



**SINGAPORE CHINESE GIRLS' SCHOOL
PRELIMINARY EXAMINATION 2025
SECONDARY FOUR**

CANDIDATE NAME

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CLASS

4		

REGISTER
NUMBER

CENTRE NUMBER

INDEX NUMBER

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PHYSICS

6091/1

Paper 1 Multiple Choice

28 August 2025

1 hour

Additional Materials: Multiple Choice Answer Sheet

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 Question Paper **and** Answer Sheet in the spaces provided.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers **A, B, C, 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.

Take $g = 10 \text{ ms}^{-2}$ or 10 Nkg^{-1} unless specified otherwise.

- 1 For which measurement would a micrometer screw gauge be most suitable for accurate measurement?
- A diameter of an atom
 - B diameter of a wire
 - C length of this page
 - D length of a pencil
- 2 A metal ball is attached to a cork with a string and lowered into a measuring cylinder of water until the ball is fully submerged while the cork remains above the water, as shown in Fig. 2.1. The string is then lowered further so that both the ball and the cork are fully submerged, as shown in Fig. 2.2.

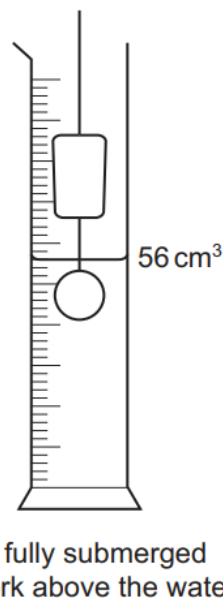
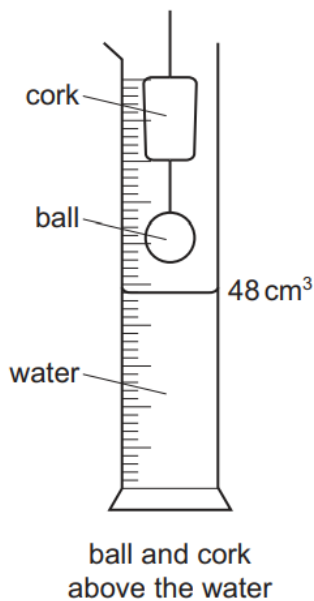


Fig. 2.1

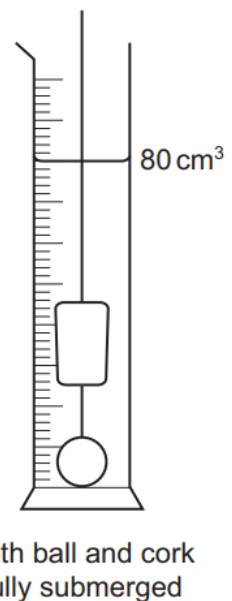
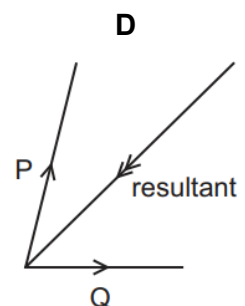
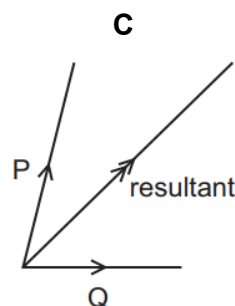
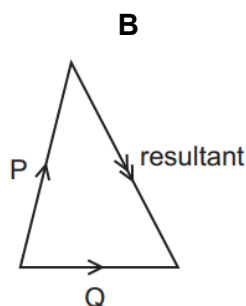
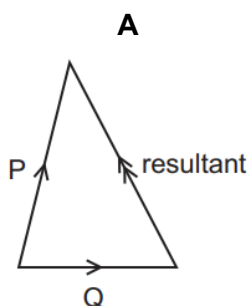


Fig. 2.2

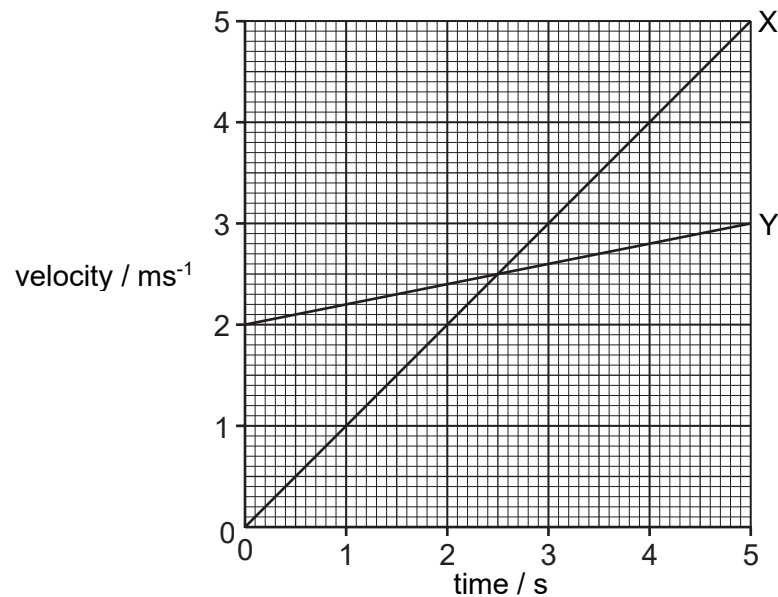
The mass of the cork is 4.8 g.

What is the likely density of the cork?

- A 0.15 g/cm³
 - B 0.20 g/cm³
 - C 0.60 g/cm³
 - D 5.0 g/cm³
- 3 Two forces P and Q act on an object. Which diagram shows the resultant of these two forces?

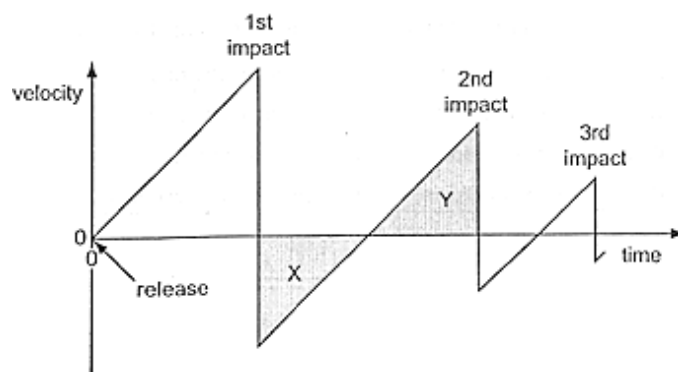


- 4 The figure below shows the velocity-time graphs of two vehicles X and Y. The accelerations and distances travelled by the two vehicles over the 5 s period can be estimated from the graphs.



