

	live	neutral	earth
A	brown	green/yellow	blue
B	brown	blue	green/yellow
C	blue	green/yellow	brown
D	blue	brown	green/yellow

- 32 Which question will distinguish between a magnetic material and a non-magnetic material?

- A** Is it a metal or non-metal?
- B** Is it a conductor or an insulator?
- C** Can it be given an electric charge?
- D** Does it affect the direction in which a compass needle points?

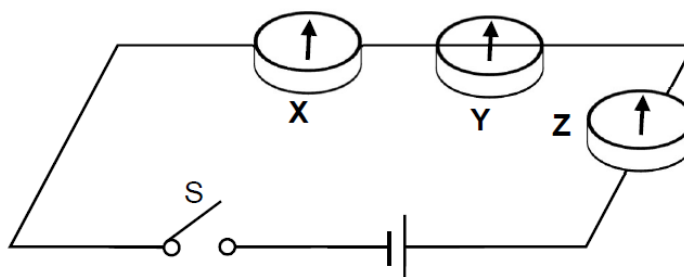
- 33 The diagram shows a bar magnet placed inside a uniform magnetic field.



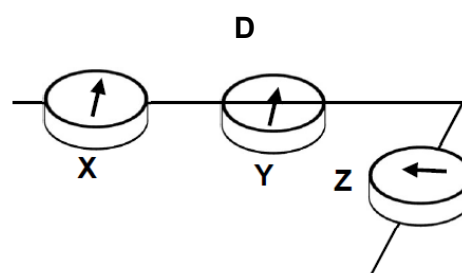
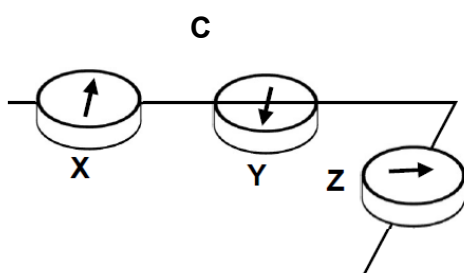
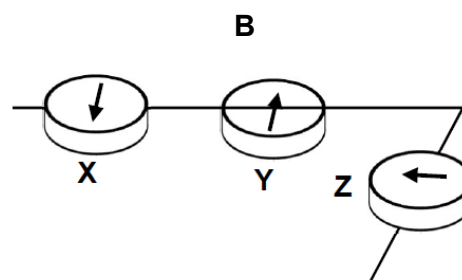
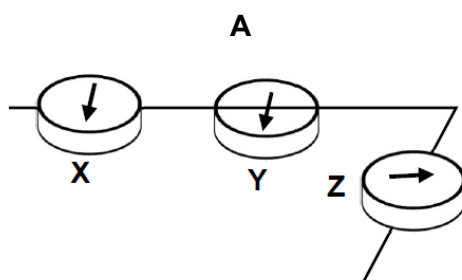
What will happen to the magnet if it is allowed to move freely?

- A** remain stationary
- B** turn 90 ° clockwise
- C** turn 90 ° anti-clockwise
- D** turn 180 ° clockwise

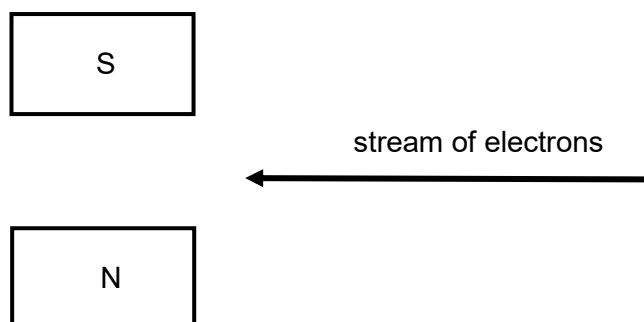
- 34 The diagram shows a circuit with a wire connected to a battery through a switch S. The compasses X and Z are placed above the wire and the compass Y is placed below the wire.



When switch S is closed, which figure shows the correct orientations of the compass needles?



- 35 The diagram shows a stream of electrons moving between two magnetic poles.

