

**JURONG SECONDARY SCHOOL
2024 GRADUATION EXAMINATION
SECONDARY FOUR**

**CANDIDATE
NAME**

CLASS

**INDEX
NUMBER**

PHYSICS

6091/01

Paper 1 Multiple Choice

19 August 2024

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

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

Write in soft pencil.

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

Write your name, class and index number on the answer sheet in the spaces provided.

There are **forty** questions in this paper. Answer **all** the 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

For Examiner's Use

Paper 1 [40 marks]

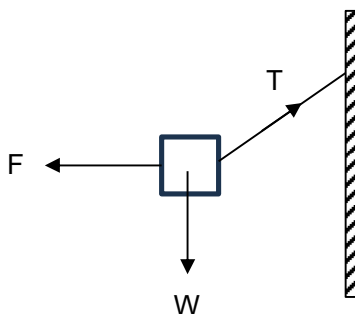
This document consists of **18** printed pages including this page.

[Turn over]

1 What is the unit of work done expressed in base units?

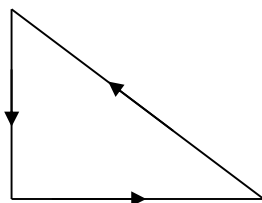
- A** kg m s^2 **B** $(\text{kg m}^2) / \text{s}^2$ **C** $\text{kg} / (\text{m s}^2)$ **D** $\text{kg} / (\text{m}^2 \text{s}^2)$

2 The diagram shows an object of weight W attached to a string of tension T . The object is pulled to the left with a force F and it remains stationary.

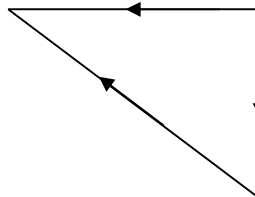


Which vector diagram represents the forces acting on the object?

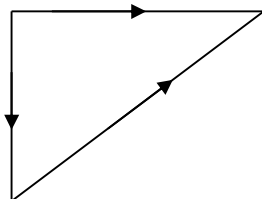
A



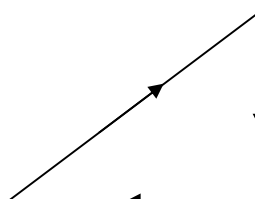
B



C



D



3 Two equal forces of 10 N act on an object at the same time.

Which of the following forces **cannot** be the resultant force acting on the object?

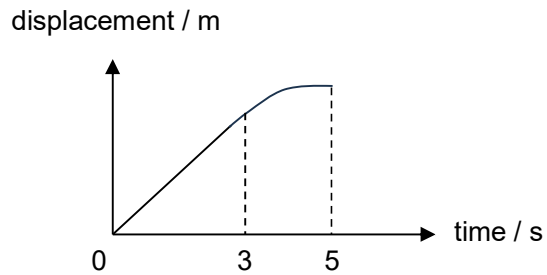
- A** 0 N **B** 10 N **C** 20 N **D** 30 N

4 A boy travels 50 km in an hour. He then travels another 10 km in an unspecified amount of time.

If his average speed for the entire journey is 10 m/s, what is his time taken to travel the 10 km?

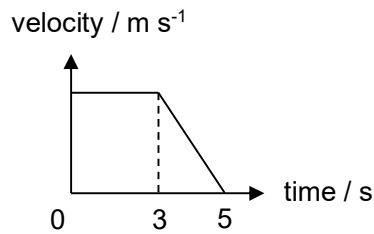
- A** 9 min **B** 12 min **C** 15 min **D** 40 min

- 5 The displacement-time graph of a body is shown.

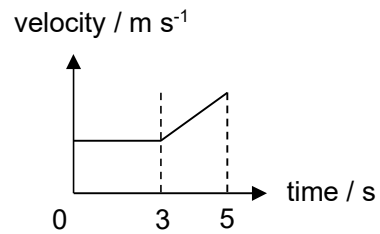


Which of the following shows the velocity-time graph of the body?

