Cambridge Assessment International Education

# Cambridge IGCSE™

**PHYSICS** **0625/22**

Paper 2 Multiple Choice (Extended) **May/June 2024**

**45 minutes**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

**INSTRUCTIONS**

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m / $s^2$).

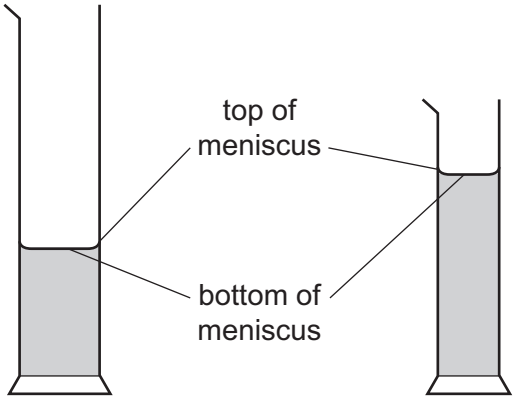
**INFORMATION**

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **16** pages. Any blank pages are indicated.


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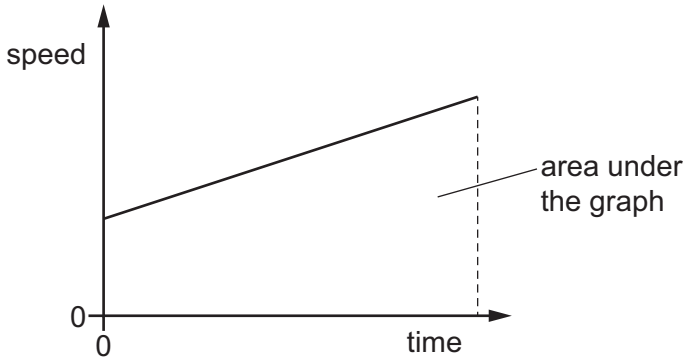
**1** A student wishes to measure accurately the volume of approximately 40 $cm^3$ of water. She has two measuring cylinders, a larger one that can hold 100 $cm^3$, and a smaller one that can hold 50 $cm^3$. The water forms a meniscus where it touches the glass.




Which cylinder and which water level does the student use to ensure an accurate result?

| | cylinder | water level |
|---|---|---|
| **A** | larger one | bottom of meniscus |
| **B** | larger one | top of meniscus |
| **C** | smaller one | bottom of meniscus |
| **D** | smaller one | top of meniscus |

**2** The motion of an object is represented by the speed–time graph shown.




Which quantity is equal to the area under the graph?

**A** acceleration

**B** average speed

**C** distance travelled

**D** kinetic energy

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**3** An astronaut of mass 80 kg is standing on a planet with gravitational field strength $g = 3.8\,\text{N/kg}$.

What is the weight of the astronaut on this planet?

**A** 780 N **B** 300 N **C** 210 N **D** 21 N

**4** A sealed container of volume 2000 $\text{cm}^3$ contains air at high pressure.

The container is placed on a top-pan balance.

The balance reads 200.00 g.

All the air is removed by a vacuum pump and the balance reading changes to 196.00 g.

What was the density of the pressurised air?

**A** 0.00200 $\text{g/cm}^3$

**B** 0.098 $\text{g/cm}^3$

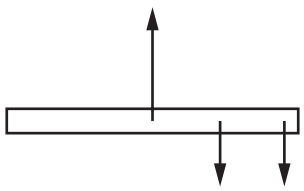
**C** 4.00 $\text{g/cm}^3$

**D** 10.2 $\text{g/cm}^3$

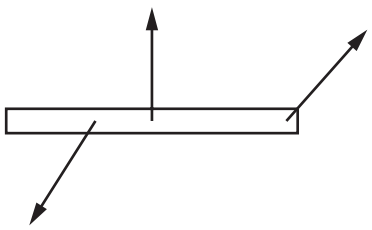
**5** Each diagram shows three forces on a beam.

In which situation is it possible for the three forces shown to be in equilibrium?

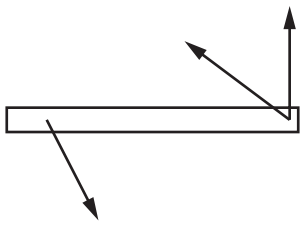
**A**



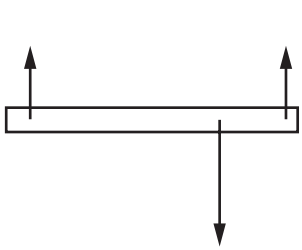
**B**



**C**



**D**



**6** A gymnast jumps down from a high piece of apparatus.

She gradually bends her knees as she lands.

