**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

**PHYSICS** **0625/23**

Paper 2 Multiple Choice (Extended) **May/June 2016**

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB recommended)

*5153628261*

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

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.

**Read the instructions on the Answer Sheet very carefully.**

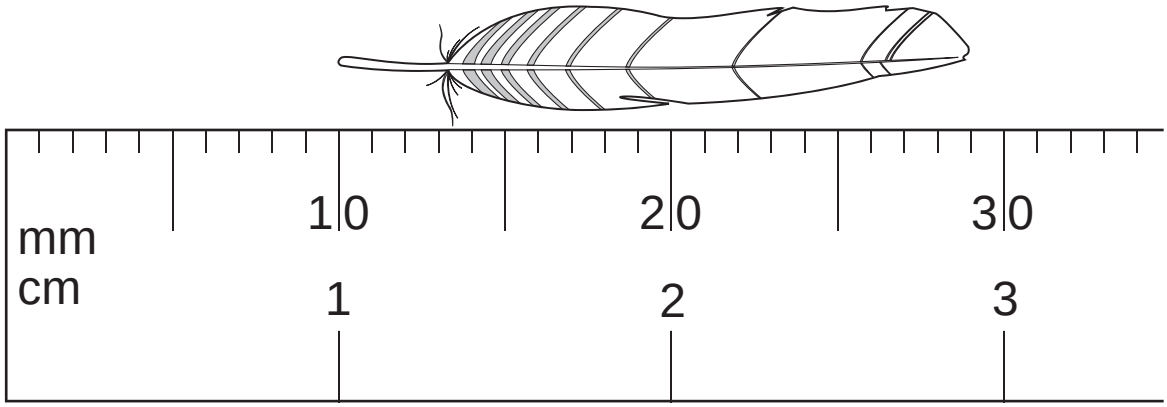
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / $s^2$).

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **17** printed pages and **3** blank pages.


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**1** The diagram shows an enlarged drawing of the end of a metre rule. It is being used to measure the length of a small feather.



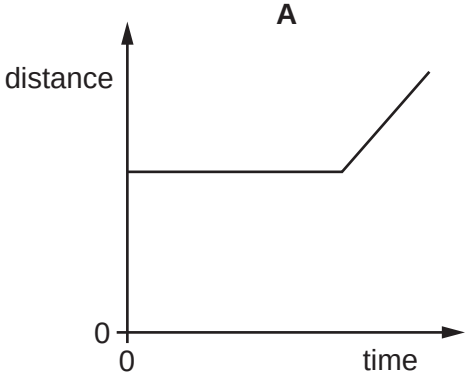

What is the length of the feather?

**A** 19 mm **B** 29 mm **C** 19 cm **D** 29 cm

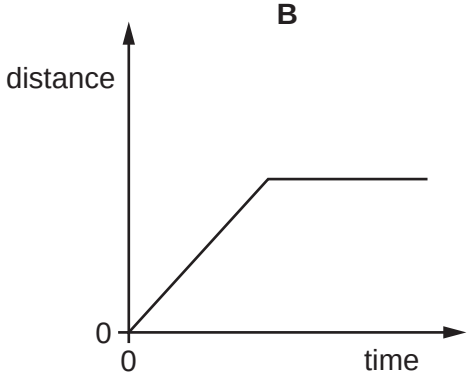
**2** An object moves at a constant speed for some time, then begins to accelerate.

Which distance-time graph shows this motion?

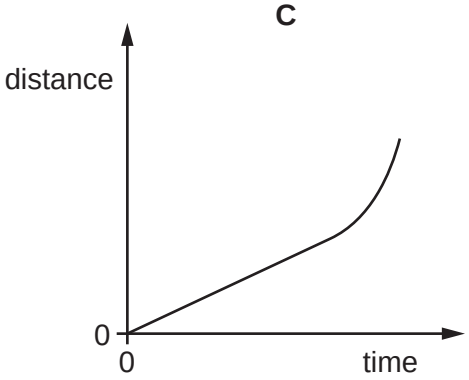
**A**



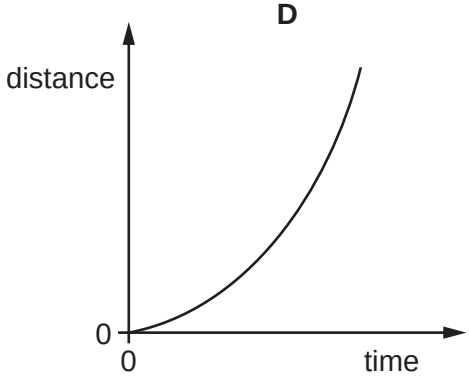

**B**




**C**




**D**




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**3** A heavy object is released near the surface of the Earth and falls freely. Air resistance can be ignored.

