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**ASSUMPTION ENGLISH SCHOOL
PRELIMINARY EXAMINATION 2025**

**PHYSICS
6091 / 01**



**ASSUMPTION
ENGLISH**

A Member of: Gabrielite Education Institution

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LEVEL: Sec 4 Express

DATE: 3 September 2025

CLASS: Sec 4/1

DURATION: 1 hour

Additional Materials provided: 1 sheet of OAS paper

INSTRUCTIONS TO CANDIDATES

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

Write your NAME and INDEX NUMBER at the top of this page and on the OAS paper. **Shade your index number on the OAS paper.**

There are 40 questions in 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 or 2B pencil on the OAS paper provided. DO NOT fold or bend the OAS paper.

At the end of the examination, hand in your OAS paper and question booklet separately.

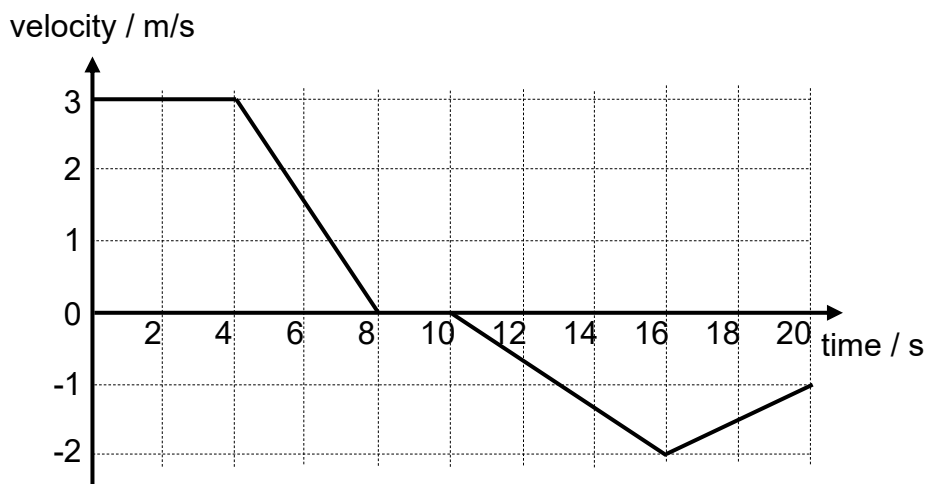
This Question Paper consists of 17 printed pages including this page.

[Turn over

MULTIPLE-CHOICE QUESTIONS (40 marks)

Answer **all** questions on the OAS paper provided.

- 1 Which list of SI units contains base units only?
- A** ampere, kilogram, hour, volt
B ampere, kilogram, kilometre, second
C kelvin, metre, mole, second
D kelvin, metre, second, volt
- 2 Which instruments are best used to determine the density of a small metal ball?
- A** digital caliper, measuring cylinder
B electronic balance, measuring cylinder
C measuring tape, beaker
D micrometer screw gauge, electronic balance
- 3 The diagram shows the velocity-time graph of an object.



Which statement must be correct?

- A** The greatest rate of change of velocity is 0.33 m/s^2 .
B The object moves in the opposite direction at $t = 8 \text{ s}$.
C The object stops moving at two different parts of the motion.
D The total distance travelled by the object is 30 m.

- 4 An object falls through a vacuum.

Which row correctly describes the acceleration and the velocity of the object?

	acceleration	velocity
A	constant	constant
B	constant	increasing
C	increasing	constant
D	increasing	increasing

- 5 An astronaut initially weighs 800 N on Earth. He travels to the Moon and does some physical work daily. He weighs 120 N on the Moon after a month.

The gravitational field strength on the Moon is 1.6 N/kg.

The gravitational field strength on Earth is 10 N/kg.

How much mass is lost by the astronaut?

