



TEMASEK SECONDARY SCHOOL

Preliminary Examination 2024

Secondary 4 Express

PHYSICS

6091/01

Paper 1 Multiple Choice

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

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

You are not required to hand in this booklet at the end of the paper.

Write your name, index number and class in all the work you hand in.

Write in soft pencil.

There are **forty** questions on this section. 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.

Take gravitational field strength as 10 N/kg.

This document consists of **15** printed pages and **1** blank page.

Answer **all** the questions (40 Marks)

- 1** Length, mass, power, time and temperature are considered physical quantities.

How many base quantities can be found in the sentence above?

- | | |
|------------|------------|
| A 2 | B 3 |
| C 4 | D 5 |

- 2** Which pair of units can be used for the same physical quantity?

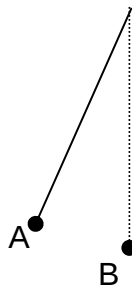
- | | |
|----------------------------------|---------------------------------|
| A km/h and m/s^2 | B kg/m^3 and Pa |
| C Nm and kgm/s | D J/s and W |

- 3** What is the correct order of magnitude for the size of a typical atom?

- | | |
|-----------------------|-----------------------|
| A 10^{-15} m | B 10^{-12} m |
| C 10^{-10} m | D 10^{-7} m |

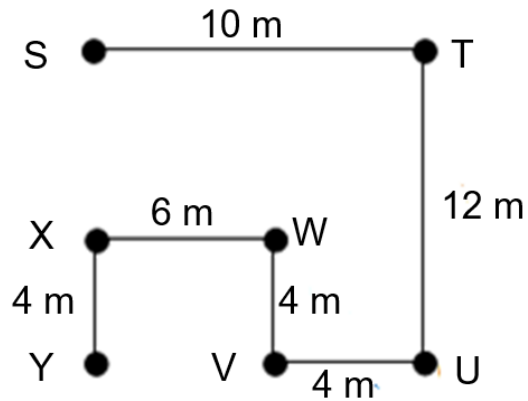
- 4** The period of an oscillating pendulum is 0.50 s.

What is the time taken for the pendulum bob to travel from A, the extreme position of the bob, to B, its rest position?



- | | |
|------------------|-----------------|
| A 0.125 s | B 0.25 s |
| C 0.50 s | D 2.0 s |

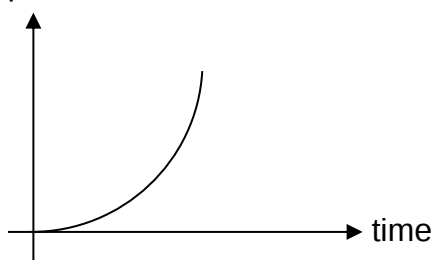
- 5 Grace moves from S to Y in the sequence as illustrated in the diagram. She took 5.0 s for the whole journey.



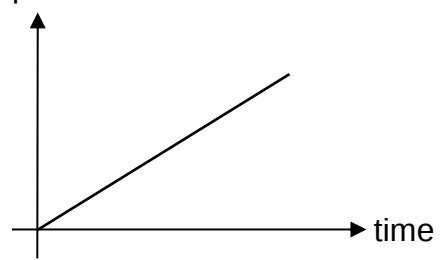
What is the magnitude of her average velocity from S to Y?

- A 0.6 m/s B 1.6 m/s
C 2.4 m/s D 8.0 m/s
- 6 A stone is thrown vertically upwards.
- Assuming resistive forces are negligible, which of the following displacement-time graphs shows the motion described above?