Which statement is correct?

- A The accelerations of X and Y are the same at 2.5 s.
 - B The acceleration of Y is greater than that of X.
 - C The distance travelled by X is greater than that travelled by Y in the 5 s period.
 - D The distances travelled by X and Y in the 5 s period are the same.
- 5 A ball is released from rest above a horizontal surface. The graph below shows the variation of its velocity with time.



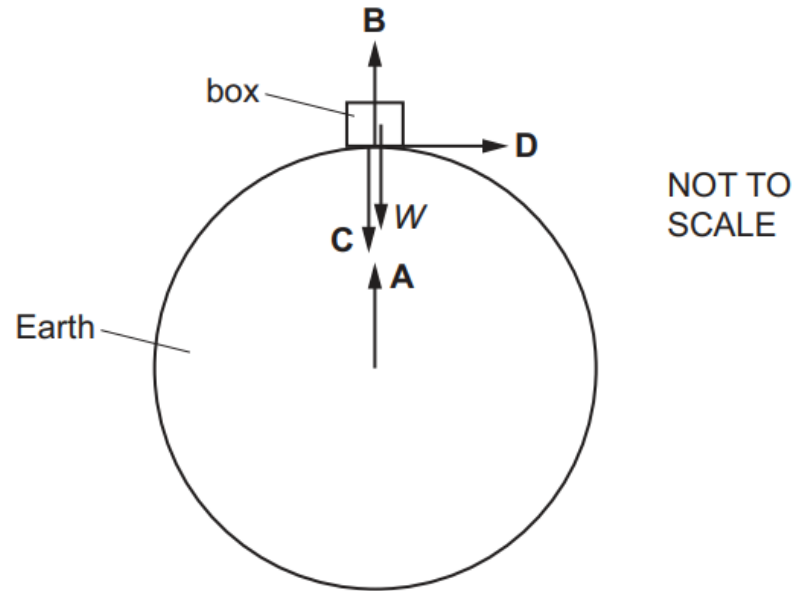
Why are areas X and Y equal?

- A For one impact, the speed at which the ball hits the surface equals the speed at which it leaves the surface.
- B The ball rises and falls through the same distance between impacts.
- C The ball's acceleration is the same during its upward and downward motion.
- D The speed at which the ball leaves the surface after an impact is equal to the speed at which it returns to the surface for the next impact.

- 6 A box rests on the Earth, as shown in the diagram below.

Newton's third law describes how forces of the same type act in pairs.

If the weight W of the box is one of the forces, which arrow represents the other force in this pair?



- 7 An object is accelerating under the influence of a force, F_1 , on a frictionless surface, as shown in Fig. 7.1. A while later, an opposing force, F_2 , of the same magnitude acts on it, as shown in Fig 7.2.

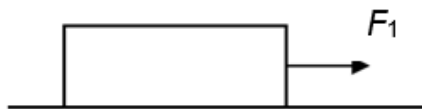


Fig. 7.1

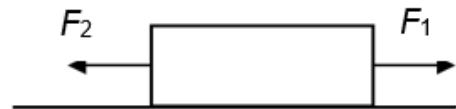
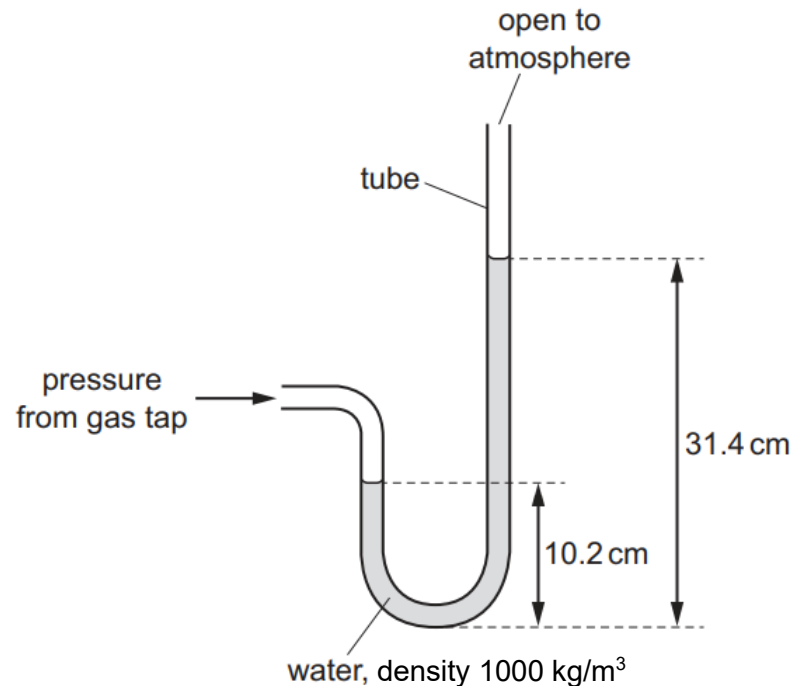


Fig. 7.2

Which statement correctly describes the object's motion immediately after the opposing force acts on it?

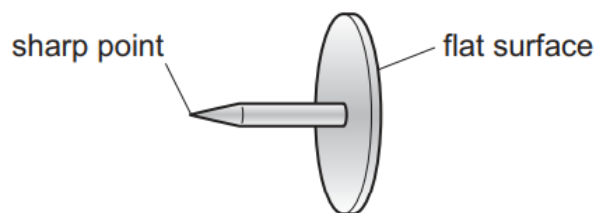
- A The object will slow down.
- B The object will move at constant velocity.
- C The object will move in the opposite direction.
- D The object will come to rest.

- 8 One end of a U-shaped tube is connected to a gas tap, with its other end open to the atmosphere, as shown in the diagram. It contains water of density 1000 kg/m^3 and the heights of the water columns on both sides are indicated. The atmospheric pressure is 101 kPa .



What is the pressure of the gas from the gas tap?

- A** 99 kPa **B** 100 kPa **C** 102 kPa **D** 103 kPa
- 9 The diagram shows a drawing pin (thumb tack) with a sharp point at one end and a flat surface at the other end.



The pin is pushed into a wooden board.

