



**ASSUMPTION  
ENGLISH**

A Montfortian Gabrielite Education Institution

## Preliminary Examination Secondary Four Express

NAME

CLASS

INDEX  
NUMBER

### Physics

Paper 1 Multiple Choice

**6091/01**

**Monday, 31 August 2026**

**1 hour**

Additional materials: 1 sheet of OAS paper

### READ THESE INSTRUCTIONS FIRST

Write your name, class and index number at the top of this page.

Write in soft pencil.

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

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.

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.

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

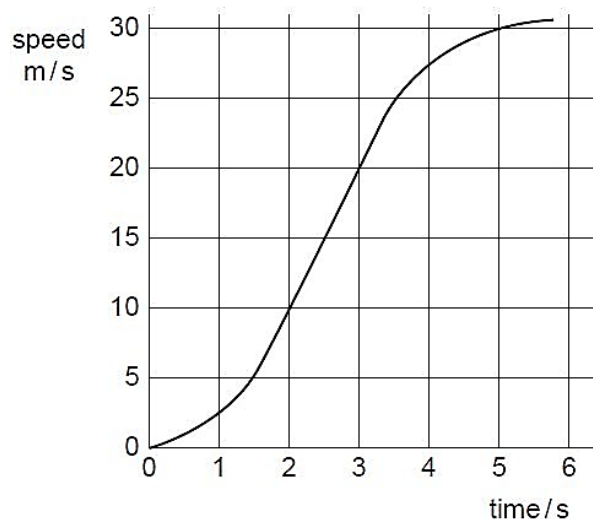
**MULTIPLE-CHOICE QUESTIONS (40 MARKS)**

Answer all questions on the OAS paper provided.

- 1 Which physical quantity is matched correctly to its unit?

|          | physical quantity | unit                                         |
|----------|-------------------|----------------------------------------------|
| <b>A</b> | electric current  | ampere per second (A/s)                      |
| <b>B</b> | latent heat       | joules per kilogram degree Celsius (J/kg °C) |
| <b>C</b> | moment            | newton per metre (N/m)                       |
| <b>D</b> | pressure          | newton per metre squared (N/m <sup>2</sup> ) |

- 2 The graph shows how the speed of an object varies with time.