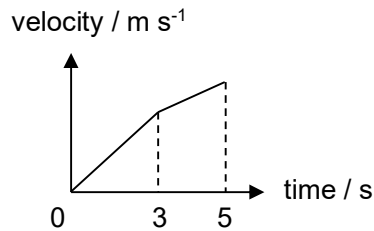
A



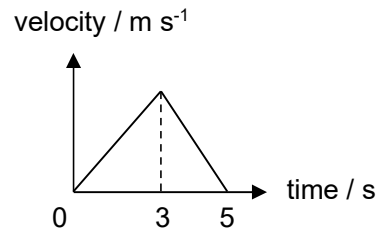
B



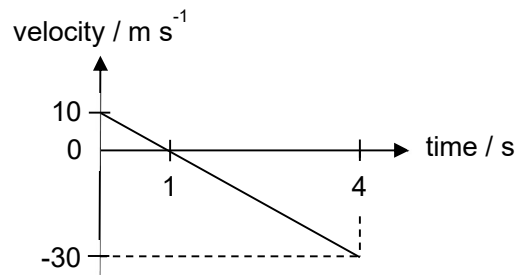
C



D



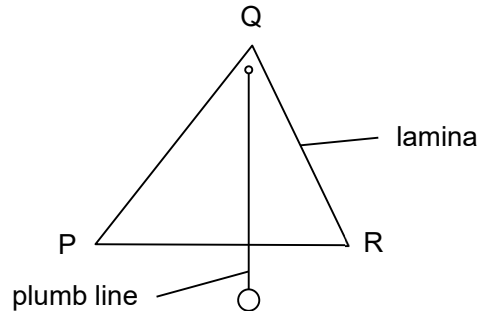
- 6 A stone is thrown vertically up from the top of a building and reaches the ground 4 seconds later. The velocity-time graph of the stone is as shown.



What is the height of the building?

- A** 5 m **B** 40 m **C** 45 m **D** 50 m

- 9** A student wants to find the centre of gravity of a triangular lamina PQR. He makes a small hole at Q. He then suspends the lamina using a pin through the hole at Q, so that the lamina swings freely. Next, he hangs a plumb line from the pin at Q. He marks the position of the plumb line on the lamina.



To determine the location of the centre of gravity, the student then repeats the experiment but with one change.

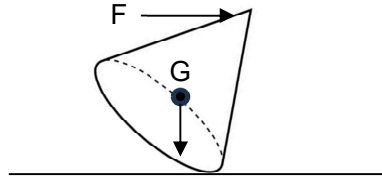
What is the change?

- A** He suspends the lamina from the hole at Q, with R on the left and P on the right.
- B** He suspends the lamina with a pin through a hole at R.
- C** He uses a larger mass for the plumb line.
- D** He uses a longer plumb line.

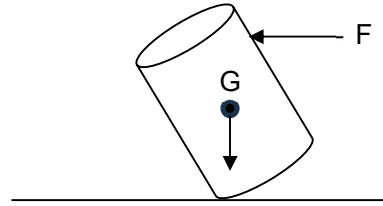
- 10** The following objects are held stationary by an applied force F . G is the centre of gravity of the object. The line of action of the weight of the object acts through G .

Which of the following objects will topple when F is removed?

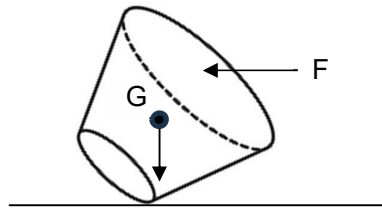
A



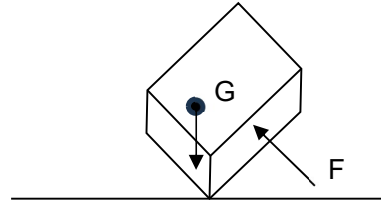
B



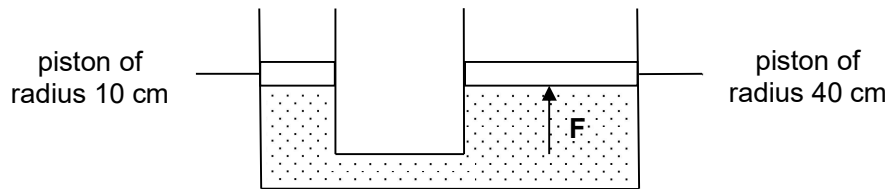
C



D



- 11** An upward force F is applied to the larger piston of a hydraulic press as shown.



Which downward force acts on the smaller piston?