How do the pressure and the force at the sharp point compare with the pressure and the force on the flat surface?

	force at the sharp point	pressure at the sharp point
A	greater than on the flat surface	greater than on the flat surface
B	greater than on the flat surface	less than on the flat surface
C	the same as on the flat surface	greater than on the flat surface
D	the same as on the flat surface	less than on the flat surface

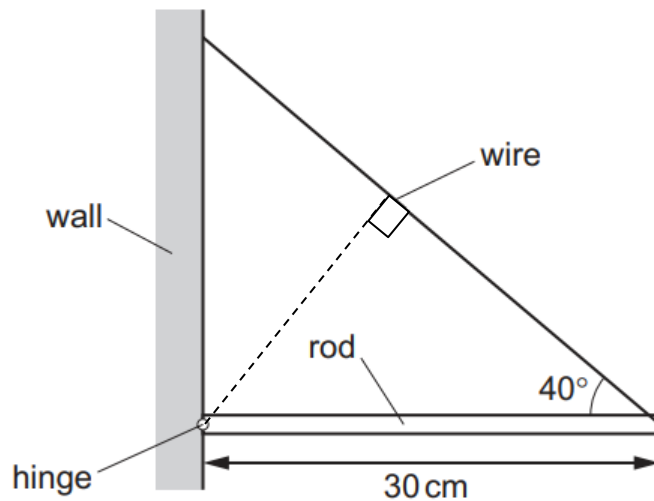
- 10** A student states 'If an object is in equilibrium, the sum of clockwise moments about point X is equal to the sum of anticlockwise moments about point Y.'

Under which condition would this statement be correct?

- A** Either X or Y is the centre of gravity of the object.
 - B** Either X or Y is the pivot of the object.
 - C** X and Y are at opposite ends of the object.
 - D** X and Y are the same point on the object.
- 11** The diagram shows a uniform rod of length 30 cm and weight 5.2 N attached to a wall by a hinge at one end.

The other end of the rod is supported by a wire so that the rod is horizontal and in equilibrium.

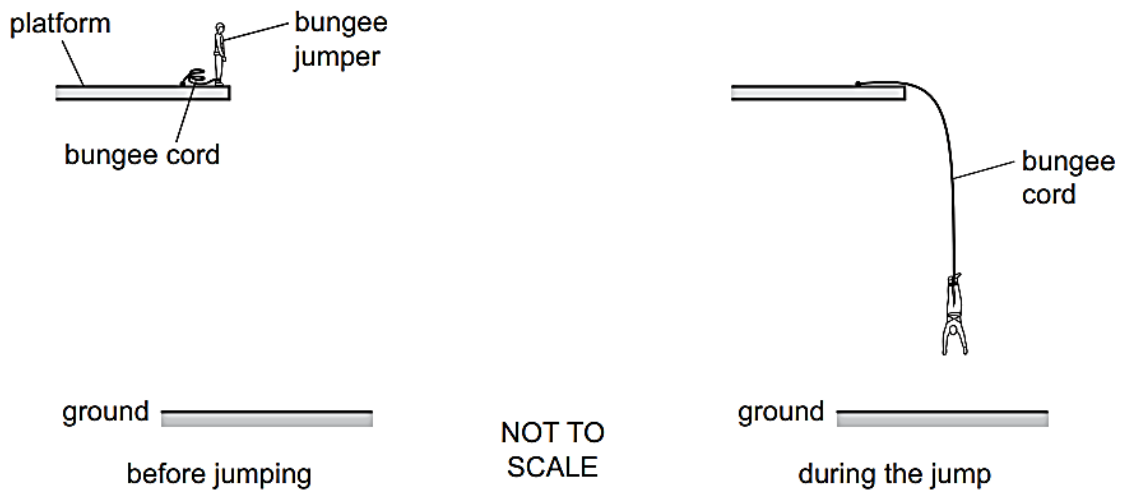
The wire is at an angle of 40° to the horizontal.



What is the tension in the wire?

- A** 3.4 N **B** 4.0 N **C** 6.8 N **D** 8.1 N
- 12** Car X is travelling at half the speed of car Y. Car X has twice the mass of car Y. Which statement is correct?
- A** Car X has half the kinetic energy of car Y.
 - B** Car X has one quarter of the kinetic energy of car Y.
 - C** Car X has twice the kinetic energy of car Y.
 - D** The two cars have the same kinetic energy.

- 13** A bungee jumper jumps from a platform and is decelerated by an elastic bungee cord, as shown in the diagram.



As the jumper falls, his initial energy in the gravitational potential store is transferred to his kinetic store and the elastic potential store of the cord.

At which part of the jump is energy in all three stores non-zero?

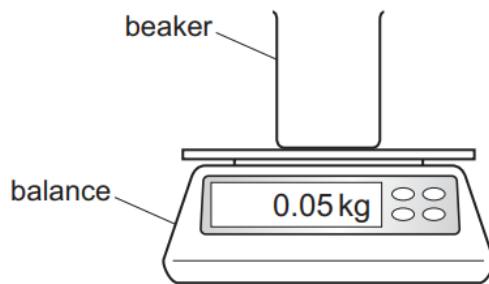
- A** on the platform before the jump
 - B** on the way down before the cord starts to extend
 - C** on the way down as he decelerates
 - D** at the bottom of the jump when he is momentarily stationary
- 14** A hydroelectric power station uses energy in the gravitational potential store of water to generate electrical energy.
- In a particular power station, the mass of water flowing per unit time is $1.5 \times 10^5 \text{ kg s}^{-1}$. The water falls through a vertical height of 120 m. The electrical power generated is 100 MW.
- What is the efficiency of the power station?
- A** 5.6%
 - B** 43%
 - C** 56%
 - D** 76%
- 15** The specific heat capacity of solid P is greater than that of solid Q.
- What does this statement mean?
- A** Less energy is needed to raise the temperature of a unit mass of solid P by 1°C than that of solid Q.
 - B** Less energy is needed to melt a unit mass of solid P than a unit mass of solid Q.
 - C** More energy is needed to raise the temperature of a unit mass of solid P by 1°C than that of solid Q.
 - D** More energy is needed to melt a unit mass of solid P than a unit mass of solid Q.

- 16** A student splashes water onto her face. Here are three statements about the effects.
- P The water uses energy to evaporate.
 - Q The water gains energy from the student.
 - R The face of the student cools.

Which statements are correct?