Which effect does this have?

**A** She will have a smaller change of momentum as she lands.

**B** She will lose less kinetic energy as she lands.

**C** She will exert a smaller impulse on the ground as she lands.

**D** She will experience a smaller force from the ground as she lands.

**7** The table gives four energy resources and states whether the main source of energy for the resource is the Sun.

Which row is correct?

| | energy resource | main source of energy is the Sun |
|---|---|---|
| **A** | geothermal | yes |
| **B** | oil | no |
| **C** | water held behind a dam | yes |
| **D** | wind | no |

**8** The equation $\Delta p = \rho g \Delta h$ can be used for a liquid.

What is the meaning of the term $\rho$?

**A** pressure due to the liquid

**B** density of the liquid

**C** total pressure due to the liquid and the air above the liquid

**D** density of an object placed in the liquid

**9** What are the correct terms for each change of state?

| | liquid to solid | liquid to gas |
|---|---|---|
| **A** | solidification | condensation |
| **B** | melting | condensation |
| **C** | solidification | evaporation |
| **D** | melting | evaporation |

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**10** Extremely small pollen grains in water are viewed through a microscope. The grains are seen to move continually and randomly.

What is the reason for this random movement?

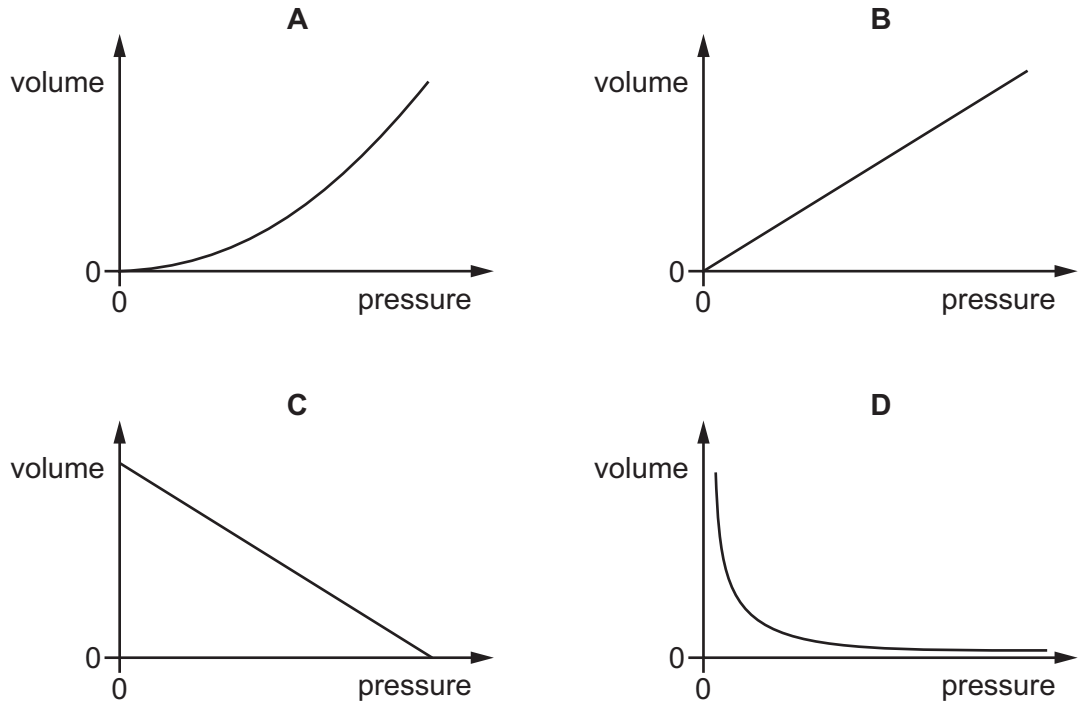
**A** The grains are moved by randomly moving water molecules.