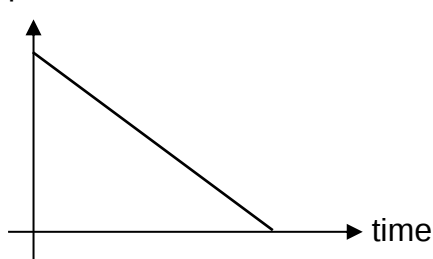
A displacement



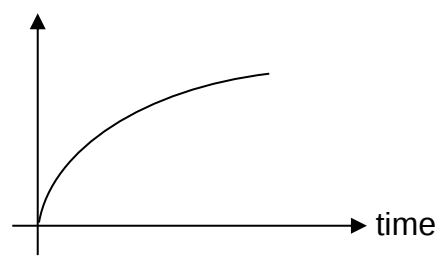
B displacement



C displacement



D displacement



7 Which object has the greatest inertia?

- A A 10 kg object at rest.
- B A 7 kg object moving at 5 m/s.
- C A 8 kg object decelerating at 2 m/s^2 from a initial speed of 30 m/s.
- D A 2 kg object accelerating at 0.5 m/s^2 from rest.

8 Two objects have the same size and shape but one is heavier than the other. They are both dropped from rest from the same height.

Which statement is true when comparing the motion of the two objects?

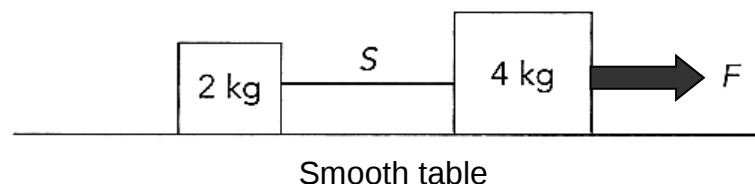
- A The heavier object has higher initial acceleration and higher terminal velocity.
- B The heavier object has lower initial acceleration but the same terminal velocity as the lighter object.
- C Both objects have the same initial acceleration and the same terminal velocity.
- D Both objects have the same initial acceleration but the heavier object has higher terminal velocity.

9 The weight of a hot-air balloon is 4000 N. The hot-air balloon rises at a constant speed of 2.0 m/s.

What is the magnitude of the resultant force acting on the hot-air balloon?

- | | |
|----------|----------|
| A 0 N | B 2000 N |
| C 4000 N | D 8000 N |

10 Two blocks are connected by a light string S as shown in the figure below. Under the action of a constant force, F , they move with a uniform acceleration of 3.0 m/s^2 .

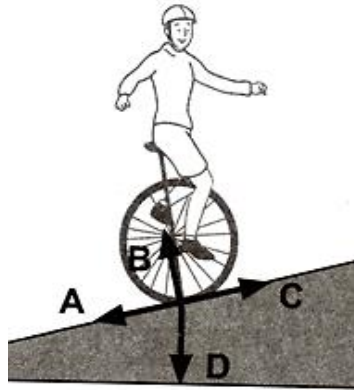


What will the acceleration of the block of mass 4 kg be if string S suddenly breaks?

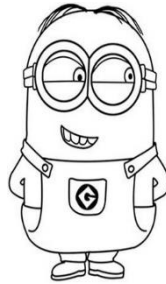
- | | |
|-----------------------|-----------------------|
| A 4.0 m/s^2 | B 4.5 m/s^2 |
| C 5.0 m/s^2 | D 6.0 m/s^2 |

- 11** A cyclist riding a unicycle is cycling up an inclined plane as shown in the figure below.

In which direction is the friction acting on the wheel of the unicycle?

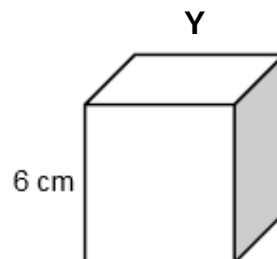
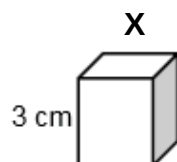


- 12** The figure below shows a figurine toy which is not very stable and topples over easily.



Which of the following will not increase its stability?

- A** Adding a heavy hat on the head of the toy.
 - B** Increasing the size of the foot of the toy.
 - C** Increasing the mass of the toy's pants.
 - D** Sticking weights to the bottom of the foot.
- 13** Two cubes, **X** and **Y**, are made up of the same material. Cube **X** has sides of 3 cm and cube **Y** has sides of 6 cm. Cube **Y** has a mass of 216 g.