Which statement about the acceleration of the object due to gravity is correct?

**A** The acceleration depends on the mass of the object.

**B** The acceleration depends on the volume of the object.

**C** The acceleration is constant.

**D** The acceleration is initially zero and increases as the object falls.

**4** A cup contains hot liquid.

Some of the liquid evaporates.

What happens to the mass and what happens to the weight of the liquid in the cup?

| | mass | weight |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | stays the same |
| **C** | stays the same | decreases |
| **D** | stays the same | stays the same |

**5** An object moves in a circle at constant speed.

Which statement about the force needed on the object is correct?

**A** A force away from the centre of the circle keeps the object moving in the circle.

**B** A force in the direction of motion of the object keeps it moving in the circle.

**C** A force towards the centre of the circle keeps the object moving in the circle.

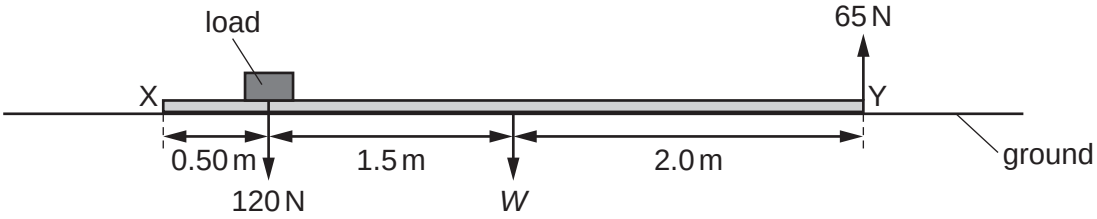
**D** No force is needed to keep the object moving at constant speed in the circle.

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**[Turn over**

**6** A long plank XY lies on the ground. A load of 120 N is placed on it, at a distance of 0.50 m from end X, as shown.

End Y is lifted off the ground. The upward force needed to do this is 65 N.




In the diagram, *W* is the weight of the plank, acting at its mid-point.

What is the value of *W*?

**A** 35 N **B** 47 N **C** 100 N **D** 133 N

**7** Which list contains only vector quantities?

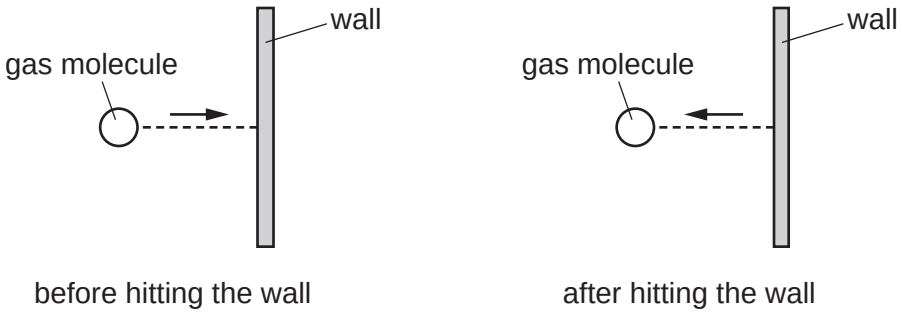
**A** energy, force, velocity

**B** speed, acceleration, force

**C** velocity, energy, acceleration

**D** velocity, force, acceleration

**8** A gas molecule strikes the wall of a container. The molecule rebounds with the same speed.




What happens to the kinetic energy and what happens to the momentum of the molecule?

| | kinetic energy | momentum |
|---|---|---|
| **A** | changes | changes |
| **B** | changes | stays the same |
| **C** | stays the same | changes |
| **D** | stays the same | stays the same |

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**9** Which energy resource does **not** derive its energy from the Sun?