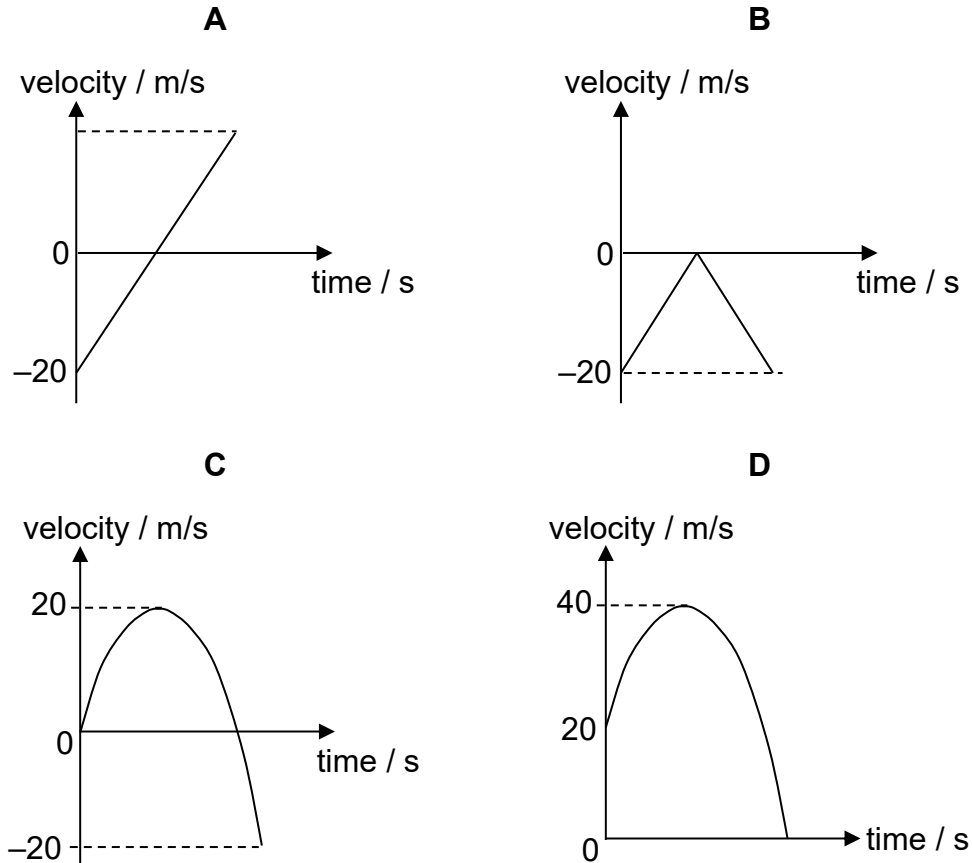


What is the distance travelled by the object when it is moving at constant acceleration?

- A** 20 m  
**B** 30 m  
**C** 75 m  
**D** 150 m

- 3 A ball is thrown vertically upwards from the top of a building with an initial speed of 20 m/s.

If air resistance is negligible, which graph best represents the velocity of the ball against time?



- 4 An astronaut measures the properties of a solid metal block on Earth and on the Moon. The gravitational field strength of the Moon is  $\frac{1}{6}$  of that on Earth.

Which row correctly describes how the properties of the block on the Moon compare to its properties on Earth?

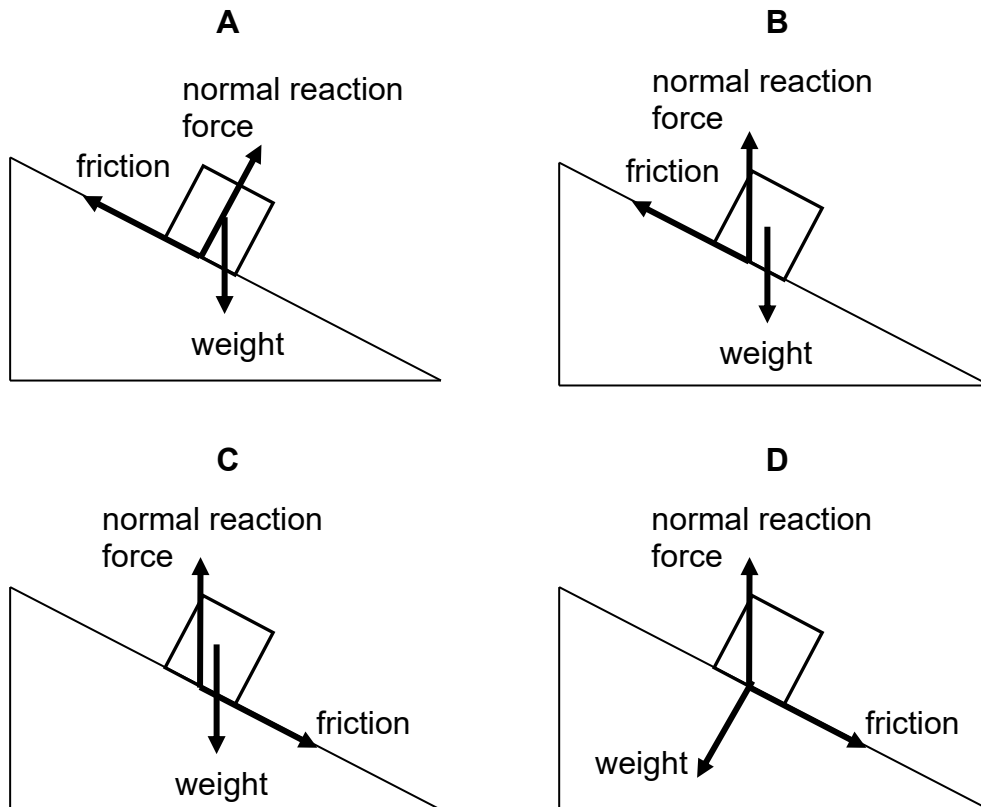
|          | mass      | weight    | inertia   |
|----------|-----------|-----------|-----------|
| <b>A</b> | decreases | unchanged | unchanged |
| <b>B</b> | decreases | unchanged | decreases |
| <b>C</b> | unchanged | decreases | decreases |
| <b>D</b> | unchanged | decreases | unchanged |

- 5 A constant pulling force of 25 N is applied horizontally to a box of mass 4.0 kg along a rough floor. The box experiences a constant friction force of 5.0 N.