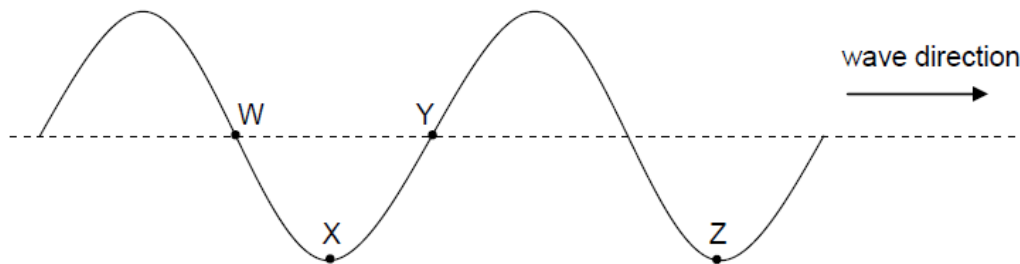
What is the density of cube **X**?

- A** 1 kg/m³
- B** 8 kg/m³
- C** 1000 kg/m³
- D** 8000 kg/m³

- 17** When a human climbs out of a warm swimming pool on a hot summer day, he feels cold.

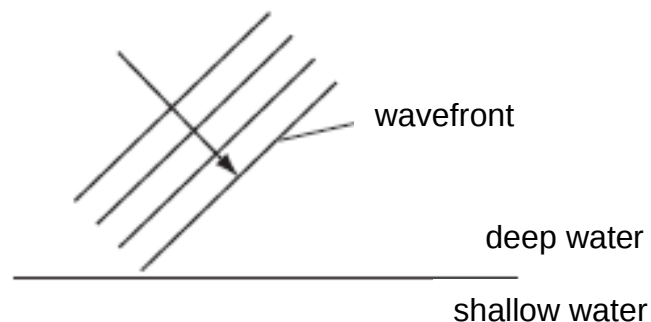
Why does this happen?

- A** The cold in the air is transferred to the human.
 - B** The water droplets are at a higher temperature as compared to his body temperature.
 - C** Energy is transferred from the human to the water when it evaporates.
 - D** The air is a better thermal conductor than water.
- 18** The diagram below shows a wave on a string with points W, X, Y and Z marked on the string. The wave is moving in the direction shown.



Which two points are moving in the same direction?

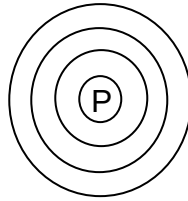
- A** W and X
 - B** W and Y
 - C** X and Y
 - D** Y and Z
- 19** The diagram shows water waves moving from deep to shallow water.



Which of the following statements is true during the process?

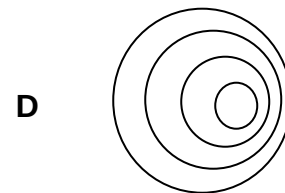
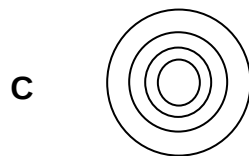
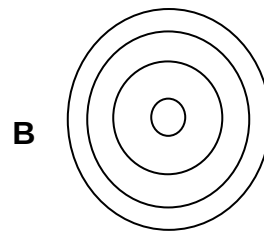
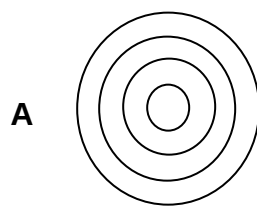
- A** The distance between crests will increase.
- B** The frequency of the wave will remain the same.
- C** The period of the wave will decrease.
- D** The speed of the wave will increase.

- 20** The diagram shows the crests of circular water wavefronts radiating from a point source, P.