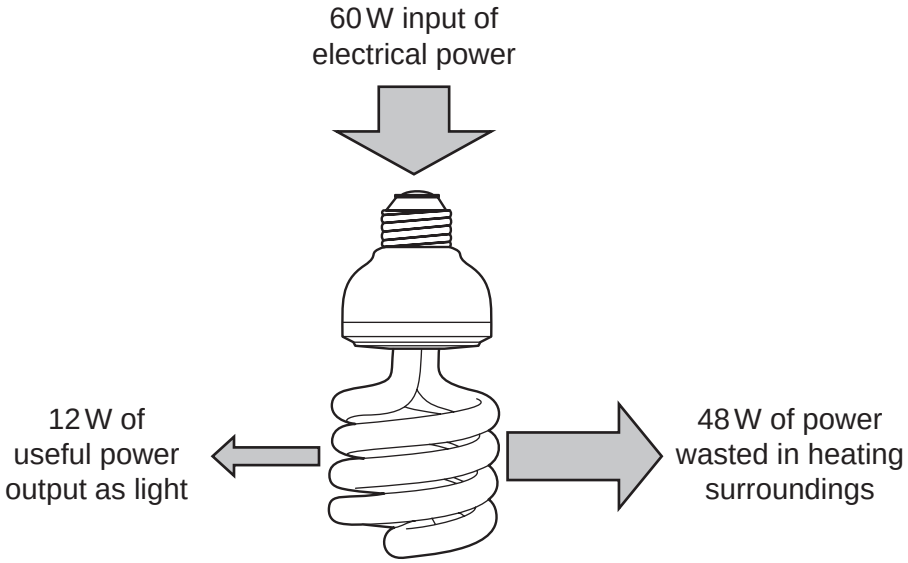
**A** hydroelectric

**B** nuclear fission

**C** waves

**D** wind

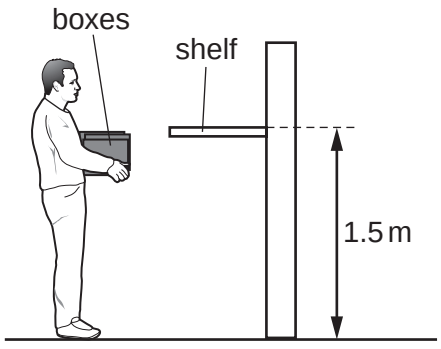
**10** The diagram shows the energy used by a modern lamp.




Which expression gives the efficiency of the lamp?

**A** $\frac{12}{60} \times 100\%$ **B** $\frac{12}{48} \times 100\%$ **C** $\frac{48}{60} \times 100\%$ **D** $\frac{48}{12} \times 100\%$

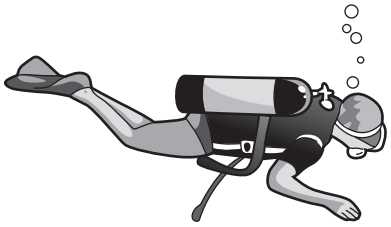
**11** Three boxes each weigh 100 N. A man lifts all the boxes together from the ground on to a shelf that is 1.5 m above the ground. The man takes 2.0 s to do this.




How much useful power does the man produce to lift the boxes?

**A** 75 W **B** 225 W **C** 300 W **D** 900 W

**12** A diver under water uses breathing apparatus at a depth where the pressure is $1.25 \times 10^5$ Pa.



A bubble of gas breathed out by the diver has a volume of 20 $cm^3$ when it is released. The bubble moves upwards to the surface of the water.

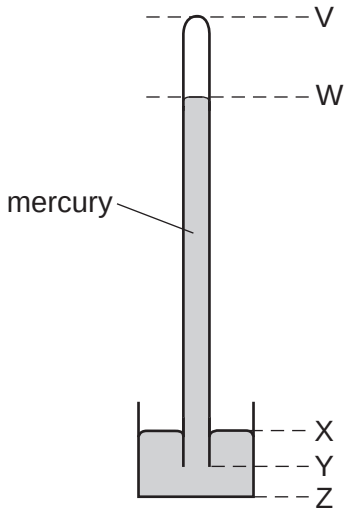
At the surface of the water, the atmospheric pressure is $1.00 \times 10^5$ Pa.