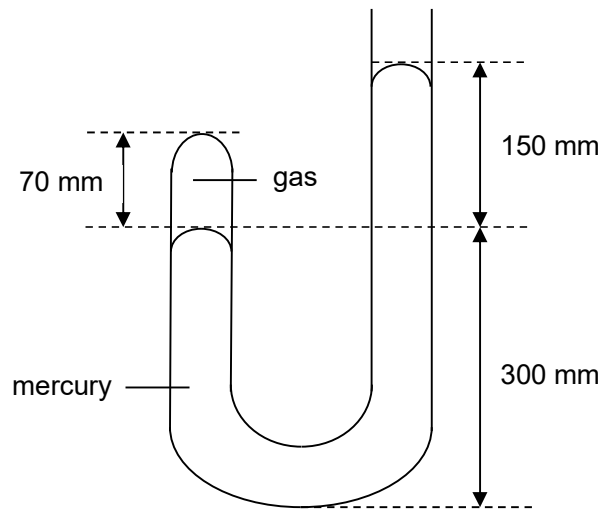
A $\frac{F}{16}$

B $\frac{F}{4}$

C $4F$

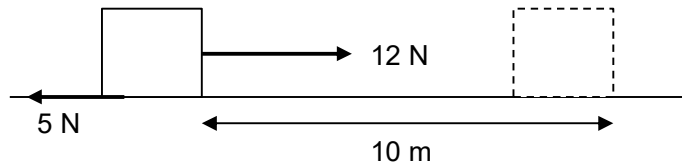
D $16F$

- 12 The diagram shows a gas trapped in the left arm of a manometer containing mercury.



If the atmospheric pressure is 760 mm Hg, what is the pressure of the trapped gas?

- A** 70 mm Hg **B** 150 mm Hg **C** 910 mm Hg **D** 1210 mm Hg
- 13 A box is pushed 10 m along a horizontal surface by a force of 12 N. The frictional force acting on the box is 5 N.



How much of the work done is transferred to the internal store and kinetic store of the box respectively?

	internal store / J	kinetic store / J
A	50	70
B	50	120
C	70	50
D	70	120

- 14** A windmill raises water from a well. The depth of the well is 6 m. The windmill raises 500 kg of water every day.

What is the power extracted from the wind to perform this task? Assume the windmill is 100 % efficient.

A 0.035 W **B** 0.35 W **C** 2.1 W **D** 21 W

- 15** A sample of gas is heated in a sealed container of fixed volume.

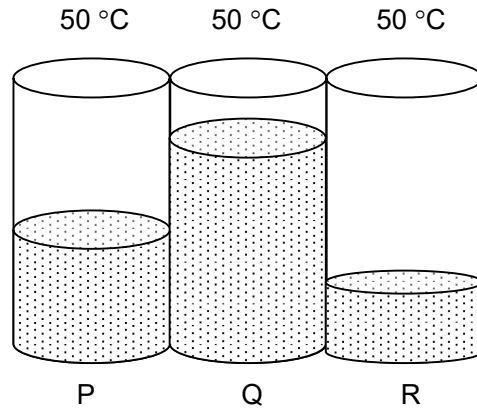
Which of the following does **not** increase?

- A** average distance between the gas molecules
- B** average kinetic energy of the gas molecules
- C** force due to the collisions between the gas molecules and the container walls
- D** number of collisions per second by the gas molecules on the container walls

- 16** Why do gases have no fixed shaped and size?

- A** Gases have large volumes.
- B** Gases have low densities.
- C** The intermolecular forces between the particles are weak.
- D** The spaces between the particles are very wide.

- 17 Three glasses of water of the same temperature are placed side by side touching each other as shown. Glass P contains 0.3 kg of water, glass Q contains 0.5 kg of water and glass R contains 0.1 kg of water.



Which of the following statements is correct?

- A Heat flows from P to Q to R.
 - B Heat flows from Q to P and from Q to R.
 - C Heat flows in all direction.
 - D There is no net heat flow between the three glasses.
- 18 A student wants to set up a convection current in the container of water as shown.