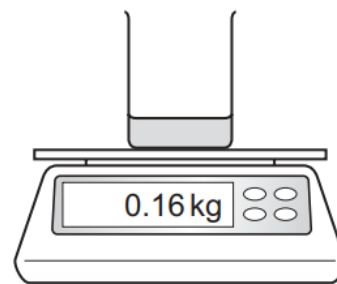
- A** P and Q only **B** P and R only **C** Q and R only **D** P, Q and R
- 17** A student placed a number of ice cubes in a container with a hole in the base. He left them to melt so that the water dripped into a beaker placed on a balance. The student recorded the initial mass of the beaker as shown in Fig. 17.1 and the final mass of the beaker and water as shown in Fig. 17.2 after five minutes.

ice in a container
with a hole
in the base



before

Fig. 17.1



after

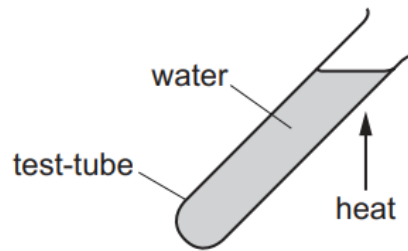
Fig. 17.2

The specific latent heat of fusion for water is 334 J/g .

How much energy was absorbed from the surroundings in order to melt the ice?

- A** 37 J **B** 53 J **C** 37 000 J **D** 53 000 J
- 18** One end of a copper rod is placed in hot water. Thermal energy travels along the rod, making the other end warmer.
- What is the behaviour of the copper at an atomic level that accounts for most of the transfer of thermal energy from one end to the other?
- A** Atoms at the hot end gain kinetic energy and move towards the other end.
 - B** Atoms at the hot end expand, colliding with other atoms and transferring energy.
 - C** Free electrons at the hot end gain energy and move towards the other end, colliding with atoms along the rod.
 - D** Free electrons at the hot end gain energy from the hot water and move directly to the other end.

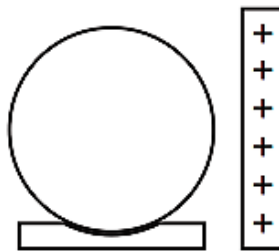
- 19** A glass test-tube containing water is heated at the top, as shown in the diagram. The water at the top boils, but the water at the bottom remains cold.



Which row explains why the water at the bottom of the test-tube remains cold?

	glass	water
A	good thermal conductor	good thermal conductor
B	good thermal conductor	poor thermal conductor
C	poor thermal conductor	good thermal conductor
D	poor thermal conductor	poor thermal conductor

- 20** The diagram shows an uncharged metal sphere placed on an insulating support. A positively charged rod is brought close to the sphere, but does not touch it.



How do the charges in the sphere move and what is now the charge on the sphere?

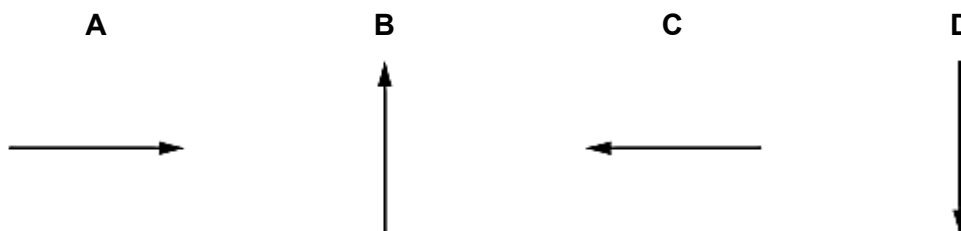
	movement on charges	charge on sphere
A	positive charges move to the left of the sphere	positive
B	positive charges move to the left of the sphere	neutral
C	negative charges (electrons) move to the right of the sphere	positive
D	negative charges (electrons) move to the right of the sphere	neutral

- 21 P is a point near to charge X, as shown in the diagram.

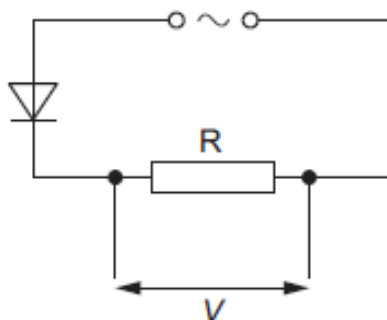


When a negatively charged test charge is placed at point P, it experiences a force of repulsion directed radially away from X.

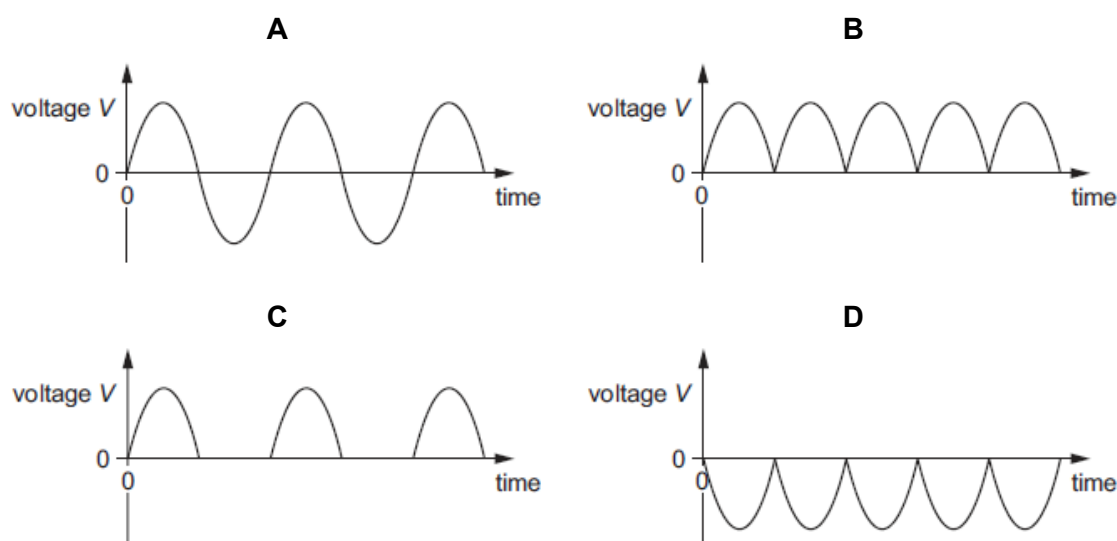
Which arrow correctly shows the direction of the electric field at point P due to the charge X?