The temperature of the water is the same at all depths.

What is the volume of this bubble when it reaches the surface?

**A** 15 $cm^3$ **B** 16 $cm^3$ **C** 20 $cm^3$ **D** 25 $cm^3$

**13** The diagram shows a simple mercury barometer.




The atmospheric pressure increases.

Which distance increases?

**A** VW **B** WY **C** XY **D** XZ

**14** What causes the random, zig-zag movement (Brownian motion) of smoke particles suspended in air?

**A** air molecules colliding with smoke particles

**B** convection currents as the hot smoke rises

**C** smoke particles colliding with each other

**D** smoke particles reacting with oxygen molecules in the air

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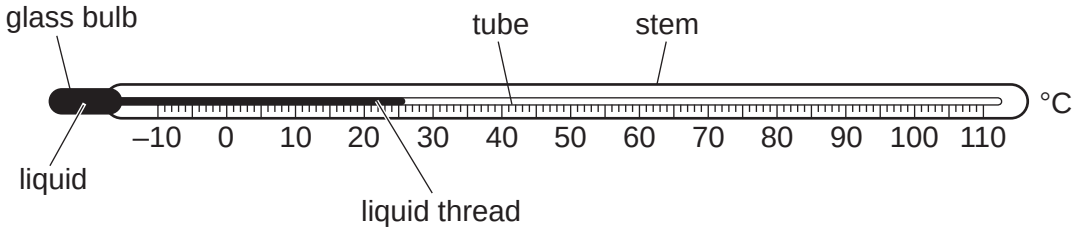
**15** A sealed bottle of constant volume contains air.

The air in the bottle is heated by the Sun.

What is the effect on the average speed of the air molecules in the bottle, and the average distance between them?

| | average speed of air molecules | average distance between air molecules |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | stays the same |
| **C** | increases | increases |
| **D** | increases | stays the same |

**16** The diagram shows a liquid-in-glass thermometer.




How can the thermometer be made more sensitive?

**A** increase the internal diameter of the tube containing the liquid thread

**B** increase the internal volume of the glass bulb and the volume of the liquid

**C** increase the length of the tube and stem

**D** increase the thickness of the glass in the glass bulb

**17** In an experiment to measure specific heat capacity, a block of aluminium is heated and its rise in temperature is measured.

The amount of energy gained by the block is $E$. The mass of the block is $m$. The rise in temperature of the block is $\Delta T$.

Which expression gives the specific heat capacity of aluminium?

**A** $\frac{m}{E\Delta T}$ **B** $\frac{m\Delta T}{E}$ **C** $\frac{E}{m\Delta T}$ **D** $\frac{E\Delta T}{m}$

**18** Which row shows the surface that is the better absorber and the surface that is the better emitter of infra-red radiation?

| | better absorber | better emitter |
|---|---|---|
| **A** | black surface | black surface |
| **B** | black surface | white surface |
| **C** | white surface | black surface |
| **D** | white surface | white surface |

**19** A student suggests some uses for containers made from good thermal conductors and for containers made from poor thermal conductors.

In which row are both suggested uses correct?

| | good thermal conductor | poor thermal conductor |
|---|---|---|
| **A** | keeping a cold liquid at a low temperature | transferring thermal energy quickly from a hot liquid |
| **B** | keeping a hot liquid at a high temperature | keeping a cold liquid at a low temperature |
| **C** | transferring thermal energy quickly from a hot liquid | transferring thermal energy quickly to a cold liquid |
| **D** | transferring thermal energy quickly to a cold liquid | keeping a hot liquid at a high temperature |

**20** A water wave passes into a region where the wave travels more slowly.

As it passes into the slow region, what happens to the frequency and what happens to the wavelength of the wave?