- | | | | |
|----------|--------|----------|--------|
| A | 0 kg | B | 5.0 kg |
| C | 8.0 kg | D | 12 kg |

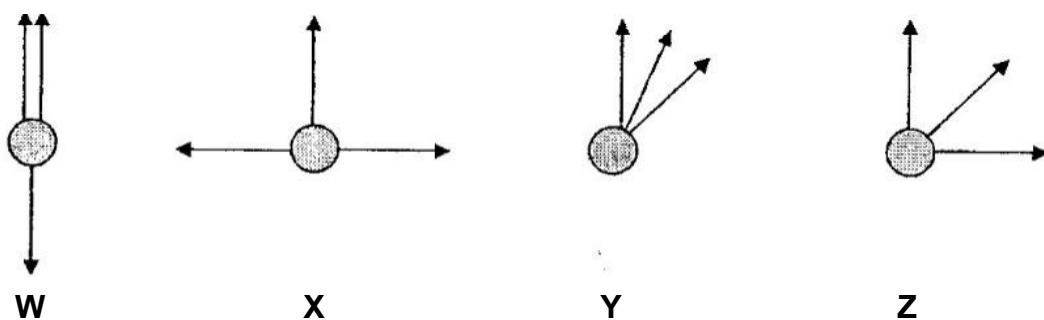
- 6 A rocket of mass 3.2×10^5 kg has an upward thrust of 4.5×10^3 kN when leaving Earth's surface.

The gravitational field strength is 10 N/kg.

What is the initial acceleration of the rocket?

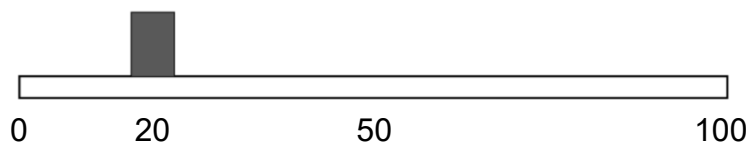
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| A | 0.99 m/s^2 | B | 4.1 m/s^2 |
| C | 10 m/s^2 | D | 13 m/s^2 |

- 7 Three forces of the same magnitude act simultaneously on an object.



Which pair of vector diagrams show the same resultant force?

- A** W and X
B W and Y
C X and Z
D Y and Z
- 8 A uniform metre rule has a weight of 30 N. A 15 N box is placed at the 20 cm mark. The metre rule can be balanced on a pivot.

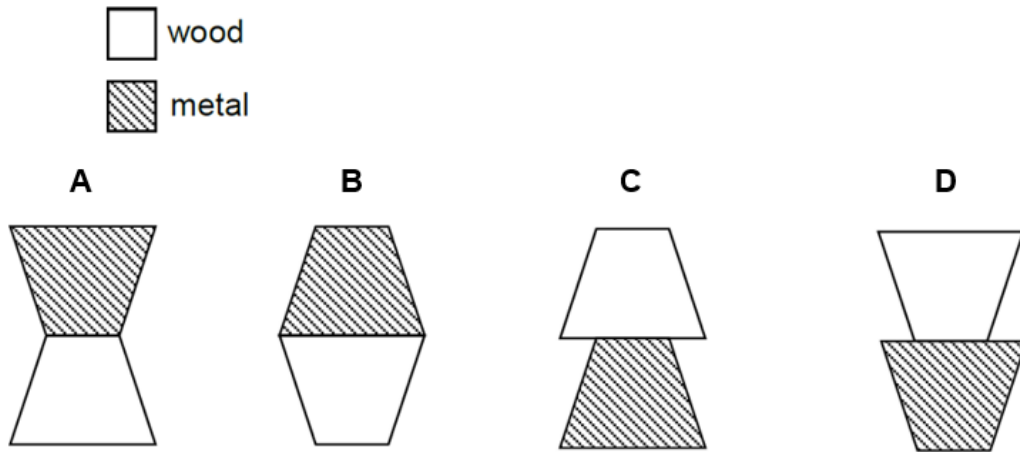


At which mark should the pivot be placed?

- A** 10 cm **B** 30 cm
C 40 cm **D** 60 cm

- 9 A student tries out different ways of stacking two containers. One container is made of wood, and the other is made of metal. The dimensions of the containers are identical.

Which arrangement has the greatest stability?