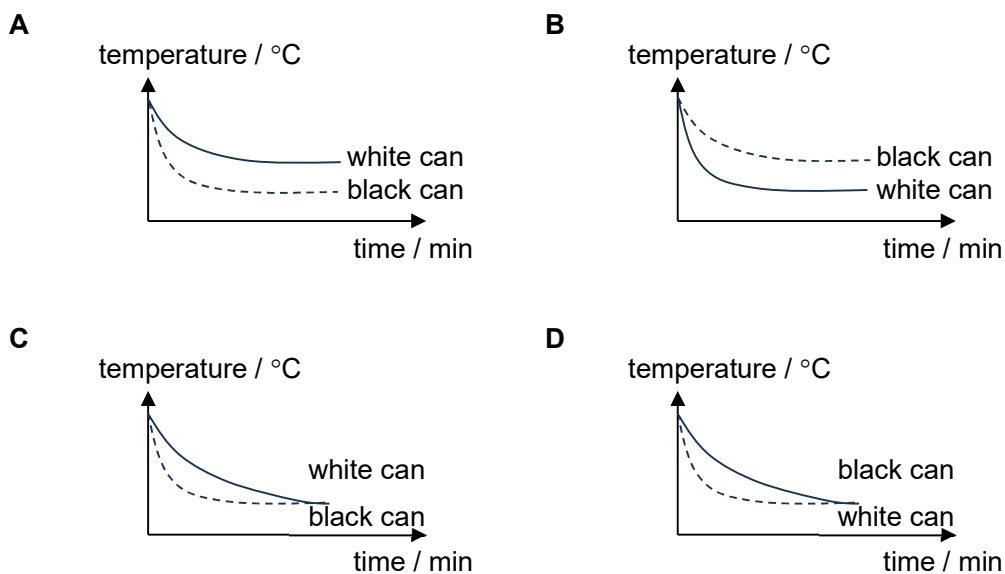
Which of the following arrangements would allow this?

- | | |
|----------------|----------------|
| A cooling at X | B cooling at Y |
| C heating at Y | D heating at Z |

- 19 Two similar tin cans are filled with boiling water. One can has a black surface while the other is white. The temperature of the water in each can is taken every minute.



Which graph shows the results obtained after a long time?

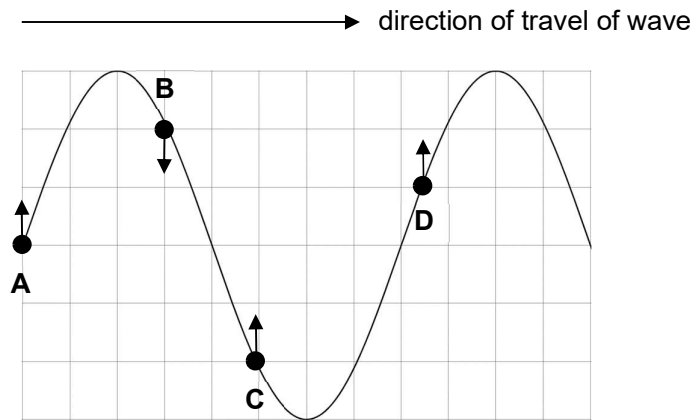


- 20 Which of the following describes the difference between heat capacity and specific heat capacity?

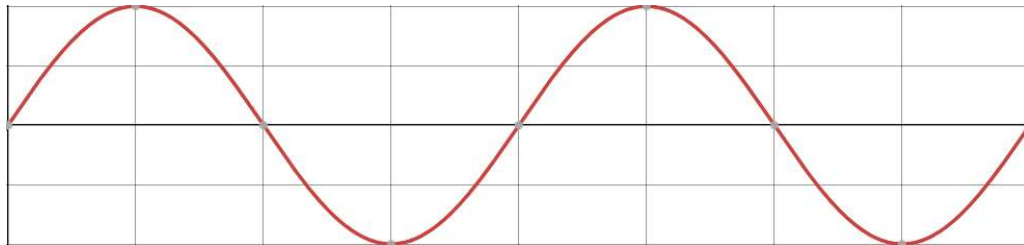
	heat capacity	specific heat capacity
A	involves 1 kg of material	does not involve 1 kg of material
B	involves a change in temperature of 1 °C	does not involve a change in temperature of 1 °C
C	does not involve 1 kg of material	involves 1 kg of material
D	does not involve a change in temperature of 1 °C	involves a change in temperature of 1 °C

- 21** The diagram shows a section of a water wave travelling from left to right. The arrows on the wave represent the direction of motion of four particles.