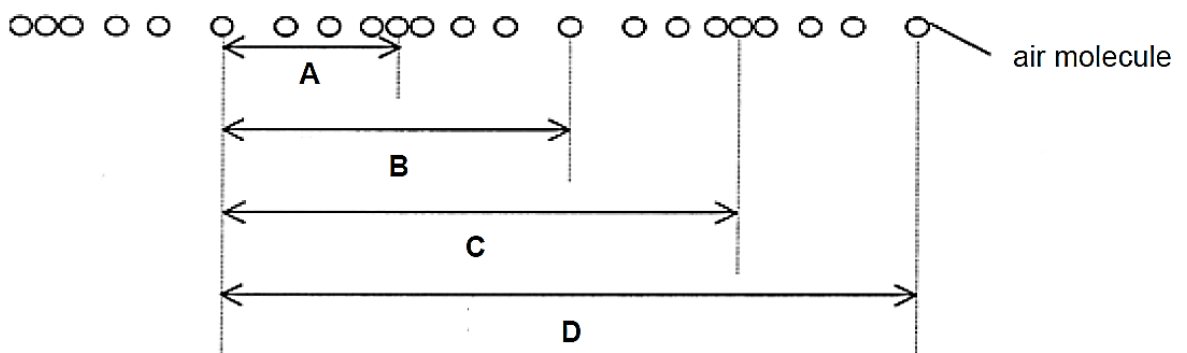
The point source is then set to vibrate with a gradually decreasing frequency.

Which diagram shows the new resulting wavefronts if the speed of the wave remains the same?



- 21** The diagram below represents the position of the air molecules in a sound wave. The wavelength of this wave is 2.0 cm.

Which distance represents 4.0 cm?



- 22 The sound wave from a flute has a smaller amplitude than that of a violin. The sound wave from the flute has a higher frequency than that from the violin.

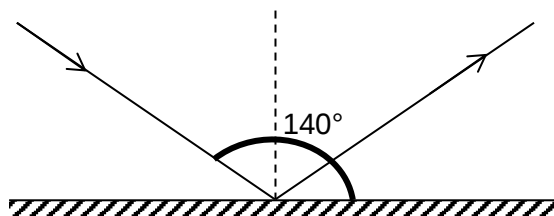
Which instrument produced a softer sound and which instrument produced a higher pitch?

	softer sound	higher pitch
A	flute	flute
B	flute	violin
C	violin	flute
D	violin	violin

- 23 What component of the electromagnetic spectrum has a wavelength shorter than microwaves and a frequency lower than ultra-violet rays?

- A Gamma rays
- B radio waves
- C X-ray
- D infra-red radiation

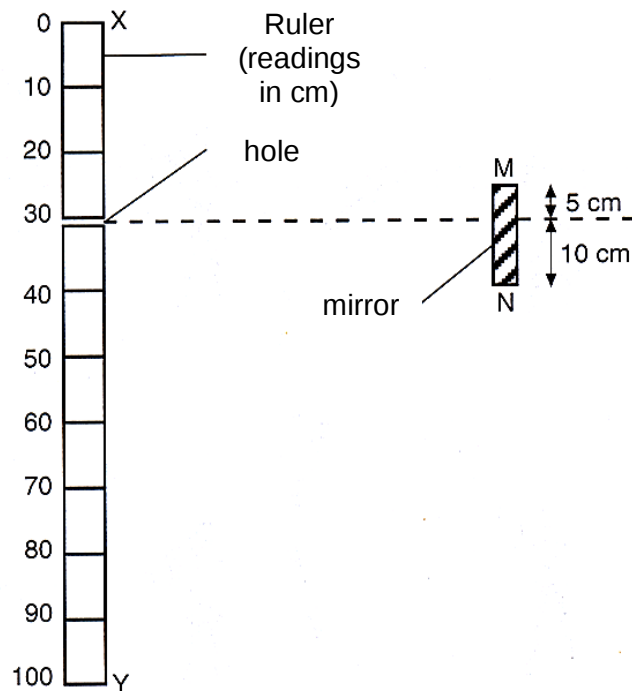
- 24 The diagram below shows a ray of light reflected by a plane mirror.



What is the angle of reflection?

- A 30°
- B 40°
- C 50°
- D 60°

- 25** The diagram shows a metre rule XY with a small hole drilled at the 30 cm mark. A plane mirror MN is placed in front of the ruler and is parallel to it.



