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

**PHYSICS** **0625/21**

Paper 2 Multiple Choice (Extended) **October/November 2017**

**45 minutes**

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

*6133216338*

**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 **20** printed pages.


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**1** A student measures the volume of a cork.

He puts some water into a measuring cylinder and then one glass ball. He puts the cork and then a second, identical glass ball into the water as shown.

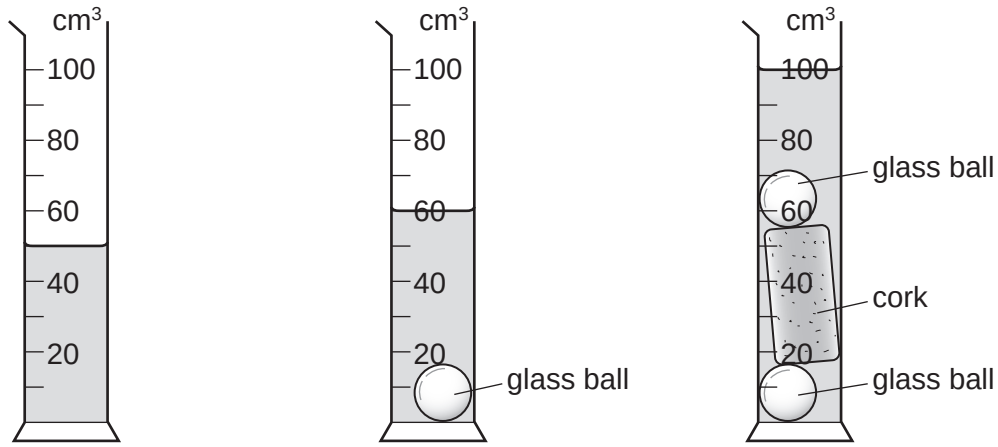



diagram 1 diagram 2 diagram 3

Diagram 1 shows the first water level.

Diagram 2 shows the water level after one glass ball is added.

Diagram 3 shows the water level after the cork and the second glass ball are added.

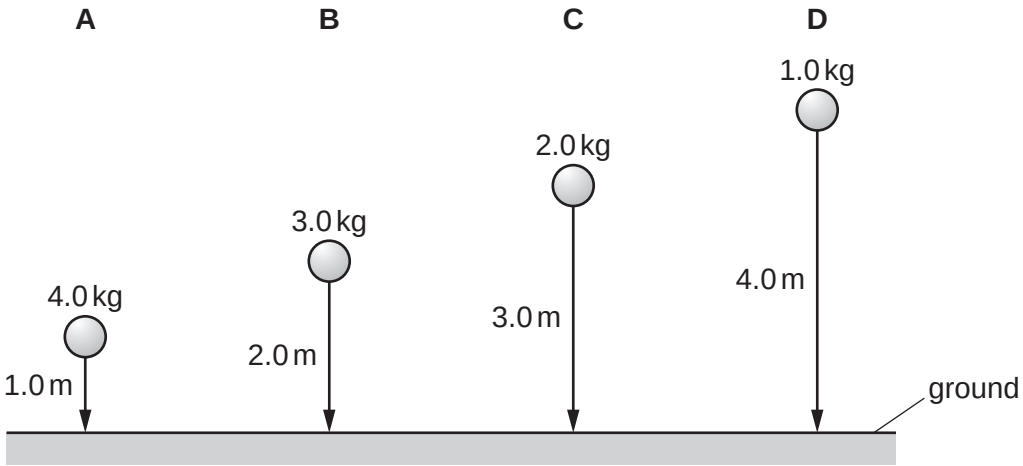
What is the volume of the cork?

**A** $30\,cm^3$ **B** $40\,cm^3$ **C** $50\,cm^3$ **D** $100\,cm^3$

**2** Four balls with different masses are dropped from the heights shown.

Air resistance may be ignored.

Which ball has the smallest average speed?




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**3** An ice crystal falls vertically from a cloud.

What happens to the acceleration of the ice crystal as it falls?

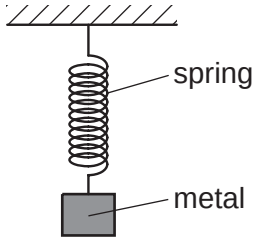
**A** It decreases because of air resistance.