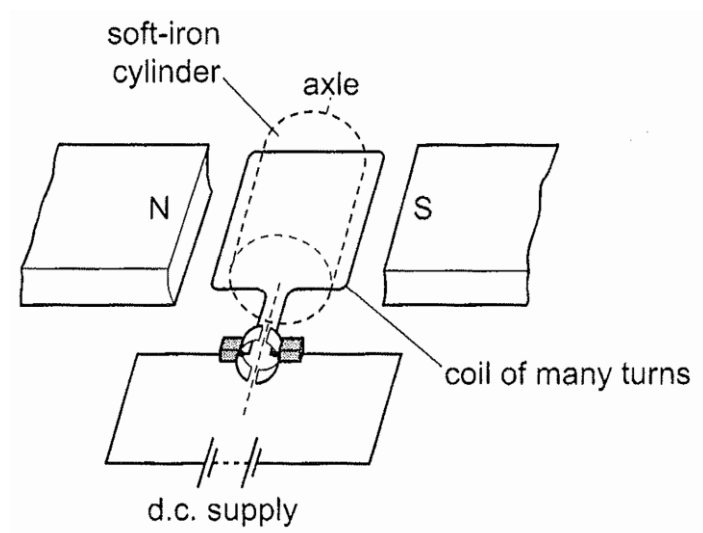


In which direction will the beam be deflected?

- A** towards the north pole
- B** towards the south pole
- C** into the page
- D** out of the page

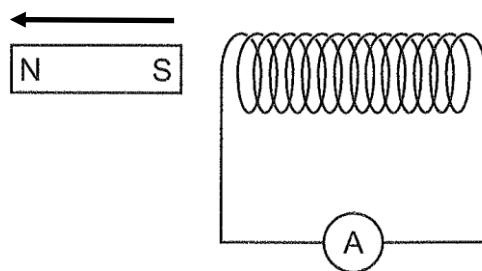
[Turn over

- 36 The diagram shows a d.c. motor.



Which change does **not** increase the turning effect on the coil?

- A increasing the diameter of the wire used to make the coil
 - B increasing the supply voltage
 - C removing the soft-iron cylinder
 - D using stronger magnets
- 37 When a magnet is pulled slowly away from a coil of wire, a deflection to the right is seen on an ammeter connected to the coil.

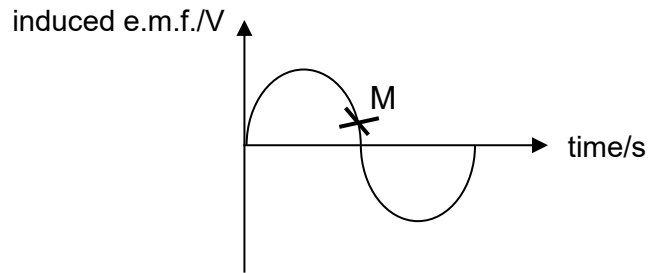


The magnet is moved quickly towards the same end of the coil.

What happens to the direction and size of deflection seen on the ammeter?

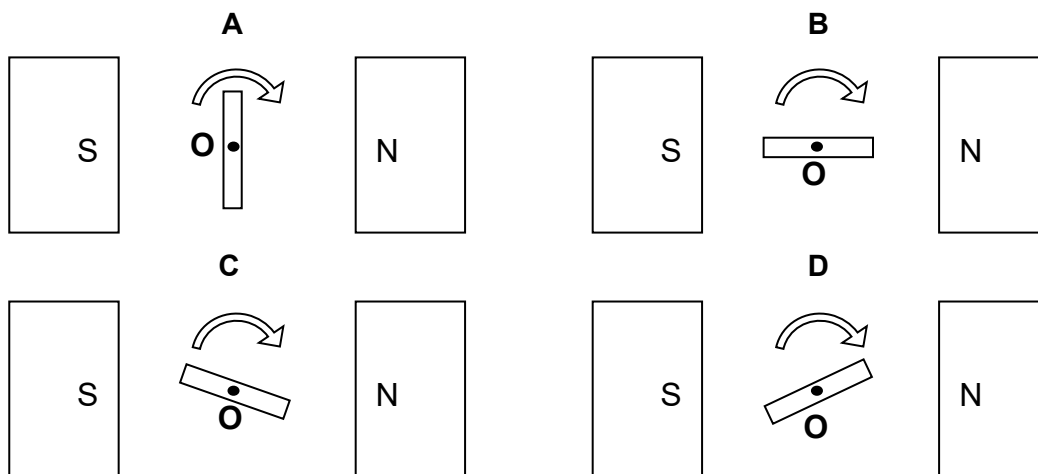
	direction of deflection	size of deflection
A	to the left	increased
B	to the left	unchanged
C	to the right	increased
D	to the right	unchanged

- 38 The graph shows how the induced e.m.f. of a simple a.c. generator varies with time.