If an observer peeps through the hole at the mirror, the extent to which he can see the metre rule is between the _____.

- A** 0 cm and 100 cm mark
B 10 cm and 70 cm mark
C 20 cm and 50 cm mark
D 30 cm and 60 cm mark
- 26** Four steps are involved in charging a metal sphere by induction.

- (i) A charged rod is brought close to the sphere.
 (ii) The charged rod is removed.
 (iii) The earth connection is removed from the sphere.
 (iv) The sphere is earthed by touching it.

What is the order such that the metal sphere can be charged by induction?

- A** (i), (ii), (iii), (iv) **B** (i), (iv), (iii), (ii)
C (iii), (i), (iv), (ii) **D** (iii), (i), (ii), (iv)

- 27** What is the potential difference across a resistor if the work done to move 5.0 C across it in 2.0 s is 10.0 J?

A 0.50 V

B 2.0 V

C 2.5 V

D 50 V

- 28** Two wires made of the same material are placed side by side. Wire P has a length L and cross-sectional area X . Wire Q has a length $2L$ and cross-sectional area $\frac{1}{2}X$.

What is the ratio of the resistance of wire P to wire Q?

A 0.25

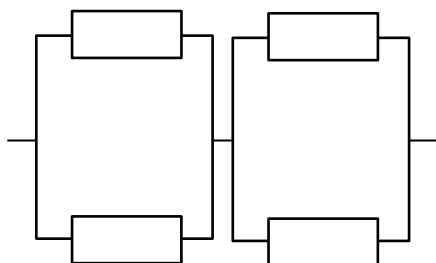
B 0.5

C 1

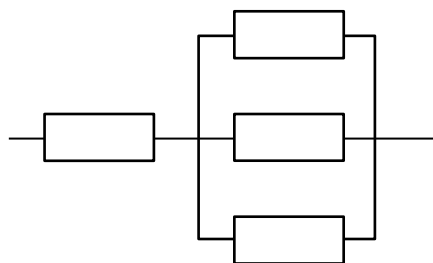
D 4

- 29** Which of the following arrangement of identical resistors have the smallest resistance?