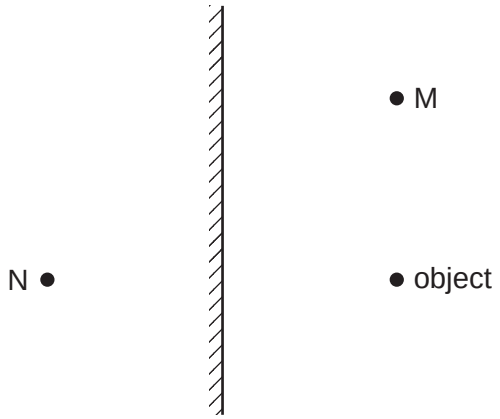
| | frequency | wavelength |
|---|---|---|
| **A** | decreases | remains the same |
| **B** | increases | remains the same |
| **C** | remains the same | decreases |
| **D** | remains the same | increases |

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**21** Which row shows the natures of light waves, sound waves and X-rays?

| | light waves | sound waves | X-rays |
|---|---|---|---|
| **A** | longitudinal | longitudinal | transverse |
| **B** | longitudinal | transverse | longitudinal |
| **C** | transverse | longitudinal | transverse |
| **D** | transverse | transverse | longitudinal |

**22** The diagram shows an object in front of a plane mirror. The mirror forms an image of the object.




At which labelled point is the image formed, and which type of image is formed?

| | where the image is formed | type of image |
|---|---|---|
| **A** | at M | real |
| **B** | at M | virtual |
| **C** | at N | real |
| **D** | at N | virtual |

**23** Light enters a glass block at an angle of incidence of 46°.

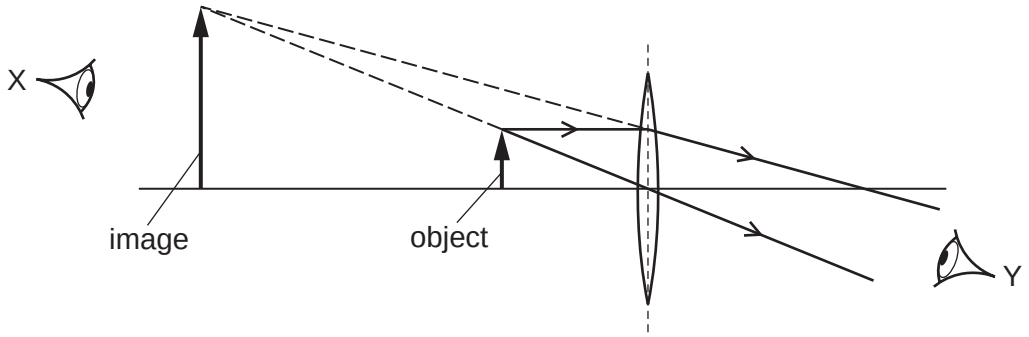
The light refracts at an angle of refraction of 26°.

What is the refractive index of the glass?

**A** 0.57 **B** 0.61 **C** 1.64 **D** 1.77

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**24** The diagram shows a converging lens forming an image of an object.




Which statement about the image is correct?

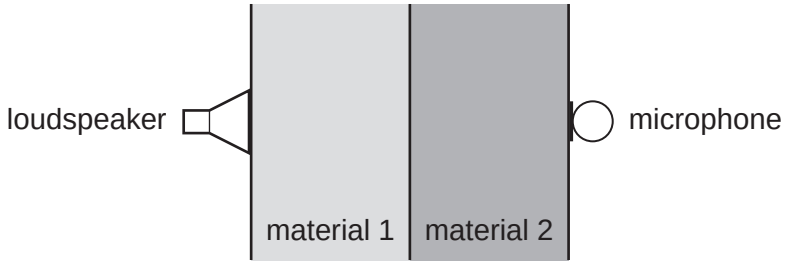
**A** It is real and can be seen by an eye at X.

**B** It is real and can be seen by an eye at Y.

**C** It is virtual and can be seen by an eye at X.

**D** It is virtual and can be seen by an eye at Y.

**25** The sound from a loudspeaker must pass through two materials to reach a microphone.




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 |

**26** Which range of wave frequencies includes only sounds that can be heard by a human with normal hearing?

**A** 3.0 Hz to 300 Hz

**B** 30 Hz to 3000 Hz

**C** 300 Hz to 30 000 Hz

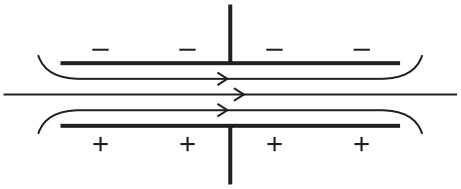
**D** 3000 Hz to 300 000 Hz

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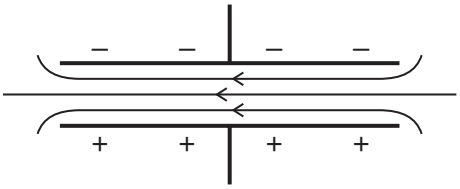
**27** Each diagram shows two charged metal plates.