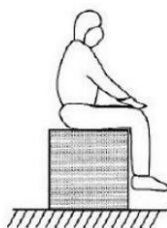
What is the acceleration of the box?

- A 1.3 m/s<sup>2</sup>
- B 5.0 m/s<sup>2</sup>
- C 6.3 m/s<sup>2</sup>
- D 7.5 m/s<sup>2</sup>

- 6 Which diagram shows the correct forces acting on an object that is sliding down a slope?



- 7 A person is sitting on a box that is resting on the ground.



Which two forces are an action-reaction pair?

|          | action force          | reaction force        |
|----------|-----------------------|-----------------------|
| <b>A</b> | force of Earth on man | force of Earth on box |
| <b>B</b> | force of Earth on man | weight of man         |
| <b>C</b> | weight of box         | force of box on Earth |
| <b>D</b> | weight of box         | weight of man         |

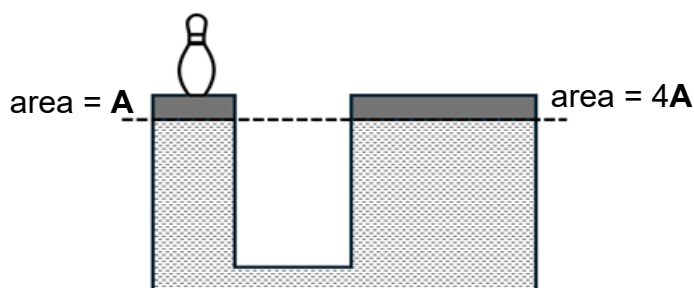
- 8 A non-uniform rod of length 4.0 m is supported by two pivots, with an electronic balance placed under each pivot.



What is the distance of the centre of gravity of the rod from end **P**?

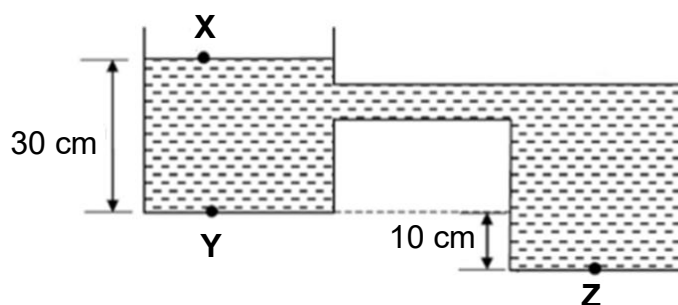
- A** 1.5 m
- B** 2.0 m
- C** 2.5 m
- D** 3.0 m

- 9 In the hydraulic system, a bowling pin of weight  $W$  rests on the small piston which has a cross-sectional area of  $A$ . The cross-sectional area of the large piston is  $4A$ .



The two pistons are at equal height. What is the upward force exerted by the liquid on the large piston?

- A  $\frac{W}{4}$   
 B  $W$   
 C  $2W$   
 D  $4W$
- 10 The container is filled with mercury. The atmospheric pressure is 76 cm Hg.



What is the pressure at **X**, **Y** and **Z** in cm Hg?

|          | pressure at <b>X</b> /<br>cm Hg | pressure at <b>Y</b> /<br>cm Hg | pressure at <b>Z</b> /<br>cm Hg |
|----------|---------------------------------|---------------------------------|---------------------------------|
| <b>A</b> | 0                               | 30                              | 10                              |
| <b>B</b> | 0                               | 76                              | 86                              |
| <b>C</b> | 76                              | 30                              | 40                              |
| <b>D</b> | 76                              | 106                             | 116                             |

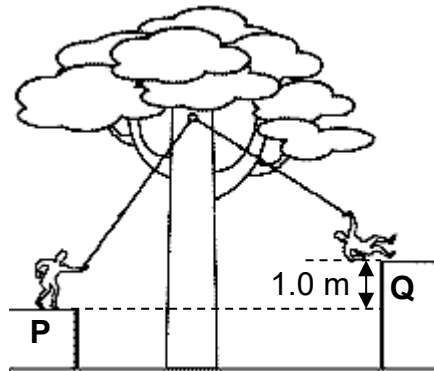
- 11 What is work done by a force?
- A force acting per unit area in contact with object
  - B force required to accelerate an object of a certain mass
  - C product of the force and the distance moved by the object
  - D rate at which a force transfers energy to an object over a period of time

- 12 A crane lifts ten boxes each of mass 80 kg from the ground to a platform at a vertical height of 10 m. The entire operation takes 50 s.