**B** The grains are moved by random convection currents in the water.

**C** The grains are moved by random rays of light reflecting off them.

**D** The grains are moved by the random motion of their own atoms.

**11** Which graph shows how the volume of a fixed mass of gas at constant temperature varies with its pressure?




**12** Which effect is caused by thermal expansion?

**A** a metal surface heating up in direct sunlight

**B** ice-cream melting on a hot day

**C** a railway track buckling on a hot day

**D** ice forming on a pond on a cold day

**13** The temperature of the water at the bottom of a waterfall is greater than the temperature of the water at the top.

The energy in the gravitational potential store of the water at the top is transferred to the thermal store at the bottom.

The specific heat capacity of water is 4200 J / (kg °C).

What is the temperature difference for a waterfall of height 21 m?

**A** 0.0050 °C **B** 0.049 °C **C** 20 °C **D** 200 °C

**14** An ice cube is placed in a beaker and is heated.

The ice melts to form water, which evaporates at first and then boils.

The steam condenses on a cold window in the room.

Which process involves a transfer of energy from the ice, water or steam to the surroundings?

**A** melting

**B** evaporating

**C** boiling

**D** condensing

**15** A teacher shows his class a polystyrene cup. The polystyrene is a thick plastic with lots of tiny air bubbles in it.

He asks the class why the cup is so good at keeping a hot drink warm. Three suggestions are made.

1 It contains air which is a poor thermal conductor.

2 The air is trapped in tiny bubbles so very little convection is possible.

3 The plastic is a poor thermal conductor.

Which suggestions are correct?

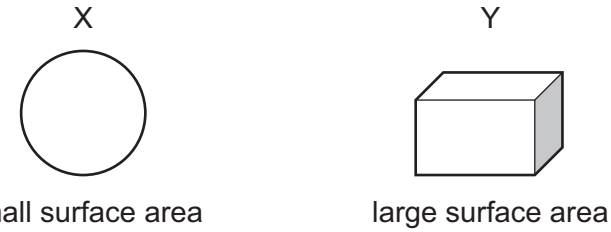
**A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

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**16** Two samples of the same material have the same mass but different surface areas.

Each sample is heated to the same temperature and then left to cool to room temperature.

Each sample is allowed to cool to the same final temperature.




Which row correctly compares the decrease in internal energy and the initial rate of cooling for each sample?

| | decrease in internal energy | initial rate of cooling |
|---|---|---|
| **A** | X loses more internal energy than Y | X cools down faster than Y |
| **B** | Y loses more internal energy than X | Y cools down faster than X |
| **C** | X and Y lose the same quantity of energy | X cools down faster than Y |
| **D** | X and Y lose the same quantity of energy | Y cools down faster than X |

**17** In which type of wave is the direction of vibration parallel to the direction of travel?

**A** electromagnetic waves

**B** seismic P-waves

**C** seismic S-waves

**D** water waves

**18** Waves in a ripple tank are diffracted as they pass through a narrow gap.

What can be done to make the spreading due to diffraction greater?

**A** Decrease the frequency of the waves and keep the speed constant.

**B** Decrease the speed of the waves and keep the frequency constant.

**C** Increase the frequency of the waves and keep the speed constant.

**D** Increase the frequency of the waves and decrease the speed.

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**19** Diagram 1 shows the page of a book in front of a plane mirror.

An eye is looking at the image of the page.

Diagram 2 shows a large letter G on the page facing the mirror.

diagram 1

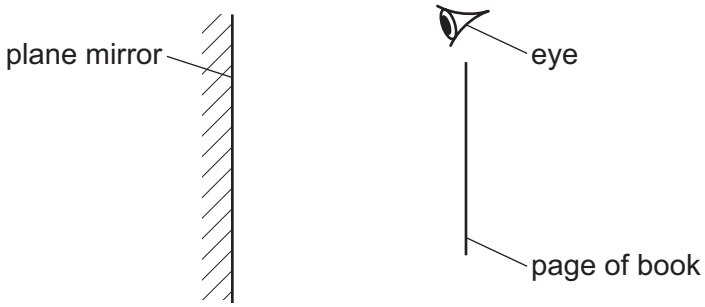



diagram 2




What is the appearance of the image of G seen by the eye?

**A**




**B**



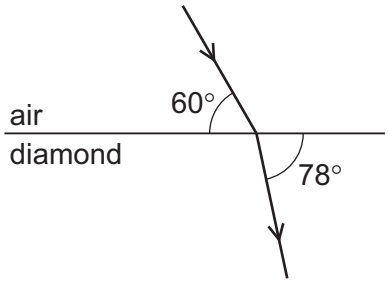

**C**




**D**




**20** The diagram shows a ray of light passing from air into diamond.




What is the refractive index of the diamond?