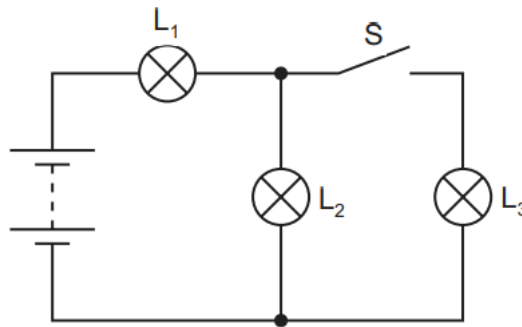
- 22 The diagram shows an alternating current (a.c.) power supply connected in series with a resistor R and a diode.



Which graph shows how the voltage V across the resistor R varies with time?



- 23** Three identical lamps L_1 , L_2 and L_3 are connected to a battery with negligible internal resistance, as shown in the diagram.

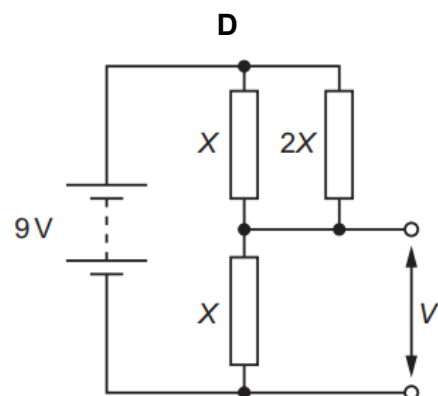
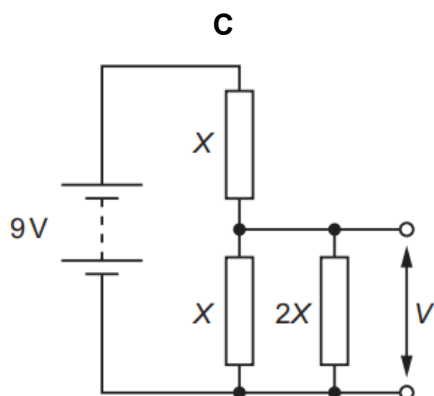
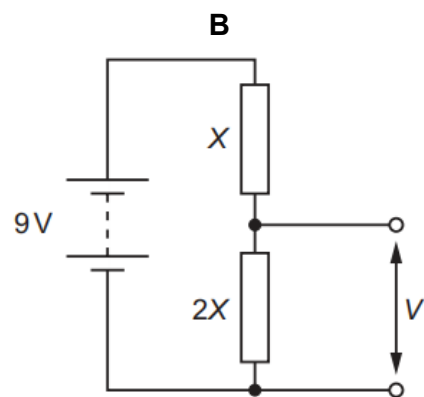
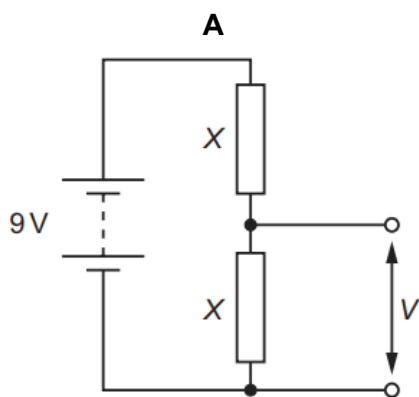


What happens to the brightness of lamps L_1 and L_2 when the switch S is closed?

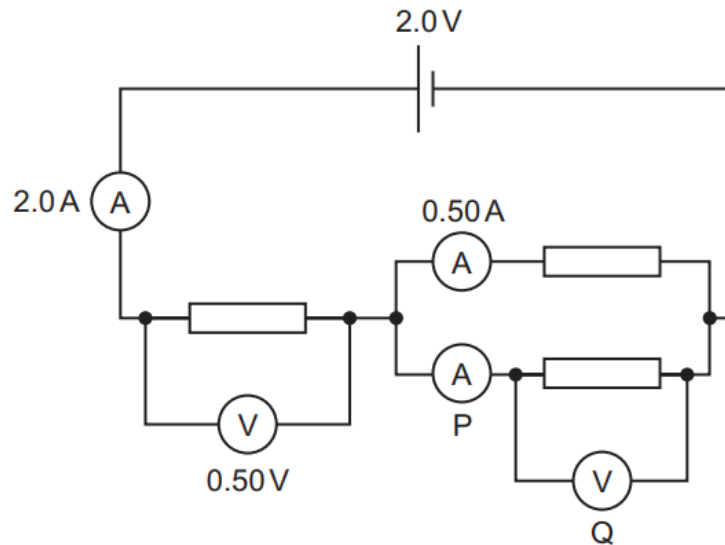
	lamp L_1	lamp L_2
A	brighter	brighter
B	brighter	dimmer
C	dimmer	brighter
D	dimmer	dimmer

- 24** Four potential divider circuits each consist of a battery of electromotive force 9 V and negligible internal resistance connected to a combination of resistors. Each resistor in the circuits has a resistance of either X or $2X$.

Which circuit diagram has the largest output voltage V ?



- 25** The diagram shows a circuit containing a cell of electromotive force (e.m.f.) 2.0 V, three resistors, three ammeters and two voltmeters. One ammeter is labelled P and one voltmeter is labelled Q. The readings on the other two ammeters and the other voltmeter are shown.



What are the readings on ammeter P and voltmeter Q?

	reading on P / A	reading on Q / V
A	1.5	1.5
B	1.5	2.5
C	2.5	1.5
D	2.5	2.5

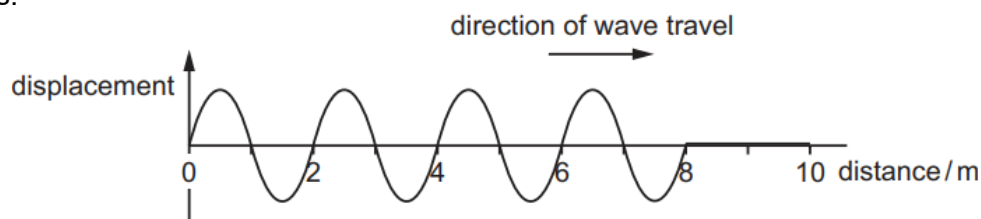
- 26** Some sources of electromagnetic waves are listed.