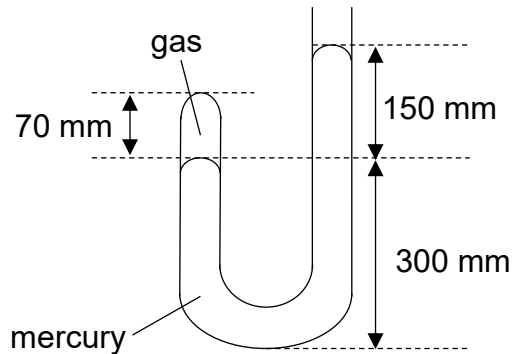
- 10 A child stands on snow wearing snowshoes. The mass of the child is 40 kg and his two feet have a total area of 0.018 m^2 .

The mass of the snowshoes is 2.0 kg and have a total area of 0.50 m^2 in contact with the snow.

The gravitational field strength is 10 N/kg . What is the pressure exerted on the snow?

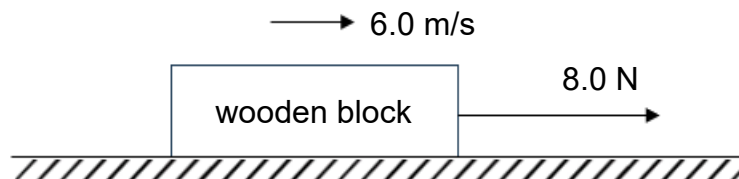
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|----------|--------|----------|--------|
| A | 77 Pa | B | 800 Pa |
| C | 810 Pa | D | 840 Pa |

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



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

- A** 70 mm Hg **B** 150 mm Hg
C 840 mm Hg **D** 910 mm Hg
- 12 A block of wood is pulled along a horizontal bench at a speed of 6.0 m/s by a force of 8.0 N.



How much work is done due to the frictional force in 5.0 s?

- A** 40 J **B** 48 J
C 240 J **D** 480 J
- 13 Which energy resource is correctly described?

	energy resource	renewable	availability
A	biofuels	yes	at all times
B	nuclear	no	irregular
C	solar radiation	yes	at all times
D	wind	no	irregular

- 14** The total energy incident in 1.0 s on a group of solar panels is 120 J/m².

720 J of energy is transferred in 1.0 s by the solar panels to be stored in a battery.

If the efficiency of the system is 17%, what is the total surface area of the panels?

- | | | | |
|----------|--------------------|----------|--------------------|
| A | 6.0 m ² | B | 7.0 m ² |
| C | 11 m ² | D | 35 m ² |

- 15** Which statement best explains why substances in gaseous state are less dense than when they are in liquid or solid states?

- A** Particles in gaseous state are in random and continuous motion.
- B** Particles in gaseous state expand more than when they are in liquid or solid state.
- C** Particles in gaseous state have smaller mass than when they are at liquid or solid state.
- D** Spaces between particles in gaseous state are larger than when they are in liquid state or solid state.

- 16** Smoke particles in a sealed container are illuminated by a beam of light. Under a microscope, the smoke particles are observed to move randomly.

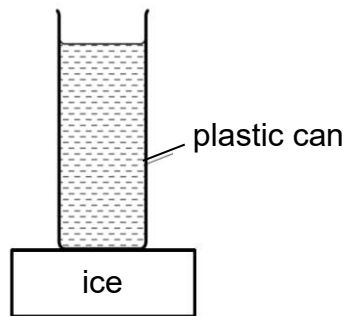
What causes this motion?

- A** atomic vibrations within the smoke particles
- B** collisions between smoke particles
- C** collisions of smoke particles with rapidly moving air molecules
- D** smoke particles gain energy from the beam of light

- 17** Which description of a dull black surface is correct?

- A** good emitter and good absorber of radiation
- B** good emitter and poor absorber of radiation
- C** poor emitter and good absorber of radiation
- D** poor emitter and poor absorber of radiation

- 18** A tall plastic can contains water at room temperature. The can is placed on top of a big block of ice.



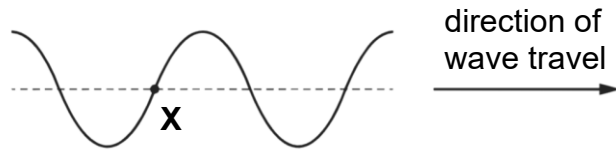
What is/are the main process(es) that cool(s) the water at the top of the can?