**A** 0.89 **B** 1.1 **C** 2.4 **D** 2.5

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**21** The ray diagrams show the formation of an image by two different converging lenses.

diagram 1

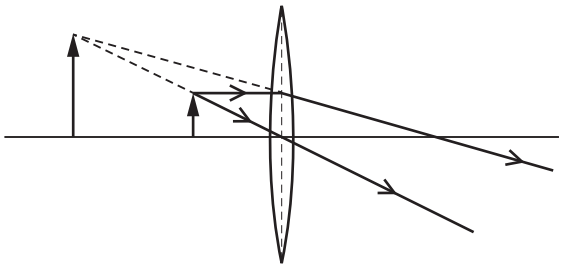
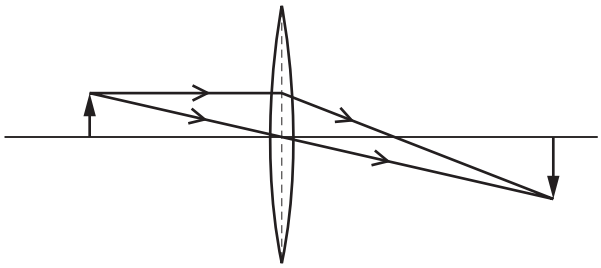


diagram 2



Which row describes the images produced?

| | diagram 1 | diagram 2 |
|---|---|---|
| **A** | real | real |
| **B** | real | virtual |
| **C** | virtual | real |
| **D** | virtual | virtual |

**22** White light enters a glass prism. The light leaving the other side of the prism is separated into colours.

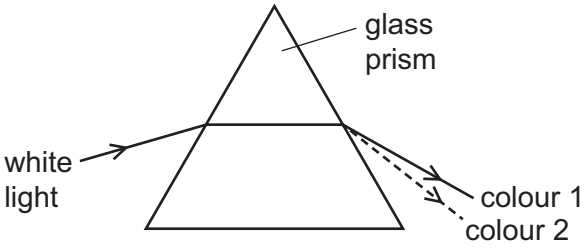



diagram 1

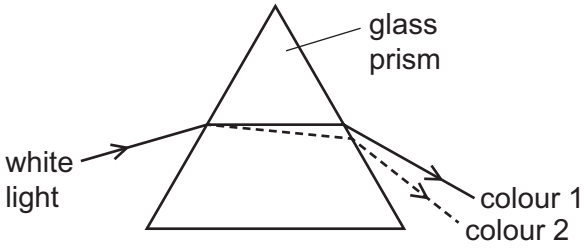



diagram 2

Which row correctly describes what happens?

| | path taken by the light | colour 1 | colour 2 |
|---|---|---|---|
| **A** | diagram 1 | red | violet |
| **B** | diagram 1 | violet | red |
| **C** | diagram 2 | red | violet |
| **D** | diagram 2 | violet | red |

**23** Thermal radiation is part of the electromagnetic spectrum.

What is the name of this region of the spectrum?

**A** gamma rays

**B** infrared

**C** ultraviolet

**D** visible light

**24** A remote-controlled vehicle is travelling on the surface of a planet. The vehicle senses an obstacle ahead. It sends a radio message to the control room from where it is being controlled. The control room is $2.4 \times 10^6$ km away from the vehicle. The control room sends a message back to the vehicle telling it to stop.

What is the minimum time that elapses between the vehicle sensing the obstacle and receiving the message back from the control room?

**A** 8.0 ms **B** 16 ms **C** 8.0 s **D** 16 s

**25** Which statement about the direction of a magnetic field at a point is correct?

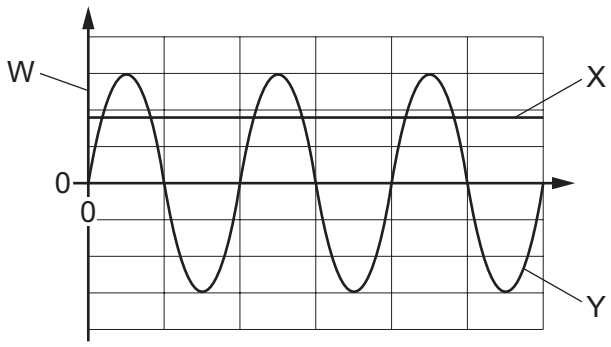
**A** It is the direction of the force on an N pole placed at that point.