**B** It decreases because of gravity.

**C** It increases because of air resistance.

**D** It increases because of gravity.

**4** A spring is stretched by hanging a piece of metal from it.




Which name is given to the force that stretches the spring?

**A** friction

**B** mass

**C** pressure

**D** weight

**5** Which object has the greatest weight?

**A** an object of mass 10 kg in a 15 N / kg gravitational field

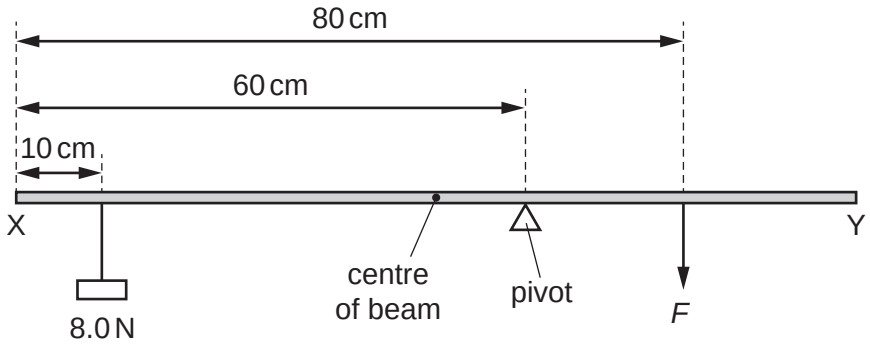
**B** an object of mass 15 kg in a 13 N / kg gravitational field

**C** an object of mass 20 kg in a 9.0 N / kg gravitational field

**D** an object of mass 50 kg in a 3.0 N / kg gravitational field

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**6** A uniform beam XY is 100 cm long and weighs 4.0 N.




The beam rests on a pivot 60 cm from end X.

A load of 8.0 N hangs from the beam 10 cm from end X.

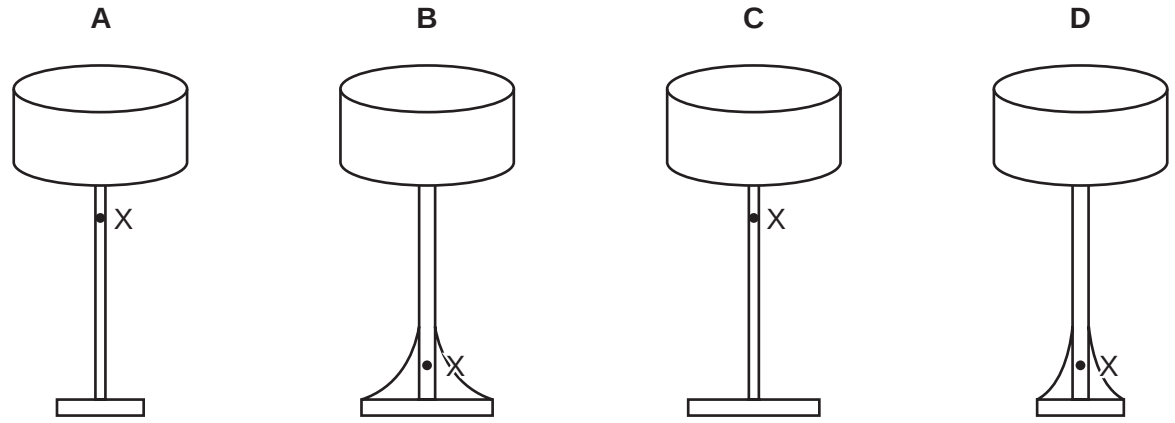
The beam is kept balanced by a force *F* acting on the beam 80 cm from end X.

What is the magnitude of force *F*?

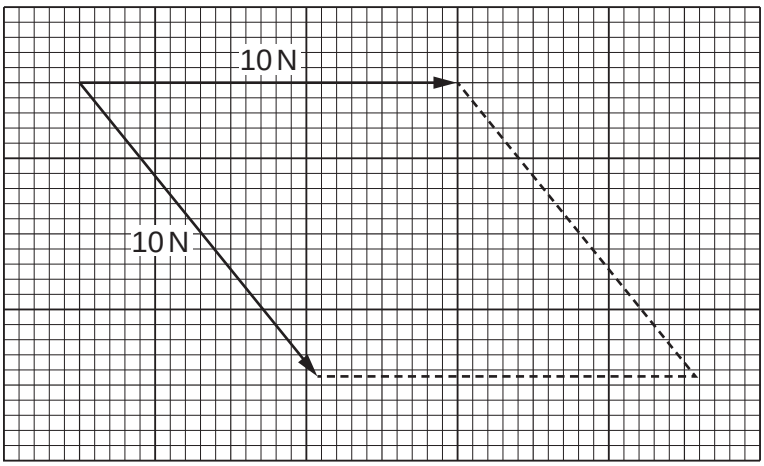
**A** 8.0 N **B** 18 N **C** 22 N **D** 44 N

**7** The diagrams show four table lamps resting on a table. The position of the centre of mass of each lamp is labelled X.