What is the useful average power developed by the crane to lift the boxes? The gravitational field strength is 10 N/kg.

- A 160 W
- B 625 W
- C 1600 W
- D 4000 W

- 13 A man wants to swing from point **P** to point **Q**, which is 1.0 m higher than **P**.



At what initial speed must he take off in order to reach point **Q**? The acceleration due to gravity is  $10 \text{ m/s}^2$ .

- A 3.2 m/s
- B 4.5 m/s
- C 10 m/s
- D 20 m/s

- 14** The pressure of a gas is doubled when its volume is halved and the temperature is unchanged.

Which statement(s) correctly explain(s) why the pressure is doubled?

- 1 Gas molecules move faster.
- 2 Gas molecules collide with each other more frequently.
- 3 Gas molecules hit the wall of the container at a greater force.

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

- 15** Why are gases compressible?

- A** Gas particles are constantly moving at high speeds.
- B** Gas particles have very high average kinetic energy.
- C** Gas particles have very large average distance between them.
- D** Gas particles have very weak intermolecular forces of attraction.

- 16** How does the transfer of energy mainly occur in a liquid?

- A** The liquid at the hotter region emits radiation in all directions towards the colder region.
- B** The liquid at the hotter region moves up and is replaced by the liquid at the colder region.
- C** The more energetic free electrons move from the hotter region to the colder region.
- D** The liquid particles at the hotter region vibrate more vigorously and collide with adjacent particles.

- 17** Which factor does **not** affect the rate of radiation of an object?

- A** colour and texture of the object's surface
- B** physical state of the object
- C** surface temperature of the object
- D** total surface area of the object

- 18** A solid substance is heated at its melting point. Which property of the solid must increase?

**A** density  
**B** kinetic energy  
**C** mass  
**D** potential energy

- 19** When a liquid evaporates, some particles escape.

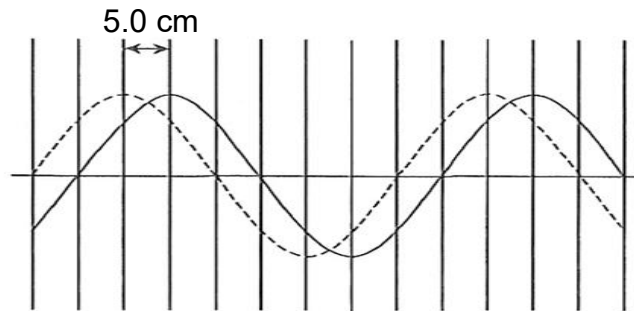
What is the effect on the average kinetic energy of the liquid particles, and from which part of the liquid do the particles escape?

|          | average kinetic energy | where particles escape from |
|----------|------------------------|-----------------------------|
| <b>A</b> | decreases              | the surface only            |
| <b>B</b> | decreases              | throughout the liquid       |
| <b>C</b> | increases              | the surface only            |
| <b>D</b> | increases              | throughout the liquid       |

- 20** What is the frequency of a wave?

**A** the maximum displacement of a particle from its undisturbed position  
**B** the number of complete waves passing a fixed point per unit time  
**C** the time taken to produce one complete wave  
**D** the total distance travelled by a single wave crest per unit time

- 21** The diagram shows a transverse wave travelling to the right at two different instances. The dashed line represents the wave at  $t = 0$  s and the solid line represents the wave at  $t = 0.050$  s.