- A** conduction
 - B** conduction and convection
 - C** convection
 - D** convection and radiation
- 19** Which statement describes what happens when wax solidifies?
- A** There is a transfer of energy and a change in temperature.
 - B** There is a transfer of energy but no change in temperature.
 - C** There is no transfer of energy and no change in temperature.
 - D** There is no transfer of energy but there is a change in temperature.
- 20** Different amounts of energy Q are supplied to copper blocks of different masses.

Which block experiences the greatest temperature change?

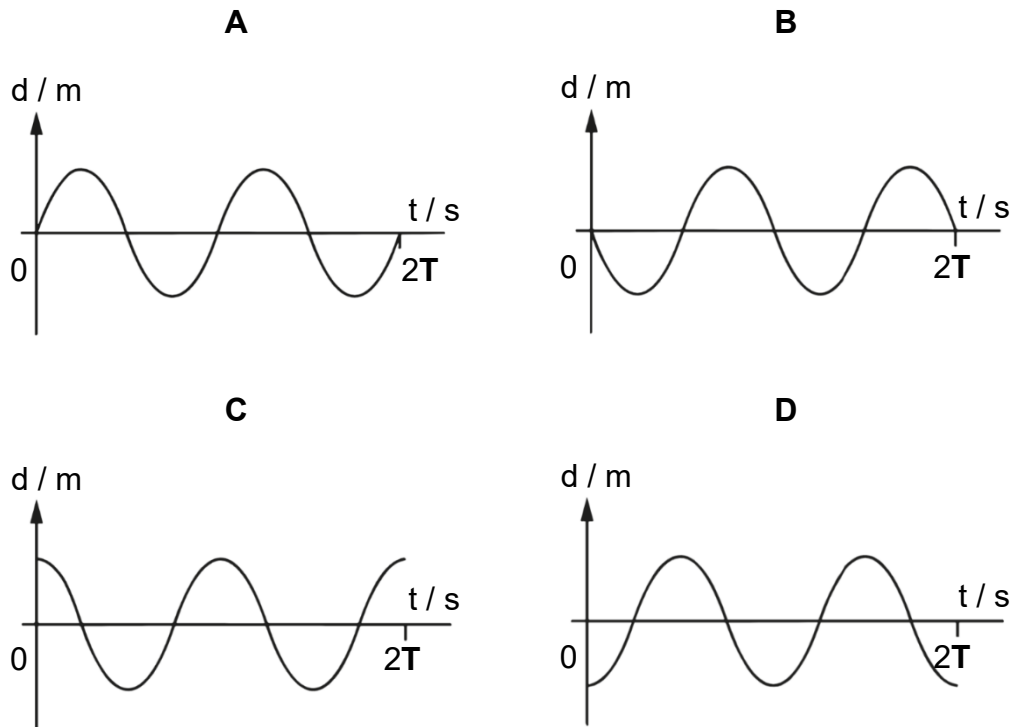
A	B	C	D
1.0 kg	2.0 kg	1.0 kg	2.0 kg
			
$Q = 150 \text{ J}$	$Q = 150 \text{ J}$	$Q = 300 \text{ J}$	$Q = 300 \text{ J}$

- 21 A transverse wave travels along a rope from left to right. The diagram shows the rope at time $t = 0$ s. The period of the wave is T .



One particle of the rope is labelled **X**.

Which graph shows the variation with time of the displacement of particle **X** between $t = 0$ s and $t = 2T$?



- 22 A man who is standing at a point **O** between two parallel walls, fires a starting pistol. He hears the first echo after 0.60 s and another one after 0.80 s.



The speed of sound in air is v . What is the distance between the two walls?

- | | | | |
|----------|--------|----------|--------|
| A | $0.3v$ | B | $0.4v$ |
| C | $0.7v$ | D | $1.4v$ |

- 23** It is known that the energy E of an electromagnetic wave and its frequency f is related by the product:

$$E = h \times f$$

where h is a constant.