- 1 a radio wave transmitter
- 2 a source of X-rays
- 3 a 30 mm wavelength radar transmitter
- 4 a light-emitting diode that emits red light

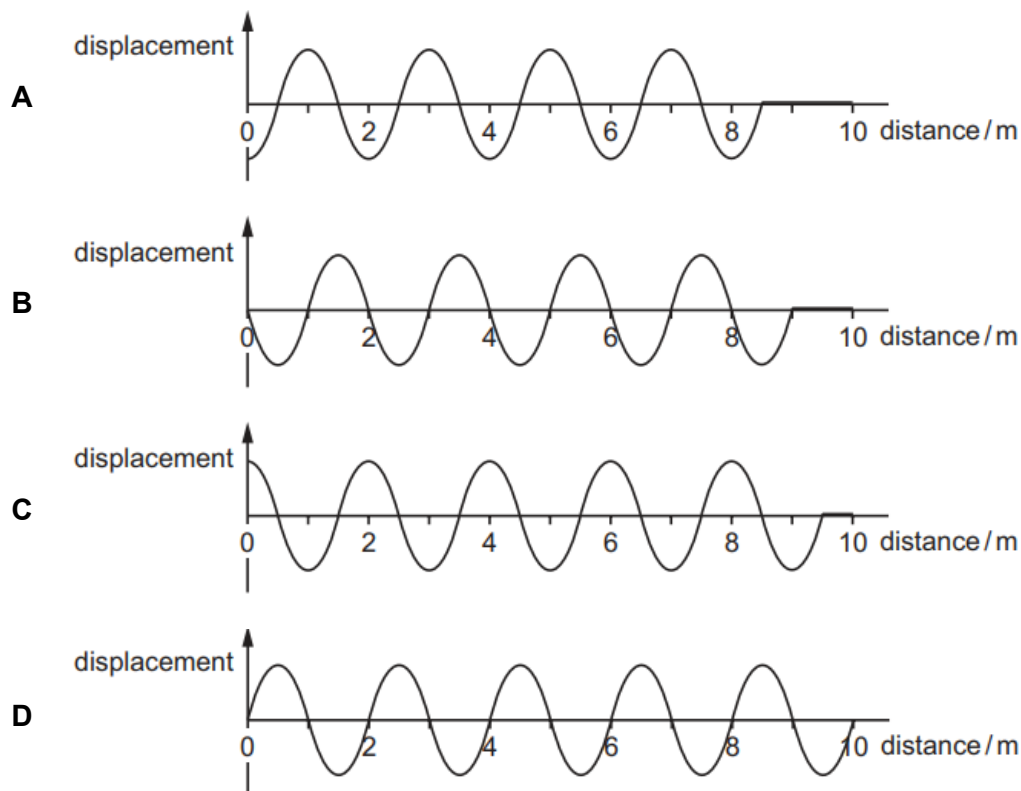
Which list gives the sources in order of increasing wavelength, from left to right, of the waves they emit?

- A** 1 → 3 → 4 → 2
- B** 2 → 4 → 1 → 3
- C** 2 → 4 → 3 → 1
- D** 3 → 1 → 4 → 2

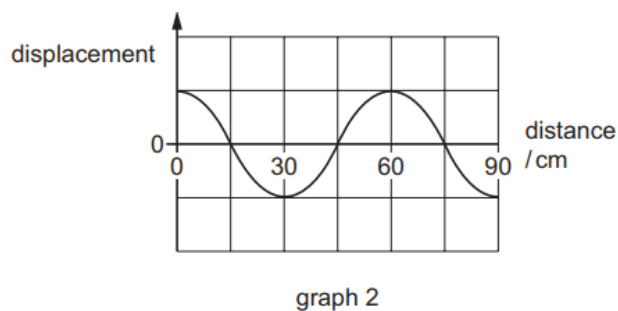
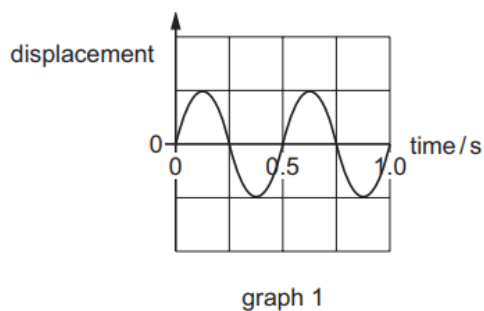
- 27 A transverse wave is travelling along a rope. The frequency of the wave is 2.0 Hz. The graph below shows the variation of the displacement of the wave with distance at time $t = 0$ s.



Which diagram shows the position of the wave at time $t = 0.5$ s?



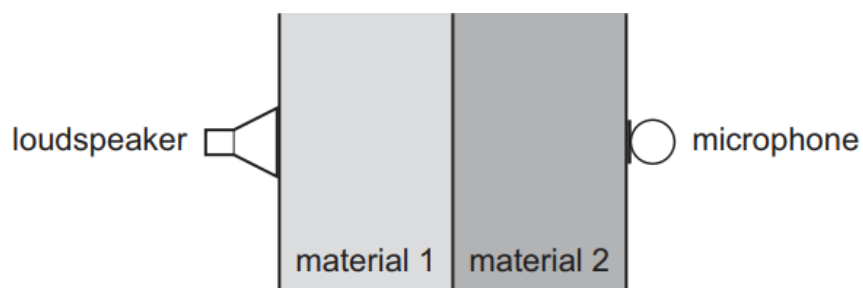
- 28 The two graphs below represent the same wave. Graph 1 shows the variation of the displacement with time at a particular distance. Graph 2 shows the variation of the displacement with distance at one instant.



What is the speed of the wave?

- A 22.5 cm s^{-1} B 30.0 cm s^{-1} C 90.0 cm s^{-1} D 120 cm s^{-1}

- 29** The sound from a loudspeaker must pass through two materials to reach a microphone, as shown in the diagram below.