What is the wavelength and the speed of the wave?

|          | wavelength / cm | speed / cm/s |
|----------|-----------------|--------------|
| <b>A</b> | 20              | 100          |
| <b>B</b> | 20              | 200          |
| <b>C</b> | 40              | 100          |
| <b>D</b> | 40              | 200          |

- 22** An electromagnetic wave is used extensively in satellite television communication and cooking. Which row correctly identifies this wave and its typical danger to human health upon overexposure?

|          | wave               | danger                           |
|----------|--------------------|----------------------------------|
| <b>A</b> | infrared radiation | cell mutation and cancer         |
| <b>B</b> | infrared radiation | severe sunburns                  |
| <b>C</b> | microwave          | internal heating of body tissues |
| <b>D</b> | microwave          | ionisation of body cells         |

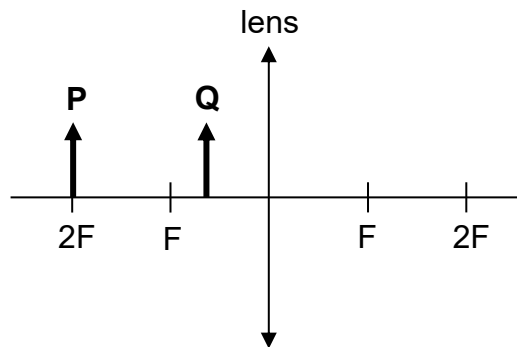
- 23** Which statement about electromagnetic waves is incorrect?

- A** They do not require a material medium to transfer energy.
- B** They transfer matter in the form of transverse waves.
- C** They travel at a constant speed of  $3.0 \times 10^8$  m/s in vacuum.
- D** They travel at a slower speed when moving into water from air.

**24** Which correctly describes the characteristics of the image formed by a plane mirror?

- A** magnified, virtual and inverted
- B** real, inverted and magnified
- C** same size, virtual and upright
- D** upright, real and diminished

**25** An object is placed in front of a thin converging lens at position **P**.



The object is then moved to position **Q**. How does the image change when the object moves from **P** to **Q**?

- A** The image changes from real to virtual, and its size increases.
  - B** The image changes from real to virtual, but its size remains the same.
  - C** The image changes from virtual to real, and its size increases.
  - D** The image remains virtual, but its size decreases.
- 26** Which example describe how electrostatic charging may be a potential hazard?
- A** accumulation of dust particles on the surface of a television screen
  - B** discharge during the transfer of fuel through pipes at petro station
  - C** electric shock when a person touches a metal doorknob
  - D** plastic sheets sticking tightly to each other after rubbing

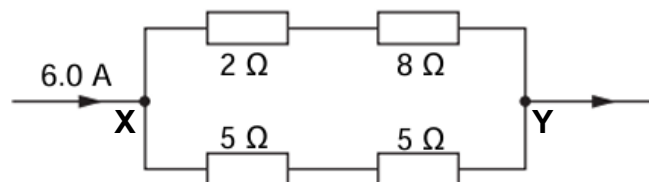
- 27** The potential difference between points **X** and **Y** in an electric circuit is 20 V. The time taken for the charges to move from **X** to **Y** is 15 ms and the work done by the charges is 1.2 J.

What is the current between **X** and **Y**?

- A** 4.0 mA
  - B** 0.25 A
  - C** 4.0 A
  - D** 16 A
- 28** A 2.0 m long copper wire **X** has a resistance of 5.0  $\Omega$ . Another copper wire **Y** has half the length and half the diameter of **X**.

What is the resistance of **Y**?

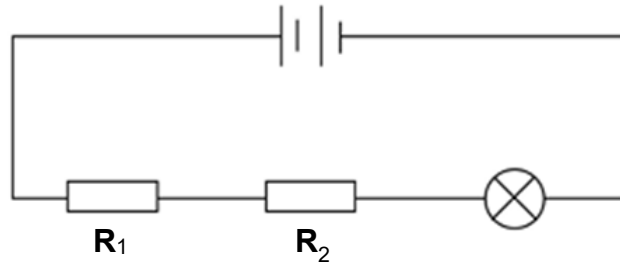
- A** 2.5  $\Omega$
  - B** 5.0  $\Omega$
  - C** 10  $\Omega$
  - D** 20  $\Omega$
- 29** The diagram shows part of an electric circuit.



What is the potential difference across **XY**?

- A** 12 V
- B** 15 V
- C** 30 V
- D** 60 V

- 30 Two fixed resistors,  $R_1$  and  $R_2$ , and a lamp are connected to a 12 V battery.