Which region of the electromagnetic spectrum has the highest energy?

- A** gamma rays
- B** infrared radiation
- C** radio waves
- D** ultraviolet radiation

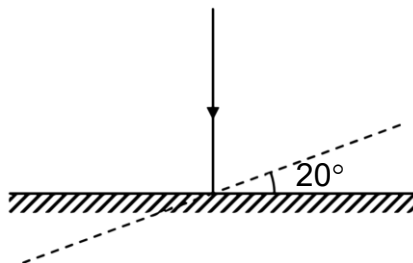
- 24** A student makes four statements about infrared waves.

- 1 They can be seen by the human eye.
- 2 They travel at 3×10^8 km/s in air.
- 3 They are transverse waves.
- 4 They can be used in intruder alarms.

Which statement(s) is/are correct for infrared waves?

- A** 1 and 3 only
- B** 2 only
- C** 3 and 4 only
- D** 2, 3 and 4

- 25** A ray strikes a plane mirror perpendicularly as shown in the diagram below.



If the mirror is then turned by 20° , what is the new angle between the incident ray and the reflected ray?

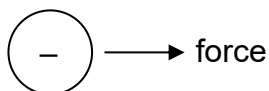
- | | | | |
|----------|------------|----------|------------|
| A | 0° | B | 20° |
| C | 40° | D | 80° |

- 26** A student makes use of a lens as a magnifying glass.

Which row shows the object distance from the lens and the characteristics of the image formed?

	object distance	characteristics of image
A	less than focal length	real and inverted
B	less than focal length	virtual and upright
C	more than focal length	real and upright
D	more than focal length	virtual and inverted

- 27** A stationary negative charge in an electric field experiences an electric force in the direction shown.



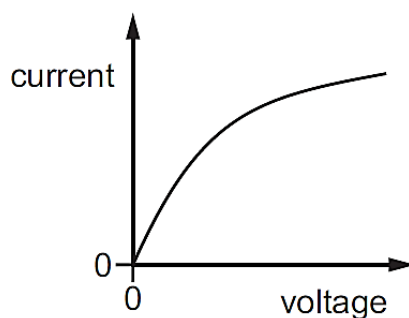
What is the direction of the electric field?

- A** horizontally to the left
B horizontally to the right
C into the page
D out of the page
- 28** A plastic rod is rubbed with cloth. The rod becomes positively charged.

What happens to the plastic rod and what is the charge on the cloth?

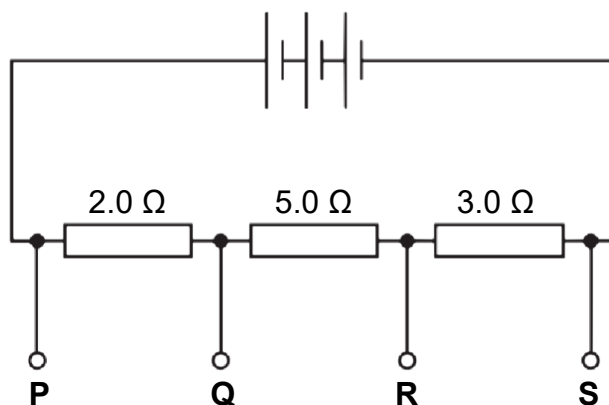
	plastic rod	charge on cloth
A	gains electrons	negative
B	gains electrons	positive
C	loses electrons	negative
D	loses electrons	positive

- 29 The graph shows the current-voltage characteristics of a filament lamp.



Which statement describes how the resistance of the lamp changes as the voltage increases?

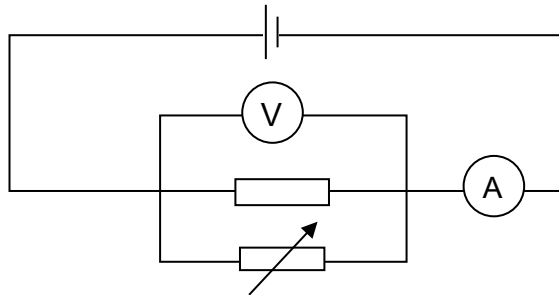
- A The resistance decreases at a decreasing rate.
 - B The resistance decreases to zero.
 - C The resistance increases at an increasing rate.
 - D The resistance remains constant.
- 30 The diagram shows a circuit with a 5.0 V power supply, three resistors and four output terminals **P**, **Q**, **R** and **S**.