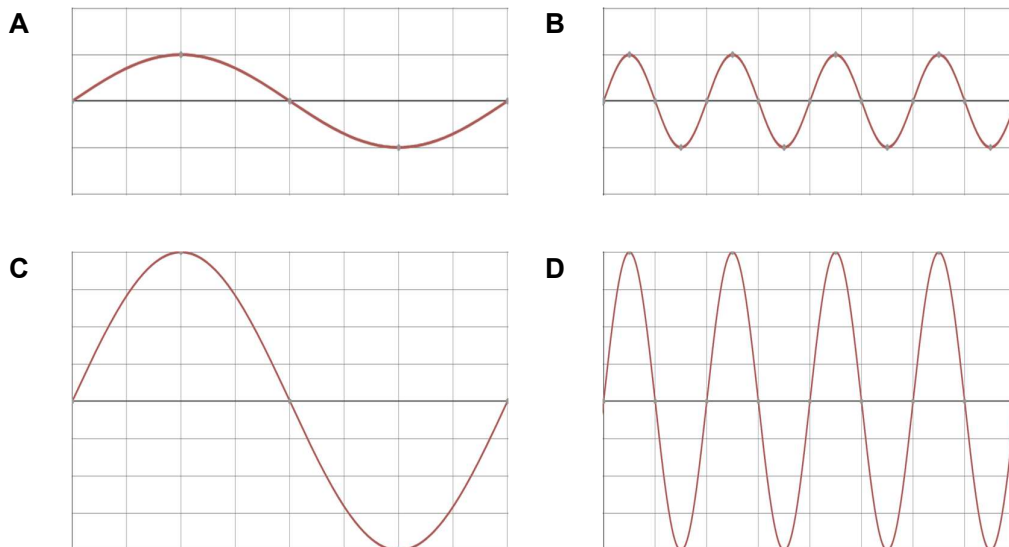
Which motion of the particle is labelled correctly?



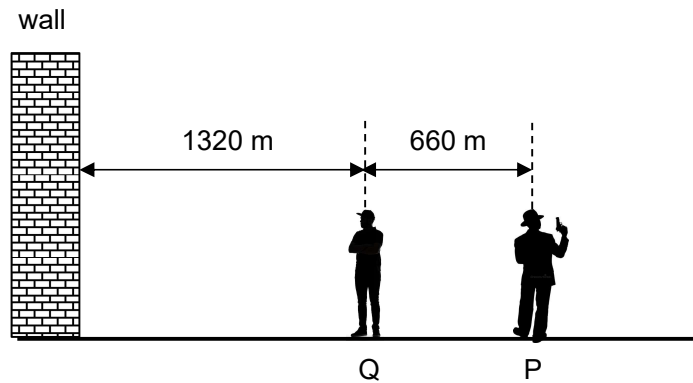
- 22** The diagram shows the displacement-time graph of a sound wave. A second sound wave is louder and of a higher pitch.



Which displacement-time graph shows the second sound wave?

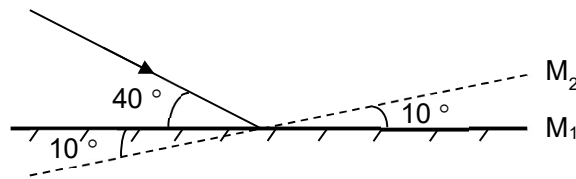


- 23** A man standing at P fires a pistol. Another man at Q hears the shot 2.0 s later.



How long later will the man at Q hear the echo from the wall?

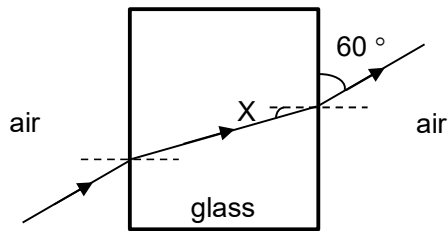
- A** 4.0 s **B** 6.0 s **C** 8.0 s **D** 12 s
- 24** Why do hospitals and clinics limit the number of times in a year a person can undergo X-ray imaging?
- A** Over-exposure can cause bones to break easily.
B Over-exposure can cause cancer.
C Over-exposure can cause heating.
D Over-exposure can cause skin tanning.
- 25** A ray of light strikes a plane mirror M_1 at an angle of 40° . The mirror is now rotated 10° anti-clockwise to a new position M_2 without changing the direction of the incident ray as shown.