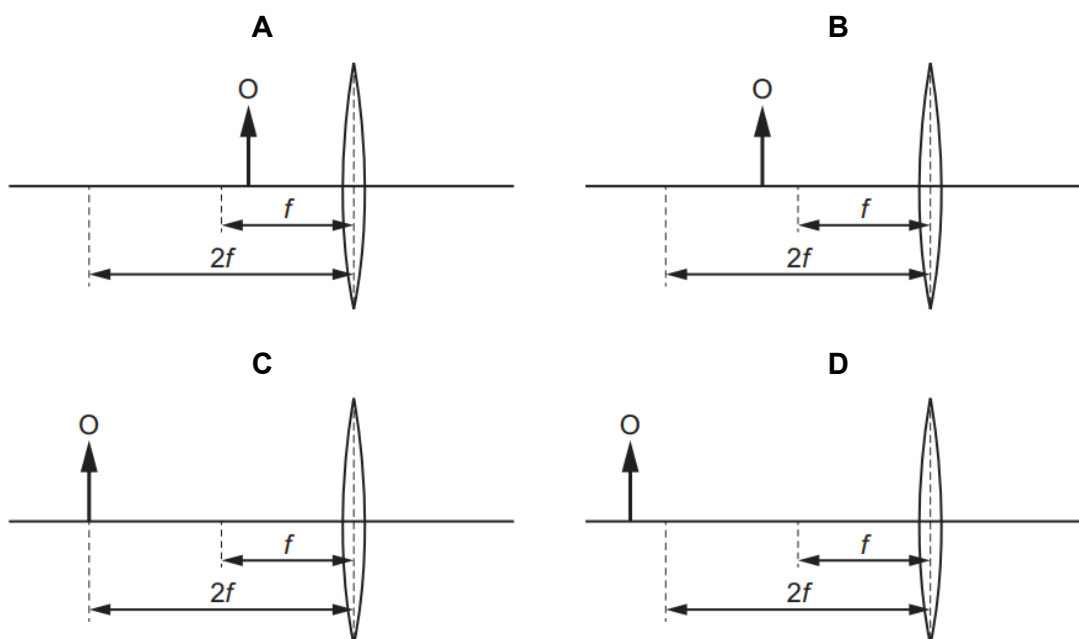
Which combination of materials gives the shortest time for the sound to reach the microphone?

	material 1	material 2
A	air	hydrogen
B	air	water
C	copper	aluminium
D	water	oil

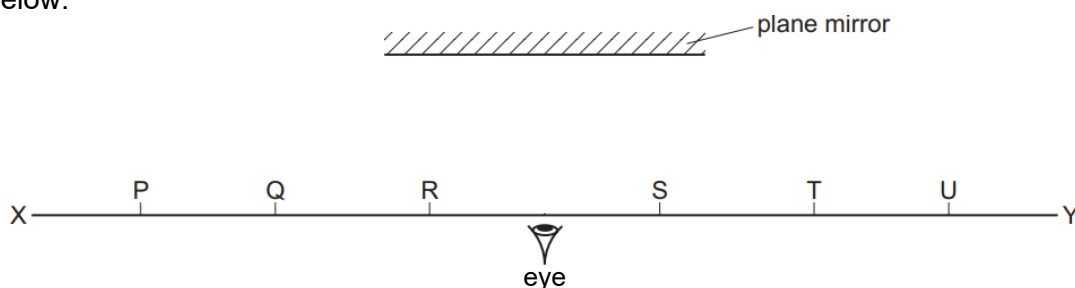
- 30** A converging lens produces an image of an object O.

The focal length of the lens is f .

At which position the object must be placed for the lens to produce a real, enlarged image?



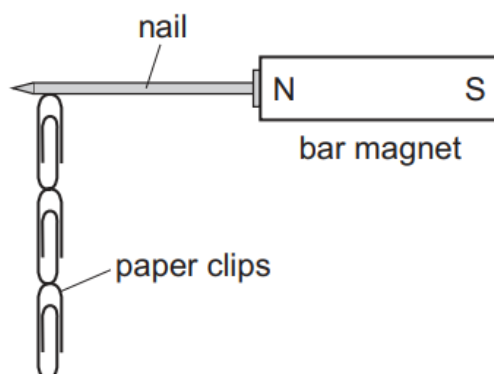
- 31** A student uses one eye to look at images in a plane mirror, as shown in the diagram below.



Objects are placed on the line XY.

Which objects will produce images that can be seen by the eye?

- A** P, Q, R, S, T and U
B Q, R, S and T only
C P and U only
D R and S only
- 32** Four nails A, B, C and D are tested to find which makes the strongest permanent magnet. One of the nails is placed against a bar magnet, as shown in the diagram below. The number of paper clips which the nail can support is recorded.



The bar magnet is then removed and the number of paper clips remaining attached to the nail is recorded. Each nail is tested individually.

Which nail becomes the strongest permanent magnet?

	number of paper clips attached to the nail	
	bar magnet present	bar magnet removed
A	2	0
B	2	1
C	4	3
D	5	2

- 33** A steel bar is placed in an East-West direction for it to be demagnetised. No other magnet is nearby.

Which method is not suitable for demagnetising the steel bar?

- A** hammering the bar
- B** heating the bar to a very high temperature
- C** slowly taking the bar out of a coil that carries an alternating current
- D** slowly taking the bar out of a coil that carries a direct current

- 34** Diagram 1 shows a coil of wire P between the poles of a magnet. The ends of coil P are connected to a battery using slip rings.

Diagram 2 shows a coil of wire Q between the poles of a different magnet. The ends of coil Q are connected to a battery using a split-ring commutator.