**B** It is the direction of the force on an S pole placed at that point.

**C** It is the direction of the force on a positive charge placed at that point.

**D** It is the direction of the force on a negative charge placed at that point.

**26** A student draws graphs of an a.c. supply and a d.c. supply.




Which row shows the correct labels for W, X and Y?

| | label of W | a.c. supply | d.c. supply |
|---|---|---|---|
| **A** | time | X | Y |
| **B** | time | Y | X |
| **C** | voltage | X | Y |
| **D** | voltage | Y | X |

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**27** A resistor transfers 100 J of energy when a charge of 10 C flows through it.

What is the potential difference across the resistor?

**A** 0.10 V **B** 10 V **C** 10 W **D** 1000 W

**28** Wire X and wire Y are made from the same metal.

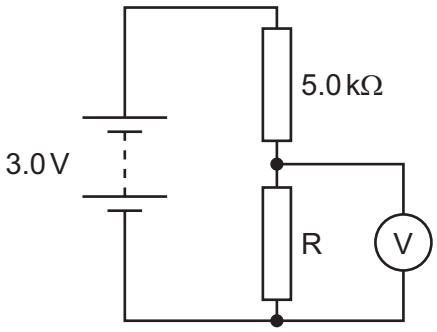
The table gives information about the two wires.

| | length / m | cross-sectional area / $mm^2$ | resistance / Ω |
|---|---|---|---|
| wire X | 1.0 | 0.40 | 2.0 |
| wire Y | 1.3 | 0.30 | |

What is the resistance of wire Y?

**A** 0.31 Ω **B** 0.78 Ω **C** 2.1 Ω **D** 3.5 Ω

**29** The diagram shows two resistors used as a potential divider.




The reading on the voltmeter is 1.8 V.

What is the resistance of the resistor R?

**A** 3.0 kΩ **B** 3.3 kΩ **C** 7.5 kΩ **D** 13 kΩ

**30** Two electrical appliances are connected to the mains supply.

The cable connected to one appliance includes an earth wire.

The cable connected to the second appliance does **not** need an earth wire.

What is a reason for this difference?

**A** One appliance has a metal case, but the other appliance does not.

**B** One appliance is fitted with a fuse, but the other appliance is not.

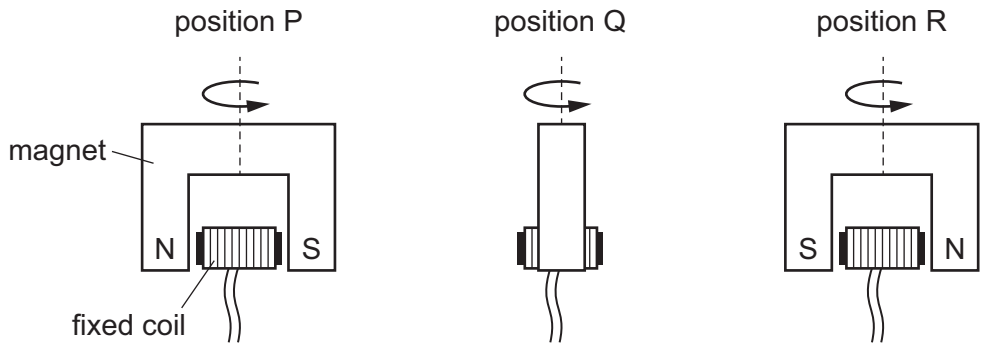
**C** One appliance is fitted with a switch, but the other appliance is not.

**D** One appliance needs more current than the other appliance.

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**31** The diagram shows a simple a.c. generator. The magnet rotates around a fixed coil wound round a fixed iron core. The electromotive force (e.m.f.) output is a sine wave, a series of crests, zeros and troughs.

The magnet is shown in three positions, P, Q and R, during its rotation. The magnetic field in the coil is zero at Q but changing most rapidly.




Which statement about the induced e.m.f. in the coil is correct?