Which lamp is the most stable?



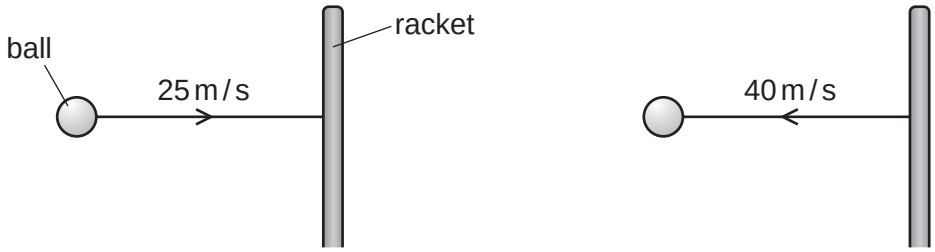
**8** The diagram shows an incomplete scale drawing to find the resultant of two 10 N forces acting at a point in the directions shown.




What is the magnitude of the resultant force?

**A** 7.5 N **B** 8.6 N **C** 18 N **D** 20 N

**9** A tennis ball of mass 0.060 kg travels horizontally at a speed of 25 m / s. The ball hits a tennis racket and rebounds horizontally at a speed of 40 m / s.



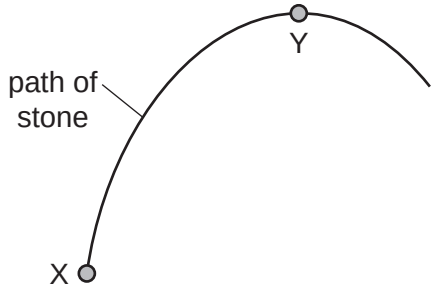

before hitting racket after hitting racket

The ball is in contact with the racket for 50 ms.

What force does the racket exert on the ball?

**A** 0.018 N **B** 0.078 N **C** 18 N **D** 78 N

**10** The diagram shows the path of a stone that is thrown from X and reaches its maximum height at Y.




The stone gains 10 J of gravitational potential energy as it moves from X to Y.

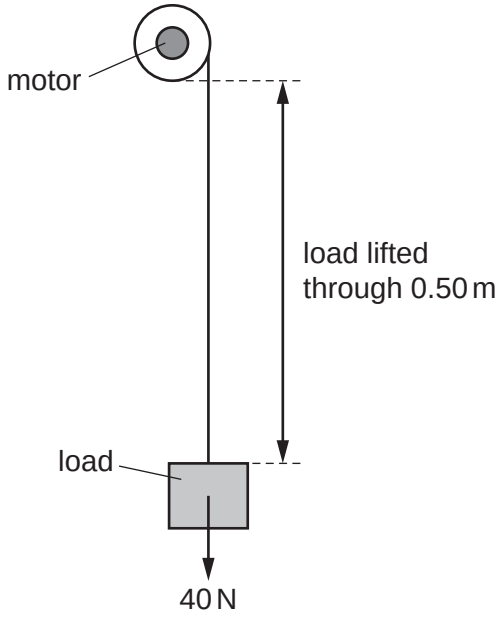
The stone has 2.0 J of kinetic energy at Y.

Air resistance can be ignored.

How much kinetic energy did the stone have immediately after it was thrown at X?

**A** 2.0 J **B** 8.0 J **C** 10 J **D** 12 J

**11** A motor is used to lift a load of 40 N.



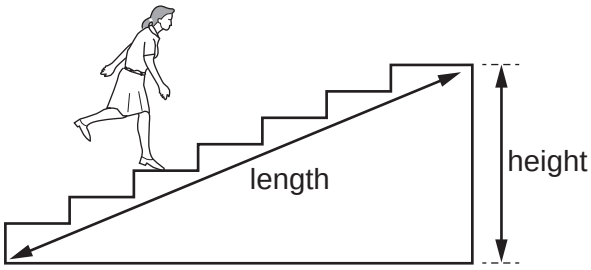

The power of the motor is 40 W and the system is 20% efficient.