What is the difference in the angle between the reflected ray before rotation and the reflected ray after rotation?

- A** 10° **B** 20° **C** 30° **D** 50°

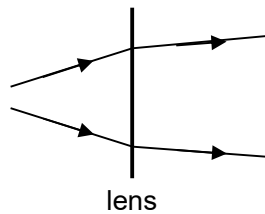
- 26 The diagram shows a ray of light passing through a glass block.



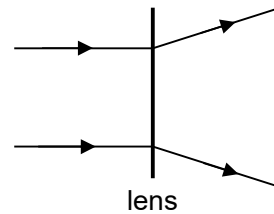
Given that the refractive index of glass is 1.5, what is angle X?

- A 12.4 ° B 19.5 ° C 35.3 ° D 48.6 °
- 27 Which diagram shows rays of light passing through a converging lens?

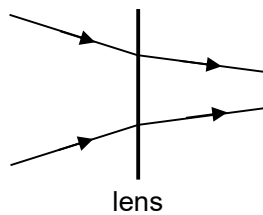
A



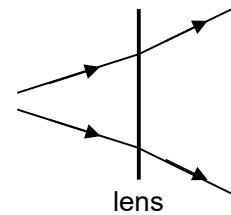
B



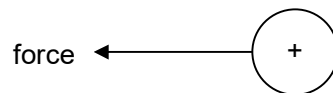
C



D



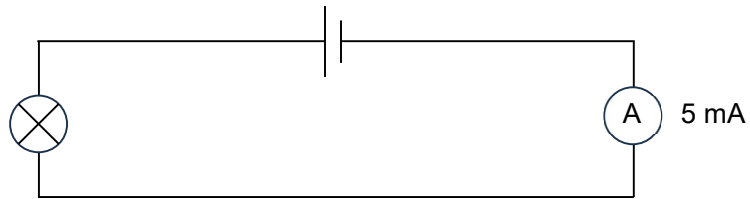
- 28 A stationary positive charge in an electric field experiences an electric force in the direction shown.



What is the direction of the electric field?

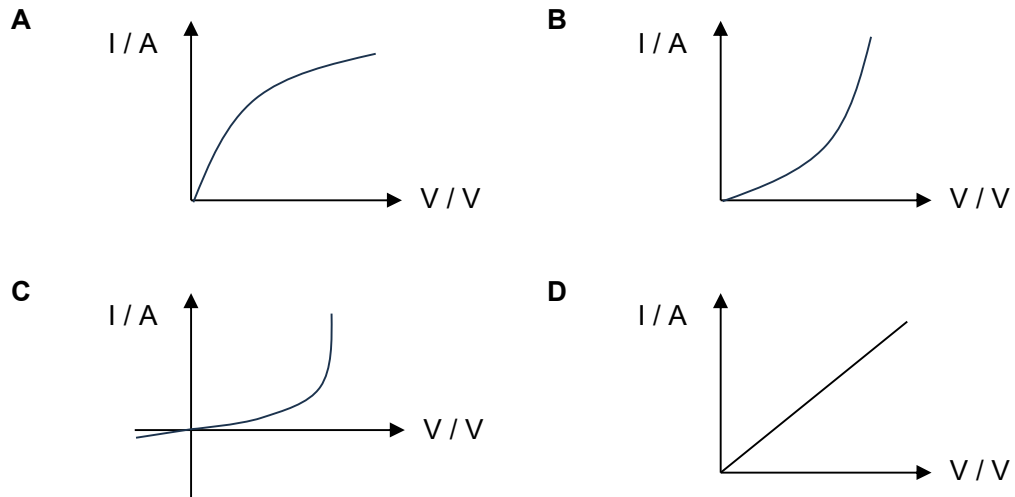
- A horizontally to the left
B horizontally to the right
C vertically downwards
D vertically upwards

- 29 A dry cell is connected to a bulb and a current of 5 mA flows through it as shown.