Which diagram shows the pattern and the direction of the electric field between the plates?

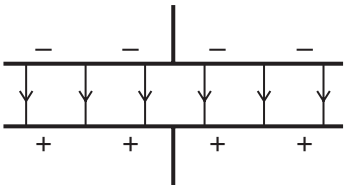
**A**



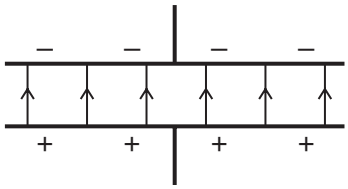
**B**



**C**



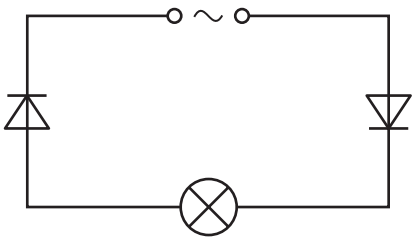
**D**



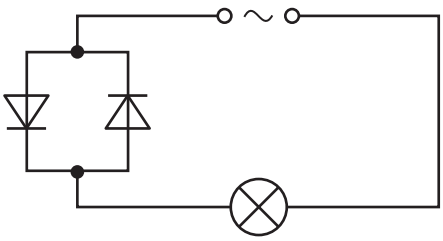
**28** The four circuits shown all include an a.c. power supply, two diodes and a lamp.

In which circuit is there a rectified current in the lamp?

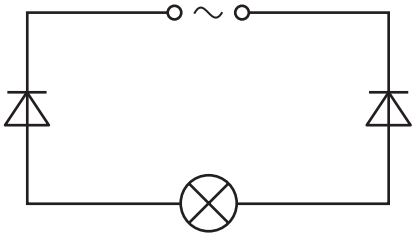
**A**



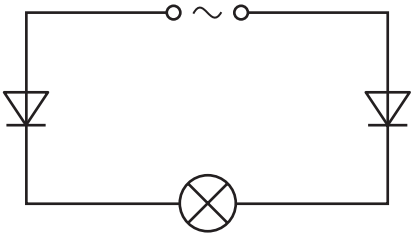
**B**



**C**



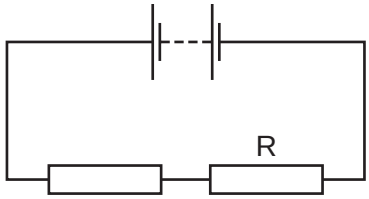
**D**



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**[Turn over**

**29** The diagram shows a battery connected to two resistors.



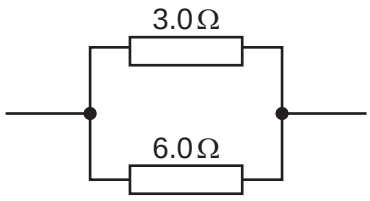

Four students separately measure the electromotive force (e.m.f.) of the battery, the current in the resistors, and the potential difference (p.d.) across resistor R.

Their results are shown in the table below.