How long does it take the motor to lift the load through 0.50 m?

**A** 0.50 s **B** 2.5 s **C** 5.0 s **D** 25 s

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**12** A student runs up a flight of stairs.




Which information is **not** needed to calculate the rate at which the student is doing work against gravity?

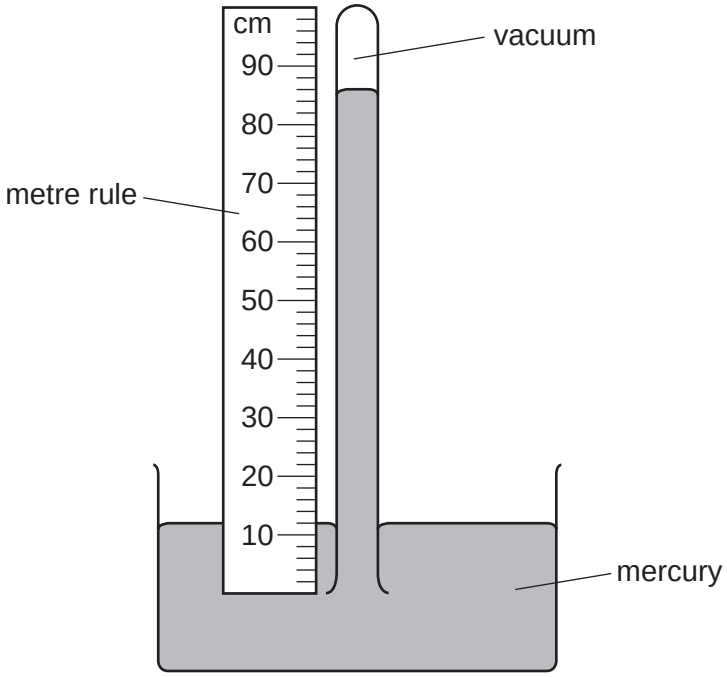
**A** the height of the flight of stairs

**B** the length of the flight of stairs

**C** the time taken to run up the stairs

**D** the weight of the student

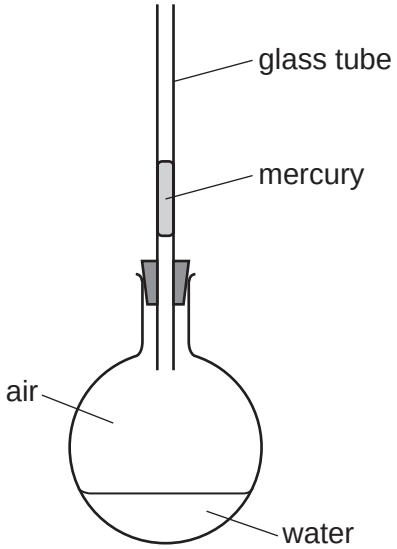
**13** The diagram shows a simple mercury barometer.




Which length is used to find the value of atmospheric pressure?

**A** 12 cm **B** 74 cm **C** 86 cm **D** 100 cm

**14** The diagram shows a glass flask, sealed with a small volume of mercury in a glass tube. When the flask is gently warmed the mercury rises up the tube.




What is the main cause of the movement of the mercury?

**A** expansion of air in the flask

**B** expansion of the glass flask

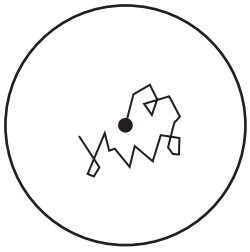
**C** expansion of the glass tube

**D** expansion of the mercury

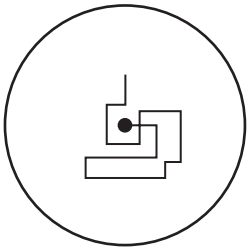
**15** A pollen grain in a beaker of still water is viewed through a microscope.

Which diagram shows the most likely movement of the pollen grain?