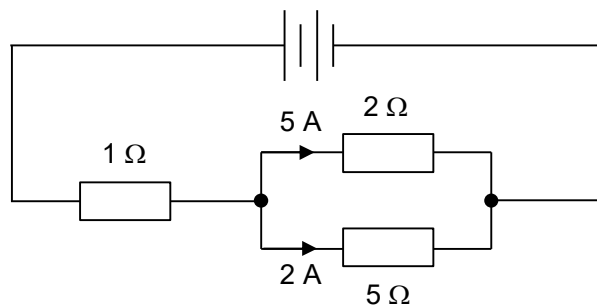


What is the time taken for the dry cell to deliver 2 C of charge?

- A** 0.01 s **B** 0.4 s **C** 10 s **D** 400 s
- 30 Which diagram shows the I-V characteristic graph of a filament lamp?



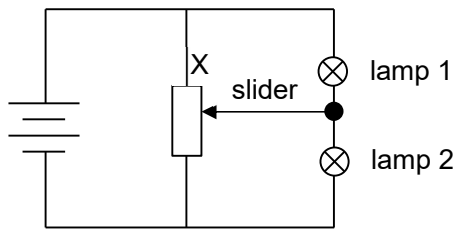
- 31 The diagram shows how a combination of resistors are connected.



What is the electromotive force of the battery?

- A** 10 V **B** 12 V **C** 17 V **D** 27 V

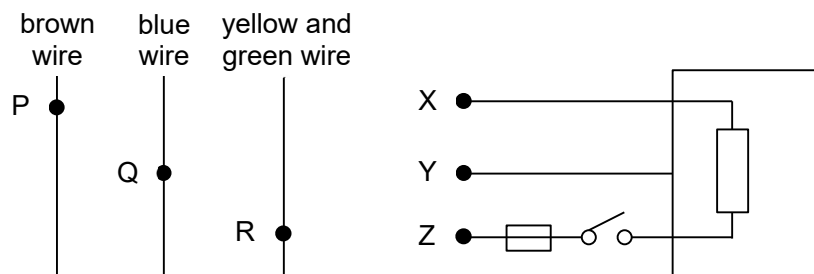
- 32** The diagram shows a potential divider circuit. The two lamps are identical.



What happens to the brightness of the lamps as the slider moves away from X of the potential divider?

	lamp 1	lamp 2
A	brighter	brighter
B	brighter	dimmer
C	dimmer	dimmer
D	dimmer	brighter

- 33** An electrical appliance with a metal casing is to be connected to the mains supply as shown.



Which of the following shows the correct connection of the wires from P, Q and R respectively?

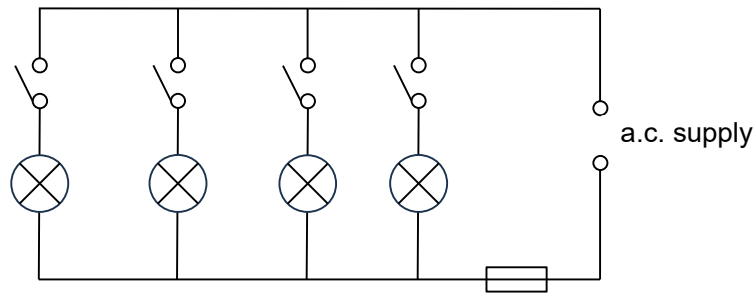
	P	Q	R
A	X	Y	Z
B	X	Z	Y
C	Y	X	Z
D	Z	X	Y

- 34** A 3000 W electrical appliance is turned on for 4 hours.

If the electricity tariff is \$0.29 per kWh, what is the cost of electricity consumption?

- A** \$3.48 **B** \$34.80 **C** \$348 **D** \$3480

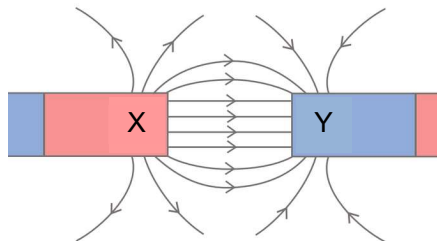
- 35** The diagram shows four lamps connected to an a.c. power supply. Each lamp is rated 120 V, 240 W.



What is the suitable fuse rating in the circuit?

- A** 4 A **B** 8 A **C** 10 A **D** 12 A

- 36** The diagram shows the magnetic field lines between the ends of two bar magnets.