Which row shows values with their correct units?

| | e.m.f. | current | p.d. |
|---|---|---|---|
| **A** | 3.0 A | 0.30 V | 1.5 A |
| **B** | 3.0 A | 0.30 A | 1.5 V |
| **C** | 3.0 V | 0.30 V | 1.5 A |
| **D** | 3.0 V | 0.30 A | 1.5 V |

**30** A 3.0 Ω resistor and a 6.0 Ω resistor are connected in parallel.

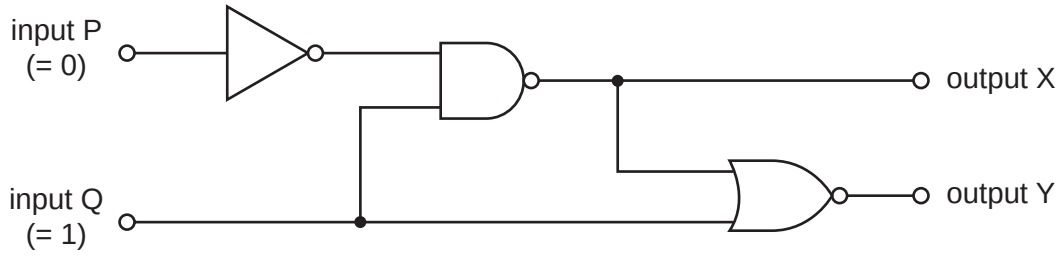



What is their combined resistance?

**A** 0.50 Ω **B** 2.0 Ω **C** 4.5 Ω **D** 9.0 Ω

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**31** The diagram shows a combination of logic gates.

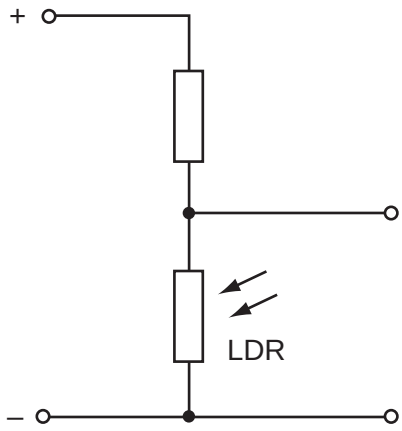



Input P is at a logic state 0 (low) and input Q is at a logic state 1 (high).

What are the logic states at output X and at output Y?

| | output X | output Y |
|---|---|---|
| **A** | 0 | 0 |
| **B** | 0 | 1 |
| **C** | 1 | 0 |
| **D** | 1 | 1 |

**32** The diagram shows part of a circuit used to switch street lamps on and off automatically.




In the evening it gets dark.

Which row shows the effect on the resistance of the light-dependent resistor (LDR) and on the potential difference (p.d.) across it?

| | resistance of LDR | p.d. across LDR |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | increases |
| **C** | increases | decreases |
| **D** | increases | increases |

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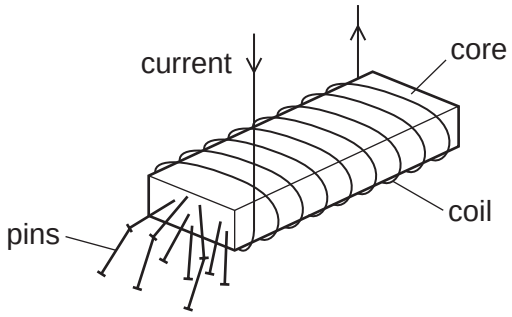
**[Turn over**

**33** A domestic circuit includes a 30 A fuse. This protects the wiring if there is too much current in the circuit.

In which wire is the 30 A fuse positioned, and what does it do when it operates?

| | position | operation |
|---|---|---|
| **A** | live wire | disconnects the circuit |
| **B** | live wire | reduces the current to 30 A |
| **C** | neutral wire | disconnects the circuit |
| **D** | neutral wire | reduces the current to 30 A |

**34** A strong electromagnet is used to attract pins.




What happens when the current in the coil is halved?

**A** No pins are attracted.

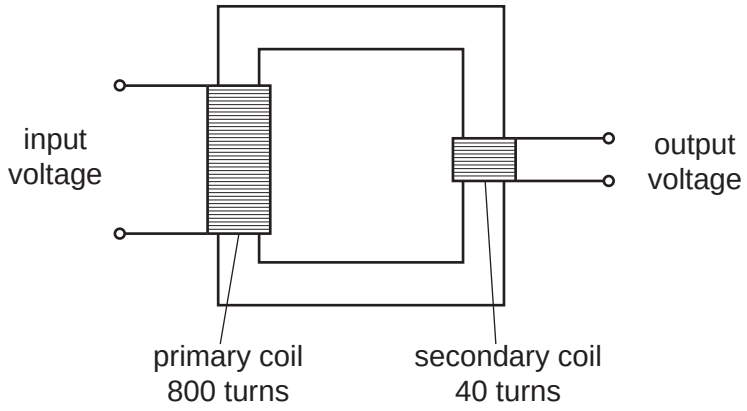
**B** Some pins are attracted, but not as many.