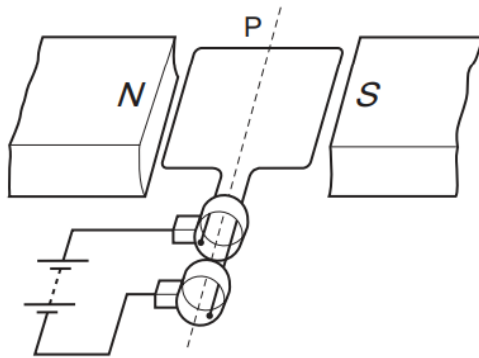


diagram 1

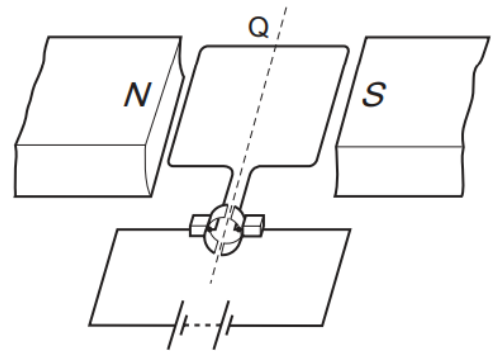
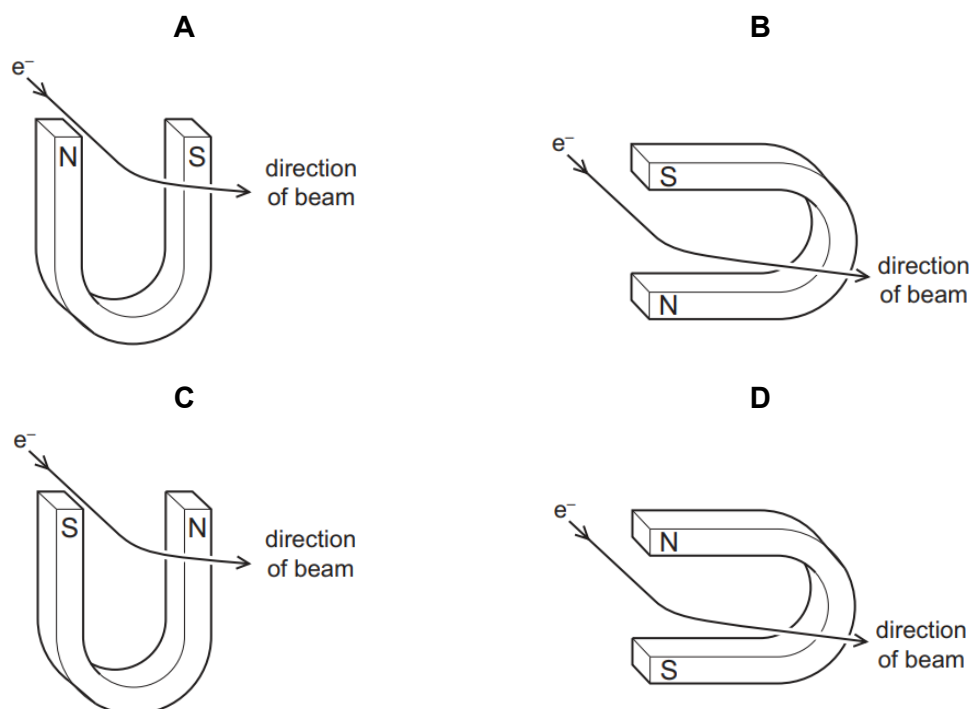


diagram 2

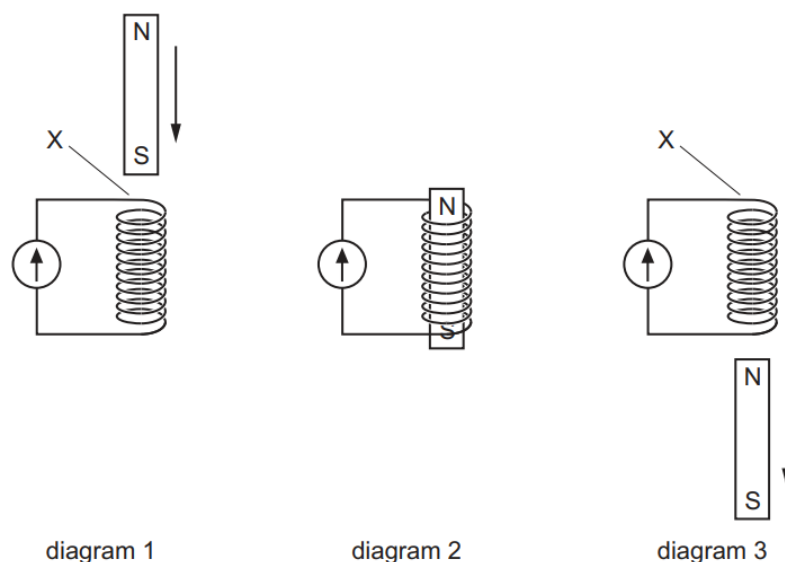
What happens to coils P and Q?

	coil P	coil Q
A	continuously turns anticlockwise	makes one quarter turn anticlockwise then stops
B	continuously turns clockwise	makes one quarter turn clockwise then stops
C	makes one quarter turn anticlockwise then stops	continuously turns anticlockwise
D	makes one quarter turn clockwise then stops	continuously turns clockwise

- 35** A beam of electrons is passed through the magnetic field of a magnet. How must the magnet be positioned to deflect the beam in the direction shown?



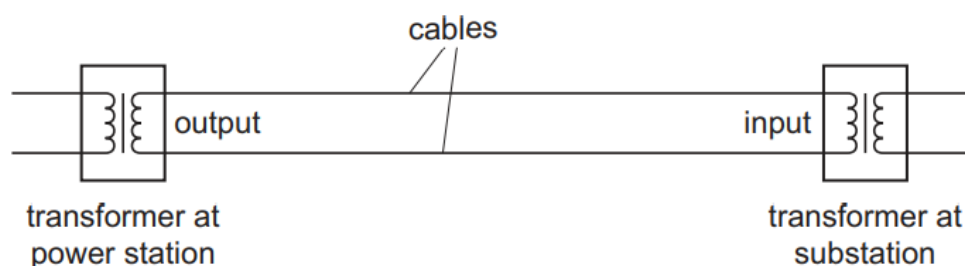
- 36** A magnet is dropped vertically through a solenoid, as shown in the diagrams below. This induces magnetic poles at both ends of the solenoid.



Which magnetic poles are induced at position X in diagram 1 and diagram 3?

	diagram 1	diagram 3
A	N pole	N pole
B	N pole	S pole
C	S pole	N pole
D	S pole	S pole

- 37** Cables transmit electrical power from the output of the transformer at a power station to the input of the transformer at a substation, as shown in the diagram.



The power at the output of the transformer at the power station is 400 MW. Which situation delivers the most power to the input of the transformer at the substation?

	potential difference at power station transformer output / kV	diameter of cables
A	200	large
B	200	small
C	400	large
D	400	small

- 38** Four students are asked to comment on the processes of nuclear fission and nuclear fusion.

Their comments are recorded in the table.

Which row is correct?

	fission	fusion
A	energy is absorbed	a large unstable nucleus splits
B	energy is released	two light nuclei join
C	a large unstable nuclei splits	energy is absorbed
D	two light nuclei join	energy is absorbed

- 39** Which statement about all three types of radioactive emissions is correct?

- A** They are all completely absorbed by a thin aluminium sheet.
- B** They are all deflected by electric fields.
- C** They are all deflected by magnetic fields.
- D** They all cause ionisation of gases.

- 40** A teacher holds a radioactive source near a detector.

The reading on the detector is 320 counts/min.

The detector is switched on again after the source has been removed and it shows a reading of 20 counts/min.

What is the counts/min solely due to the source and why is there a reading on the detector when there is no radioactive source present?

	counts/min due to the source	reason for reading with no source
A	300	zero error on detector
B	300	background radiation
C	340	zero error on detector
D	340	background radiation

END OF PAPER

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