If  $R_1$  is replaced with a new resistor that has a higher resistance, what happens to the potential difference across  $R_2$  and the brightness of the lamp?

|          | potential difference of $R_2$ | brightness of lamp |
|----------|-------------------------------|--------------------|
| <b>A</b> | decreases                     | decreases          |
| <b>B</b> | decreases                     | increases          |
| <b>C</b> | increases                     | decreases          |
| <b>D</b> | increases                     | increases          |

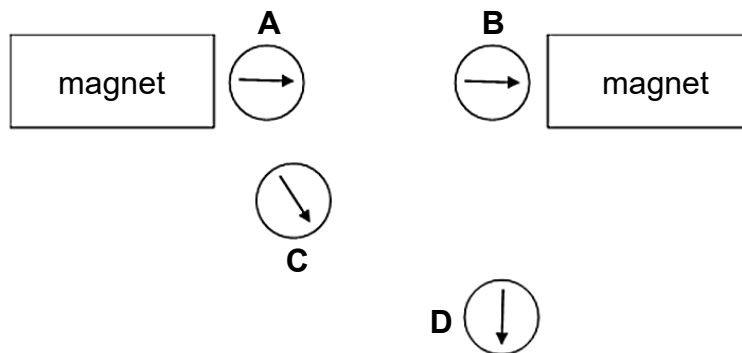
- 31 A man decides to replace an old refrigerator that consumes an average power of 700 W with a new energy-saving model that consumes an average power of 400 W.

Given that the refrigerator operates continuously and the cost of electricity is \$0.25 per kWh, what are the total savings in a month of 30 days?

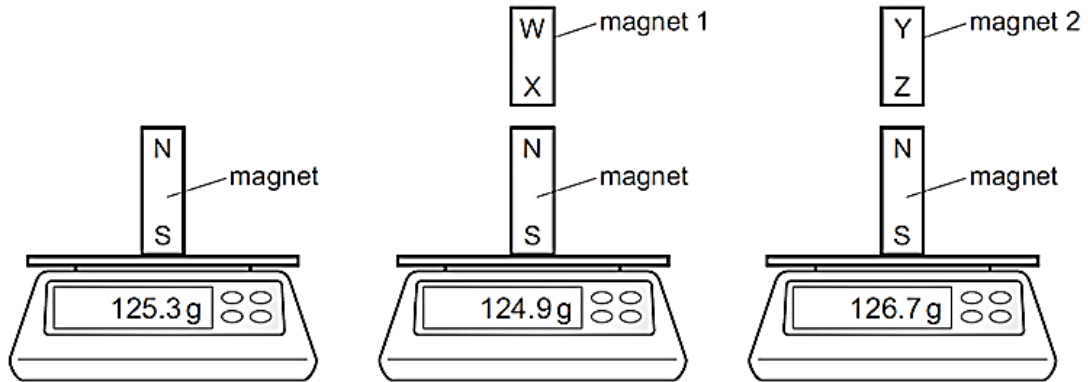
- A** \$1.80
- B** \$2.25
- C** \$54.00
- D** \$75.00

- 32** What is the electrical hazard when a multi-plug adaptor is used to connect many appliances to the same power socket?
- A** The current through each individual appliance increases, causing them to get damaged.
  - B** The overall flow of current from the socket is reduced, causing appliances to malfunction.
  - C** The total current from the mains becomes too large, causing wires to overheat.
  - D** The voltage across the live and neutral wires increases, causing insulation to melt.
- 33** Two magnets are brought close to each other. Four compasses are placed near to the poles as shown.

Which compass is pointing in the wrong direction?



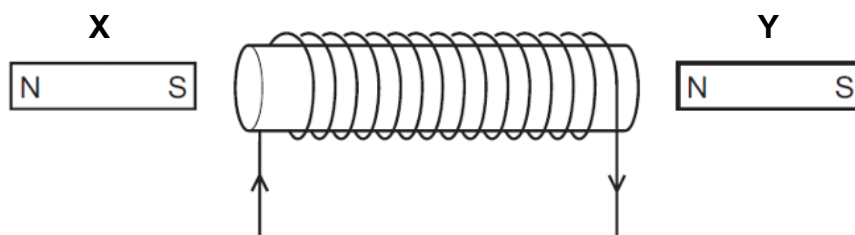
- 34** A student conducts an experiment to determine the polarity of magnet 1 and magnet 2. A magnet with known poles is placed on an electronic balance. Magnets 1 and 2 are brought close to and held directly above this magnet, one at a time. The readings of the balance are shown.