Between which pair of terminals is there a potential difference of 3.5 V?

- A **PQ**
- B **PR**
- C **QS**
- D **RS**

- 31 In the circuit shown, what will happen when the resistance of the variable resistor is increased?



	voltmeter	ammeter
A	decrease	decrease
B	decrease	increase
C	increase	increase
D	no change	decrease

- 32 The power rating of a refrigerator is 1500 W when connected to power source of 240 V.

It costs \$0.35 for 1 kWh of electrical energy.

How much will it cost to keep the refrigerator running for 1 week?

- | | | | |
|----------|---------|----------|---------|
| A | \$3.68 | B | \$2.19 |
| C | \$12.60 | D | \$88.20 |

- 33 The case of an electric fan is earthed. The plug to the fan contains a 5 A fuse. There is a current of 4 A when the fan works normally.

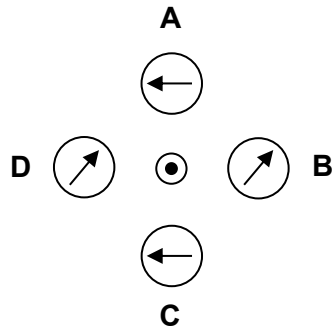
The cable to the fan becomes so worn that the live wire makes electrical contact with the metal case.

The switch is opened. What happens at the moment when the live wire touches the metal case?

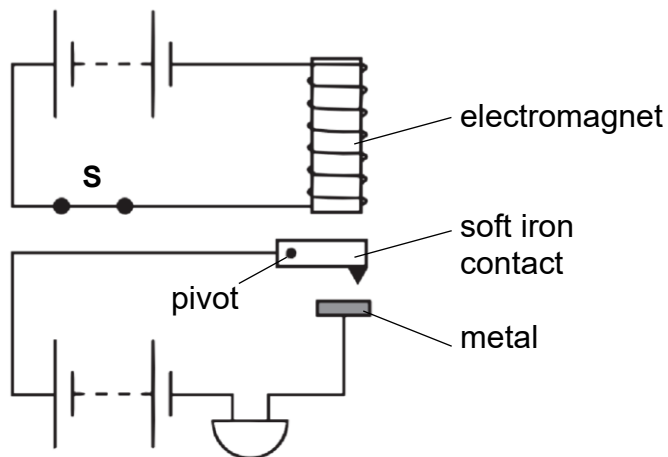
- A** Current flows to the earth wire but the fuse is unaffected.
- B** The fuse melts and current stops flowing.
- C** The metal case becomes very hot and may cause a fire.
- D** The metal case is at high potential but there is no current flow.

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

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



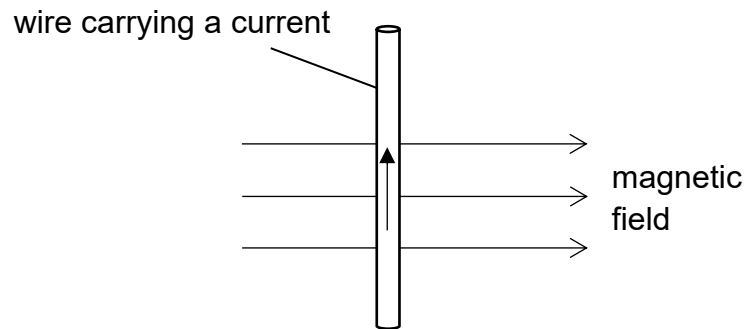
- 35** The diagram shows an alarm system in which switch **S** is closed. The top circuit is arranged so that the electromagnet is positioned over the soft iron contact.



What happens when switch **S** is opened?