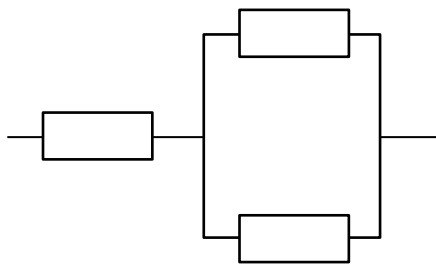
A



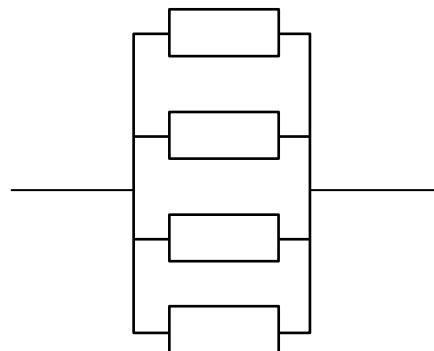
B



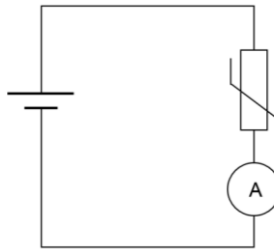
C



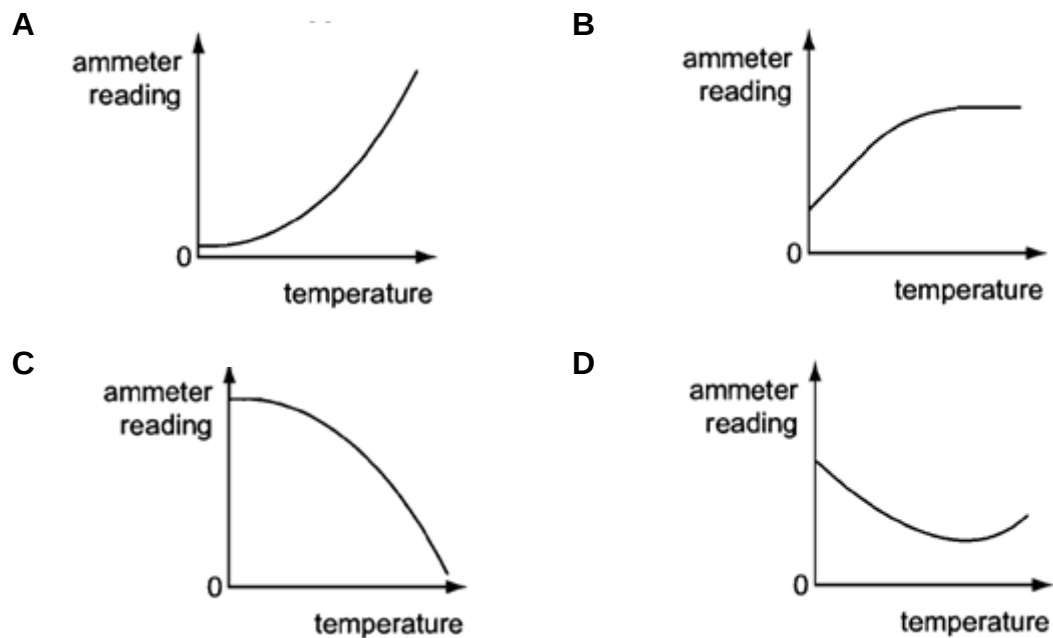
D



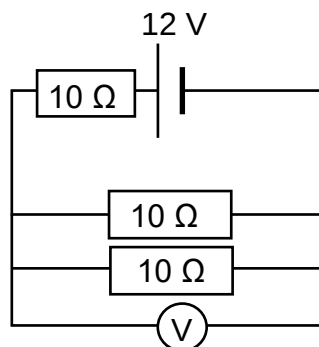
- 30** The diagram below shows a circuit that contains a NTC thermistor and an ammeter connected in series.



Which graph shows how the ammeter reading changes as the temperature of the NTC thermistor rises?



- 31** In the diagram below, a voltmeter is attached to a circuit consisting of three resistors.



What is the voltmeter reading?

- | | |
|--------------|---------------|
| A 3 V | B 4 V |
| C 8 V | D 12 V |

- 32** The cost of a unit (kWh) of electricity is \$0.20.

Appliance	Power rating / W	Time used / hours
Lamp	100	5
Heater	1500	3
Cooker	3000	0.5

What is the total cost of usage when all these appliances are used for the durations shown above?

- A** \$ 0.13 **B** \$ 1.30
C \$ 6.50 **D** \$ 101.20

- 33** A 3-pin plug is working under normal condition. The brown wire carries a current of 4 A when the appliance is switched on.

What would be the current in the blue and yellow-green wires?

	Blue wire	Yellow-green wire
A	0 A	4 A
B	2 A	2 A
C	4 A	0 A
D	4 A	4 A

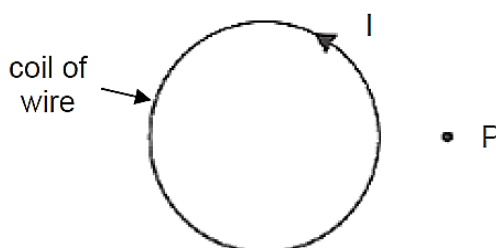
- 34** One end **Z** of a metal rod attracts the north pole of a permanent magnet.

- (i) The rod could be made of iron.
- (ii) The rod could be made of steel.
- (iii) The rod could be a permanent magnet with **Z** being a north pole.
- (iv) The rod could be a temporary magnet with **Z** being a south pole.

Which of the following statements are true?