**A** The magnitude of the e.m.f. at position Q is larger than that at position P.

**B** The magnitude of the e.m.f. at position Q is zero.

**C** The magnitude of the e.m.f. at position Q is smaller than at position R, but not zero.

**D** The magnitude of the e.m.f. at position R is larger than at position P.

**32** A 24 V power supply and a 100% efficient transformer are used to light a 6.0 V, 12 W lamp.

What is the current in the power supply?

**A** 0.50 A **B** 2.0 A **C** 3.0 A **D** 8.0 A

**33** The scattering of particles by a thin gold foil provided scientists with evidence for the nuclear atom.

Which particles were scattered by the gold nuclei in the thin foil?

**A** $\alpha$-particles

**B** $\beta$-particles

**C** neutrons

**D** protons

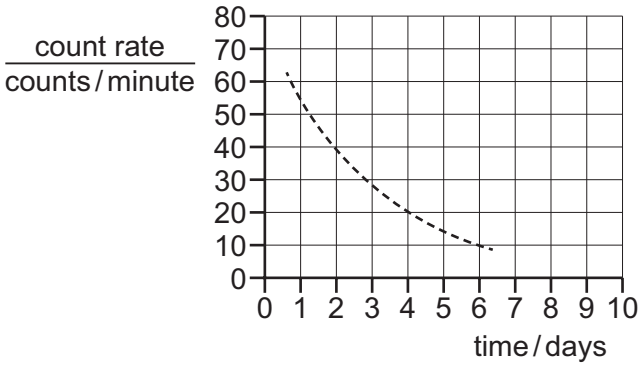
**34** A nucleus X has 17 protons and 18 neutrons.

Which notation is correct for this nucleus?

**A** $^{17}_{18}X$ **B** $^{17}_{35}X$ **C** $^{18}_{17}X$ **D** $^{35}_{17}X$

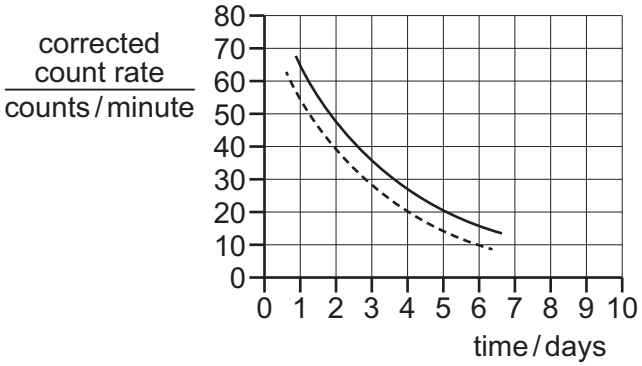
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**35** The dashed line on the graph shows the decay curve recorded from a sample of a particular radioactive isotope. The count rate includes background radiation.

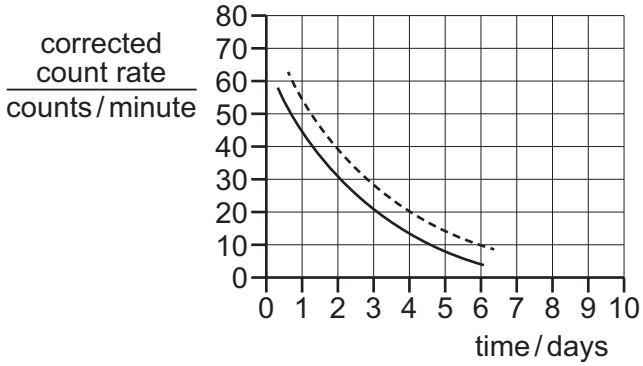



Which curve shows the corrected count rate for the decay?