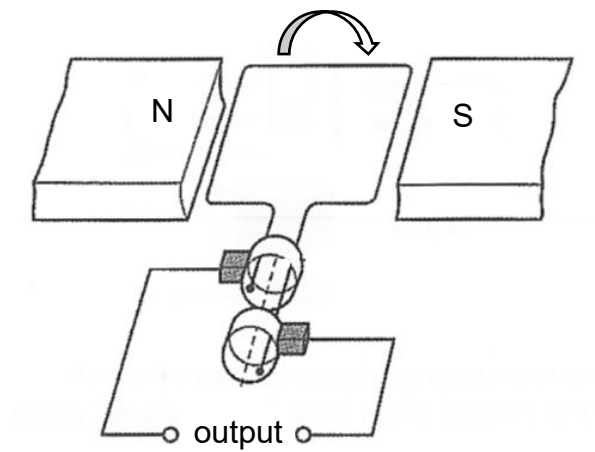
	iron contact	bell
A	drops	rings
B	drops	stops ringing
C	moves up	rings
D	moves up	stops ringing

- 36 The diagram shows a wire carrying a current in a magnetic field.



What is the direction of the force on the wire?

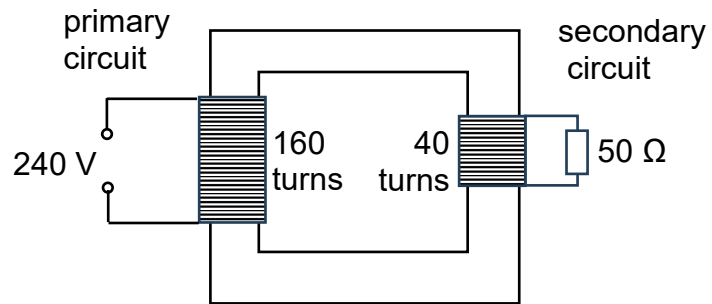
- A left to right
 - B right to left
 - C into the page
 - D out of the page
- 37 The simple a.c. generator consists of a rectangular coil of wire placed in between two magnetic poles. The coil is rotated in the direction as shown in the diagram.



What can be said of the induced electromotive force when the coil is in this position?

- A maximum, due to greatest rate of change to magnetic field
- B maximum, due to smallest rate of change to magnetic field
- C zero, due to greatest rate of change to magnetic field
- D zero, due to smallest rate of change to magnetic field

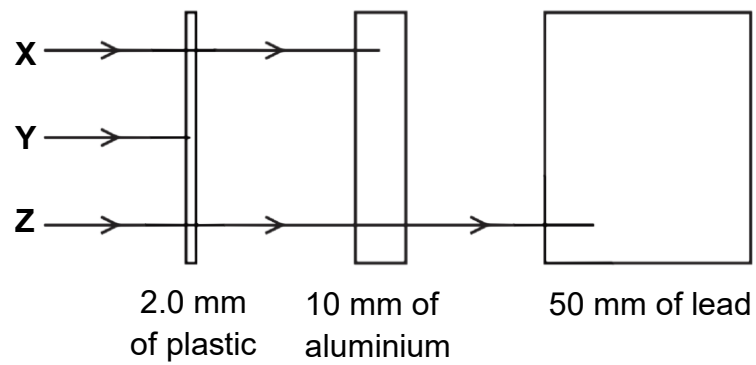
- 38 The diagram shows an ideal transformer connected to a $50\ \Omega$ resistor.



What is the current in the primary circuit?

- | | | | |
|----------|--------|----------|-------|
| A | 0.30 A | B | 1.2 A |
| C | 1.5 A | D | 4.8 A |
- 39 Which is **not** the correct procedure if a person is contaminated with radioactive substance?
- A** leave the contaminated area
 - B** remove the contaminated clothing
 - C** use dry cloth to wipe exposed skin
 - D** wash exposed skin with soap and water

- 40 The diagram shows the paths of three different types of radiation, **X**, **Y** and **Z**.



What are **X**, **Y** and **Z**?

	X	Y	Z
A	α -particles	β -particles	γ -rays
B	β -particles	α -particles	γ -rays
C	β -particles	γ -rays	α -particles
D	γ -rays	α -particles	β -particles

- End of Paper -