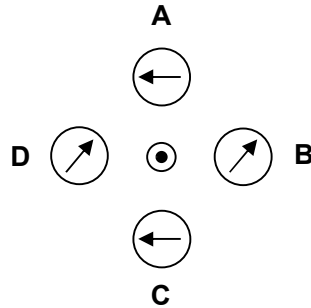


Which of the following correctly shows the poles of X and Y?

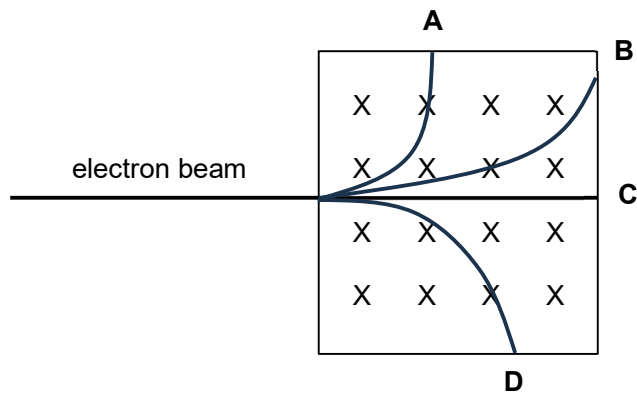
	pole of X	pole of Y
A	north	north
B	north	south
C	south	north
D	south	south

- 37** A wire perpendicular to the page carries an electric current. There are four compasses near the wire.

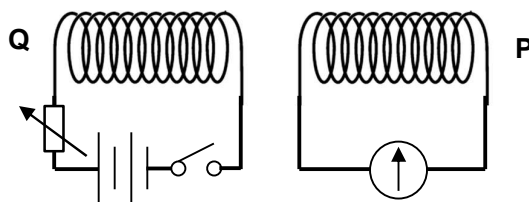
Which compass correctly shows the direction of the magnetic field caused by the current?



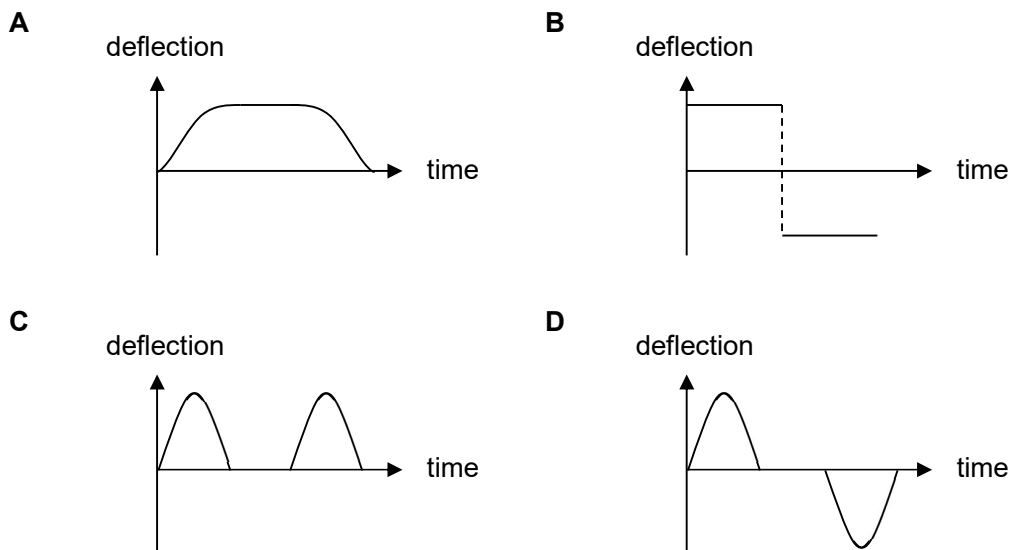
- 38** An electron beam enters a uniform magnetic field. Which is the correct path of the electron beam?



- 39** A coil P is connected to a galvanometer. A second coil Q is placed next to P and connected to a battery, a variable resistor and a switch as shown.



Which graph best represents the deflection of the galvanometer when the switch is closed for a few seconds and opened again?



- 40** One nucleus of a uranium isotope contains 238 nucleons of which 146 are neutrons.

Which is the nucleus of another isotope of uranium??

	number of nucleons in the nucleus	number of neutrons in the nucleus
A	235	143
B	237	147
C	238	144
D	241	146

End of Paper