**C** The same number of pins is attracted.

**D** More pins are attracted.

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**35** The diagram shows a transformer.



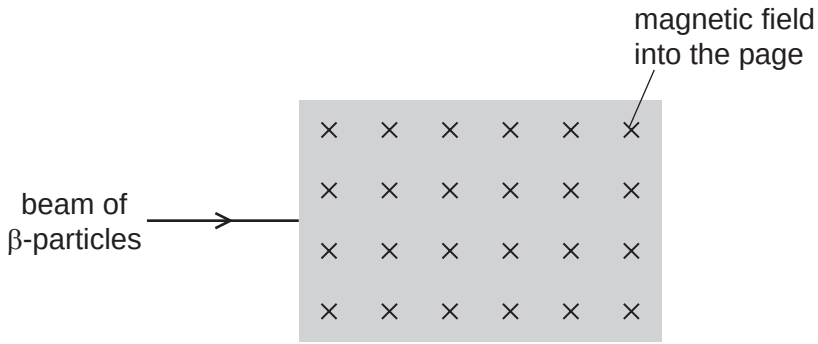

The input voltage is 240 V.

What is the output voltage?

**A** 6.0 V **B** 12 V **C** 20 V **D** 40 V

**36** The diagram shows a shaded area where the direction of a magnetic field is into the page.

A beam of β-particles enters the field as shown.




In which direction is the beam of β-particles deflected as they enter the magnetic field?

**A** into the page

**B** out of the page

**C** down the page

**D** up the page

**37** Below are four statements about isotopes of a certain element.

Which statement about the isotopes **must** be correct?

**A** They are radioactive.

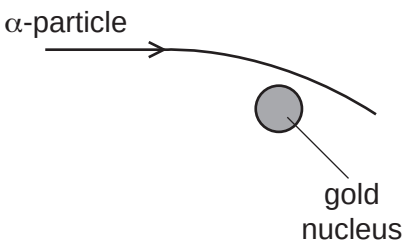
**B** They are unstable.

**C** They have the same number of neutrons.

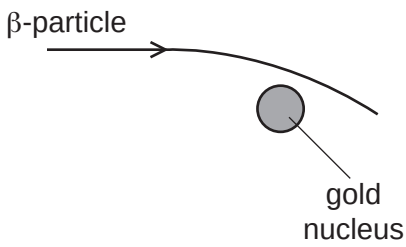
**D** They have the same number of protons.

**38** Which diagram represents an experiment that provided evidence for the nuclear atom?

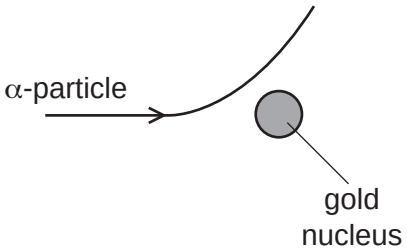
**A**



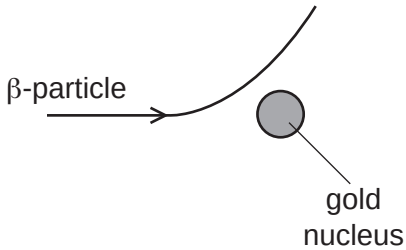

**B**




**C**




**D**




**39** Sodium-24 decays to magnesium-24 according to the following equation.

$$^{24}_{11}\text{Na} \rightarrow {}^{24}_{12}\text{Mg} + \text{emitted particle}$$

What is the emitted particle?

**A** α-particle

**B** β-particle

**C** neutron

**D** proton

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**40** The reading on a detector placed near a radioactive material is 536 counts per second.

The background count rate is 44 counts per second.

The half-life of the radioactive material is 34 hours.

What is the reading on the detector after 68 hours?

**A** 44 counts per second

**B** 123 counts per second

**C** 134 counts per second

**D** 167 counts per second

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