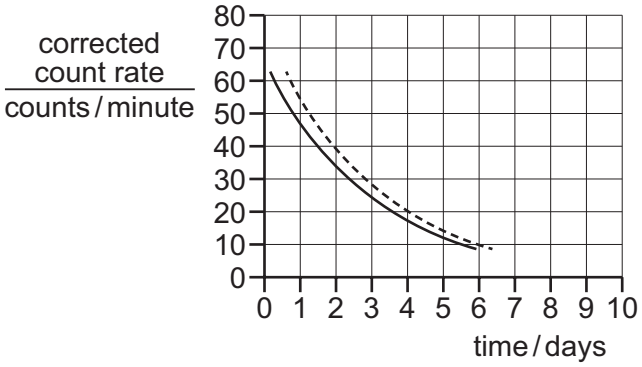
**A**



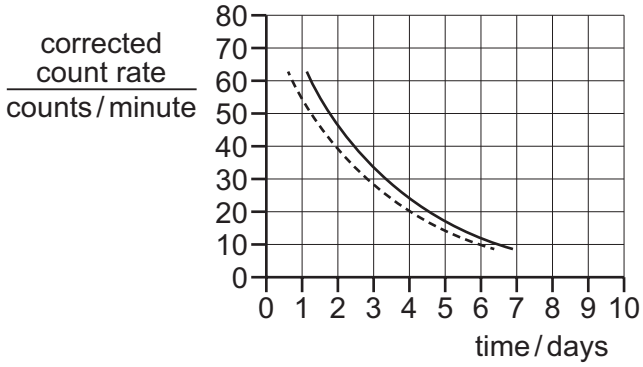

**B**




**C**




**D**




**36** Which type of radioactive source is suitable for use in measuring and controlling the thickness of paper in a paper-manufacturing factory?

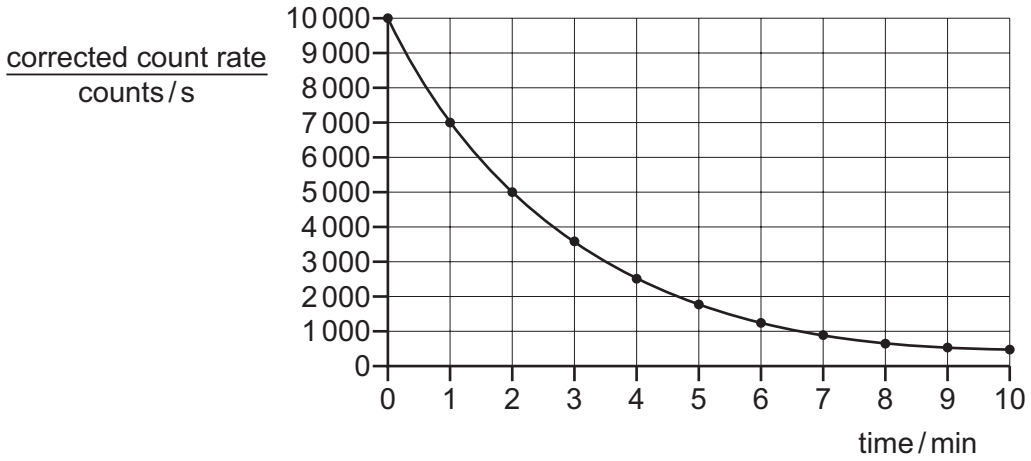
| | type of emission | half-life |
|---|---|---|
| **A** | alpha | long |
| **B** | alpha | short |
| **C** | beta | long |
| **D** | beta | short |

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**[Turn over**

**37** A medical tracer is used to investigate a tumour in a patient.

The graph shows the corrected count rate from the tracer against time.




What is the half-life of the source?

**A** 2 minutes

**B** 10 minutes

**C** 5 000 minutes

**D** 10 000 minutes

**38** The Earth orbits the Sun once in approximately 365 days.

The average radius of the orbit is $1.5 \times 10^{11}$ m.

What is the average orbital speed of the Earth?

**A** $3.0 \times 10^{4}$ m / s

**B** $1.1 \times 10^{8}$ m / s

**C** $2.6 \times 10^{9}$ m / s

**D** $1.3 \times 10^{15}$ m / s

**39** Which statement about the life cycle of a star is correct?

**A** All stars eventually run out of hydrogen as fuel.

**B** A red giant forms a planetary nebula with a supernova at its centre.

**C** A white dwarf star eventually forms a black hole.

**D** Most stars expand and form protostars.

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**40** A galaxy at a distance of $3.1 \times 10^{21}$ km is moving away from the Earth with a speed of 7000 km / s.

What is the Hubble constant $H_0$ calculated using this data and what is the speed of a galaxy at a distance of $6.2 \times 10^{21}$ km from the Earth?

| | $H_0 / s^{-1}$ | $\frac{\text{speed of galaxy}}{\text{km/s}}$ |
|---|---|---|
| **A** | $2.3 \times 10^{-18}$ | 3 500 |
| **B** | $2.3 \times 10^{-18}$ | 14 000 |
| **C** | $4.4 \times 10^{17}$ | 3 500 |
| **D** | $4.4 \times 10^{17}$ | 14 000 |

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