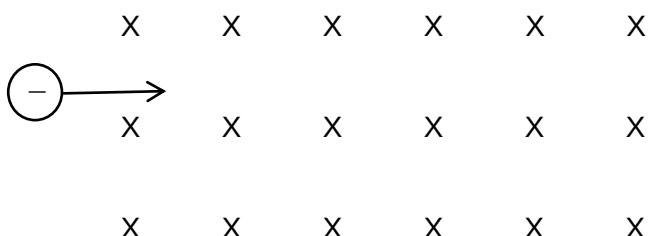
- A** (i) & (iv) only.
B (i), (ii) & (iv) only.
C (ii) & (iii) only.
D All of the above statements.

- 35 Which is the best way to demagnetises a bar magnet?
- A Leaving a magnet inside a coil connected to a d.c. supply.
 - B Leaving a magnet inside a coil connected to an a.c. supply.
 - C Withdrawing the magnet from inside a coil connected to a d.c. supply
 - D Withdrawing the magnet from inside a coil connected to a a.c. supply
- 36 Which of the following decreases the rate of rotation of the coil in a D.C. motor?
- A use a pair of stronger magnets
 - B insert a soft iron core in the coil
 - C increase the gap between the split rings
 - D decrease the current flowing in the coil
- 37 A current I is flowing in a coil of wire in the direction shown.



Which of the following gives the correct direction of the magnetic field at point P?

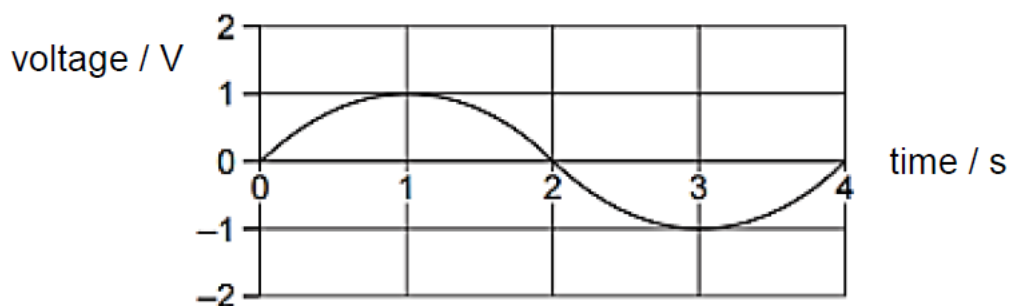
- A Into the paper
 - B Upwards
 - C Out of the paper
 - D Towards the left
- 38 The diagram shows an electron moving into an magnetic field.



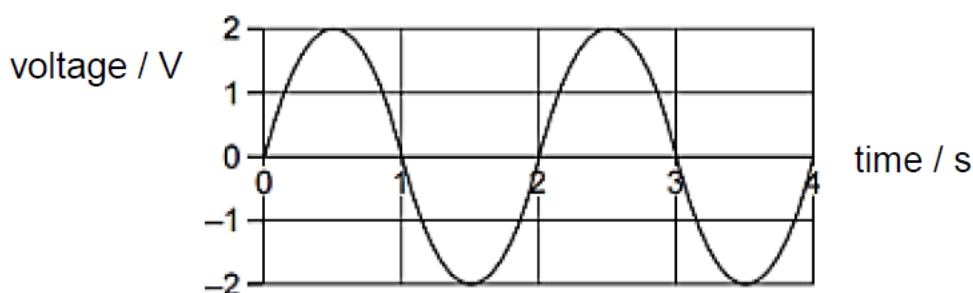
What is the direction of the force experienced by the electron?

- A Into the paper
- B Upwards
- C Out of the paper
- D Downwards

- 39 A simple a.c. generator produces a voltage that varies with time as shown.



Some adjustments are made to the a.c. generator to produce the following graph.



What are the adjustments made?

	number of turns of the coil	speed of rotation
A	remains constant	halved
B	doubled	halved
C	remains constant	doubled
D	doubled	doubled

- 40 X and Y are different isotopes of the same element. X has a higher mass number.

Which statement is correct?

- A** They have the same number of neutrons.
- B** X has a higher number of protons.
- C** X has a higher number of neutrons.
- D** X has a higher number of electrons.

----- End of Paper -----

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