What are the poles at **W**, **X**, **Y** and **Z**?

|          | <b>W</b> | <b>X</b> | <b>Y</b> | <b>Z</b> |
|----------|----------|----------|----------|----------|
| <b>A</b> | north    | north    | south    | south    |
| <b>B</b> | north    | south    | south    | north    |
| <b>C</b> | south    | south    | north    | north    |
| <b>D</b> | south    | north    | north    | south    |

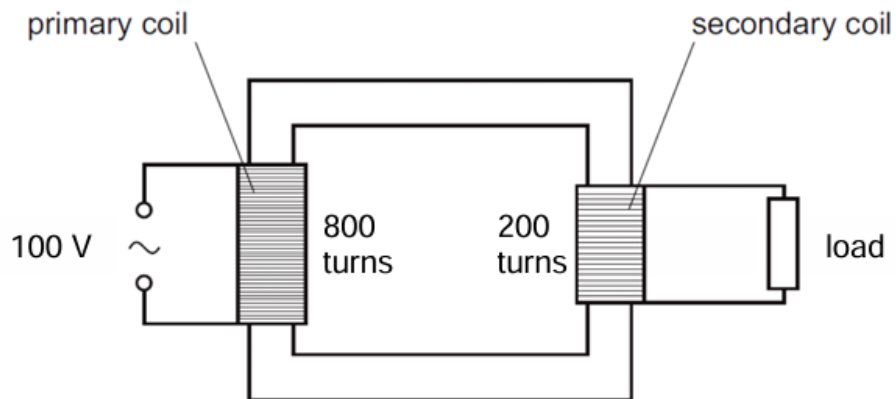
- 35** Two magnets are placed near the current-carrying coil.



Which statement is correct?

- A** Both **X** and **Y** are attracted to the coil.
- B** Both **X** and **Y** are repelled by the coil.
- C** **X** is attracted to the coil, but **Y** is repelled by the coil.
- D** **Y** is attracted to the coil, but **X** is repelled by the coil.

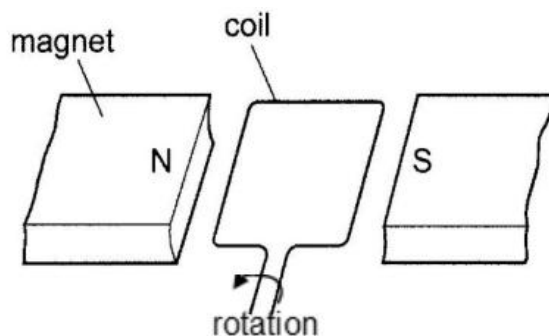
- 36** The diagram shows an ideal transformer connected to an alternating current (a.c.) supply. A  $10\ \Omega$  load is connected to the secondary coil.



What is the type of transformer and what is the current flowing through the load?

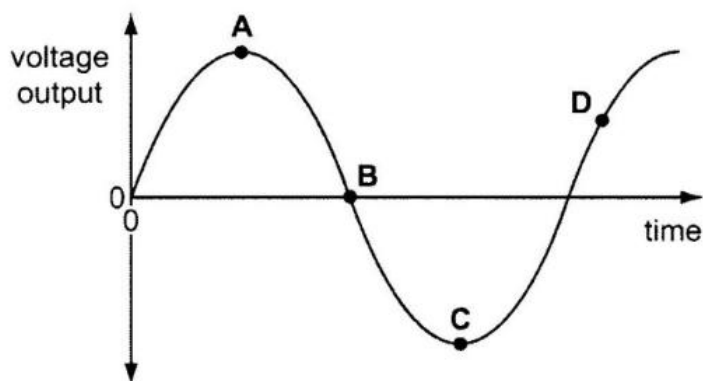
|          | type of transformer | current / A |
|----------|---------------------|-------------|
| <b>A</b> | step-down           | 2.5         |
| <b>B</b> | step-down           | 40          |
| <b>C</b> | step-up             | 2.5         |
| <b>D</b> | step-up             | 40          |

- 37 The diagram shows part of an alternating current (a.c.) generator when the rectangular coil is in a horizontal position.