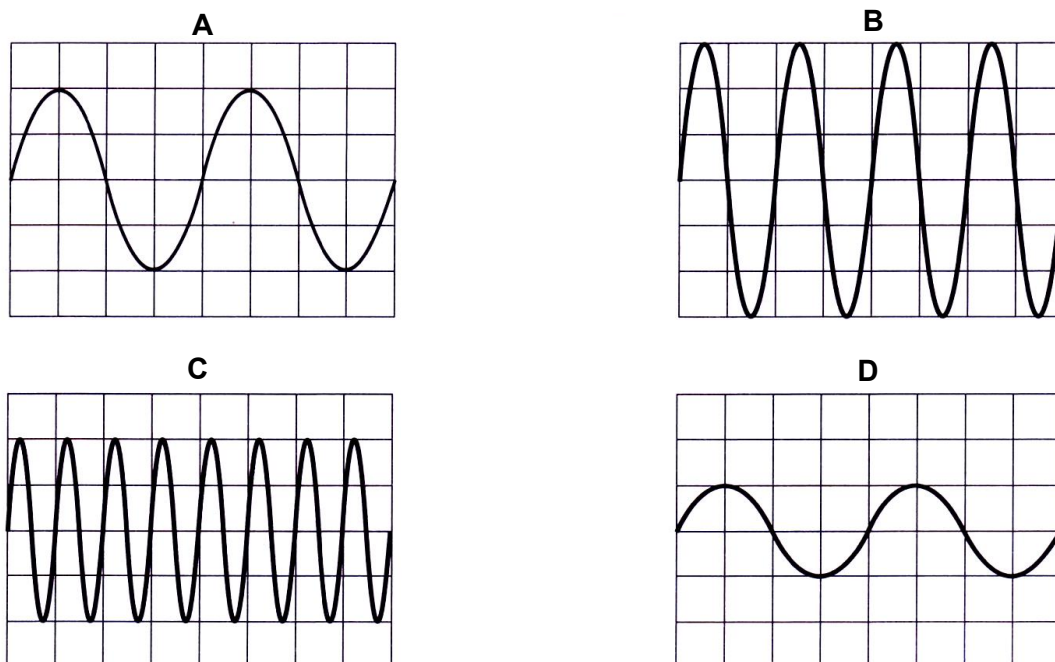
The diagrams below show the front view of the coil of an a.c. generator. The coil is being rotated about an axis through O in a uniform magnetic field.

Which of them shows the position of the coil when the value of the induced emf is at M?



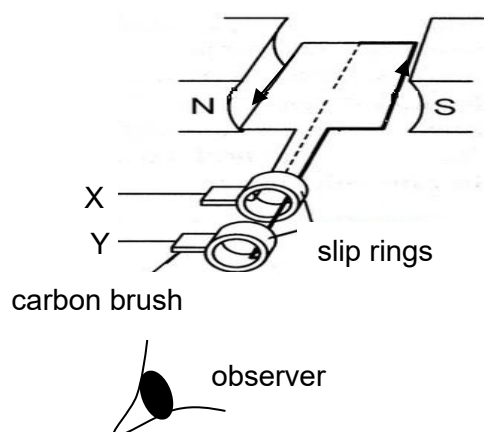
- 39 A signal of peak voltage 20 V and frequency 10 Hz is applied to the terminals of a c.r.o.. The Y-gain of the c.r.o. is set at 10 V per division and the time-base is set at 25 ms per division.

Which trace can be obtained?



[Turn over

- 40 The diagram shows an a.c. generator connected to leads X and Y. At the instant shown, the current direction in the coil is as shown.



Which row shows the direction of rotation of the coil as seen by an observer and the rule used to obtain the direction of current as shown?

	direction of rotation	rule used
A	clockwise	Fleming's left hand rule
B	clockwise	Fleming's right hand rule
C	anti-clockwise	Fleming's left hand rule
D	anti- clockwise	Fleming's right hand rule

- End of Paper -