The graph shows the voltage output against time.

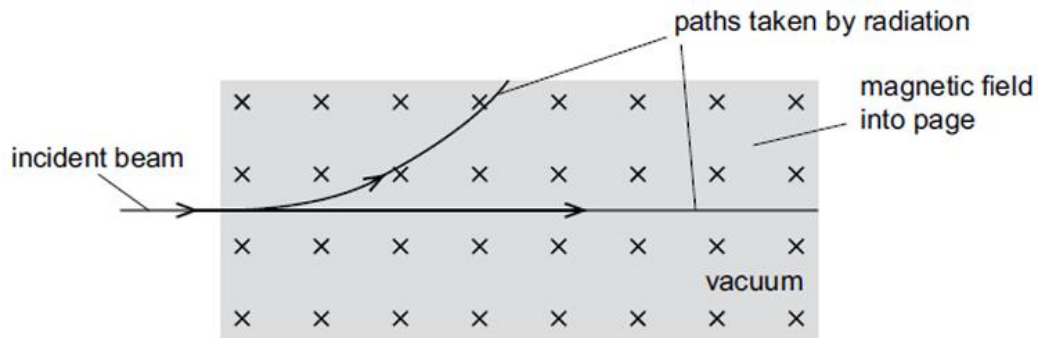
Which point on the graph represents the voltage output when the coil is in the vertical position?



- 38 The fission of uranium ( $^{235}_{92}\text{U}$ ) produced barium ( $^{139}_{56}\text{Ba}$ ), krypton and two neutrons. What is the nucleon number of krypton in this reaction?

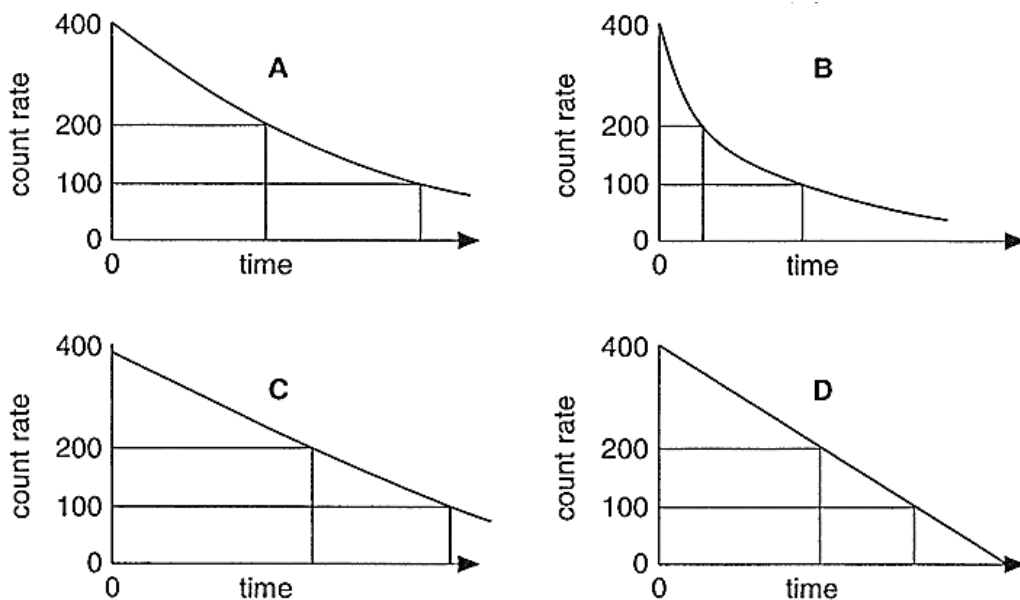
- A 93
- B 94
- C 95
- D 96

- 39 A beam of radiation enters a uniform magnetic field that is directed into the page. The beam splits and the paths taken by the radiation are shown below.



What types of radiation are in the beam?

- A** alpha particles and beta particles only  
**B** alpha particles and gamma rays only  
**C** beta particles and gamma rays only  
**D** gamma rays, alpha particles and beta particles
- 40 Which graph shows how the count rate of a radioactive isotope varies with time?



- End of Paper -