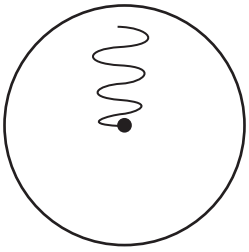
**A**



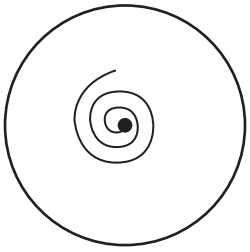
**B**



**C**

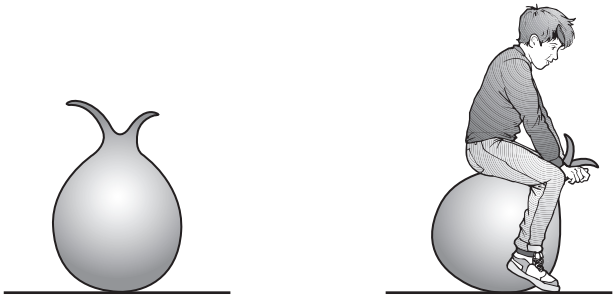


**D**



**16** The diagram shows an air-filled rubber toy. A child sits on the toy and its volume decreases.

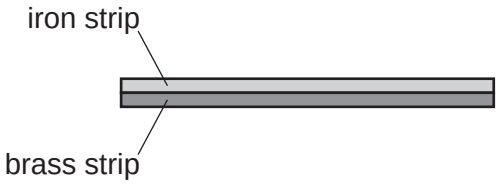
The temperature of the air in the toy does not change.



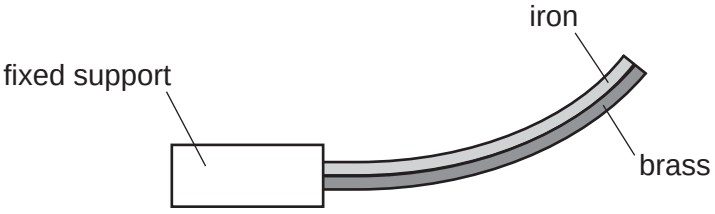
How does the air pressure in the toy change and why?

| | pressure | reason |
|---|---|---|
| **A** | decreases | air molecules move more slowly |
| **B** | decreases | air molecules strike the rubber less frequently |
| **C** | increases | air molecules move more quickly |
| **D** | increases | air molecules strike the rubber more frequently |

**17** A strip of iron and a strip of brass are firmly attached to each other along their entire length. This combination is a bimetallic strip.




This bimetallic strip is heated and it bends as shown.




The bimetallic strip is now cooled and becomes straight again.

What causes the bimetallic strip to become straight again?

**A** The brass contracts more than the iron.

**B** The brass expands more than the iron.

**C** The iron contracts more than the brass.

**D** The iron expands more than the brass.

**18** An aluminium block has a mass of 200 g.

The specific heat capacity of aluminium is 900 J / (kg °C).

How much energy is needed to raise the temperature of the block from 20 °C to 110 °C?

**A** 2.0 J **B** 200 J **C** 16 200 J **D** 16 200 000 J

**19** Which statement about convection currents is correct?

**A** Convection currents occur because, when cooled, liquids contract and become more dense.

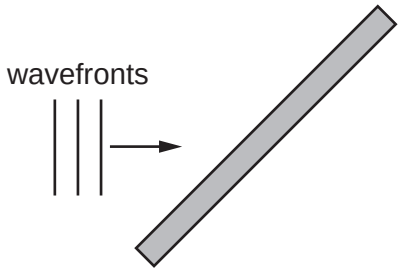
**B** Convection currents occur because, when warmed, liquids expand and become more dense.

**C** Convection currents only occur in liquids.

**D** Convection currents only occur in solids and liquids.

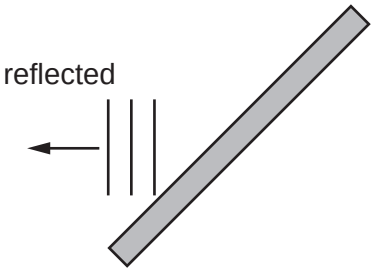
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**20** The diagram represents plane wavefronts of a water wave about to strike a solid barrier.

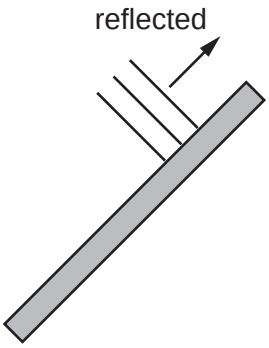



Which diagram shows the position of the wavefronts after reflection at the barrier?

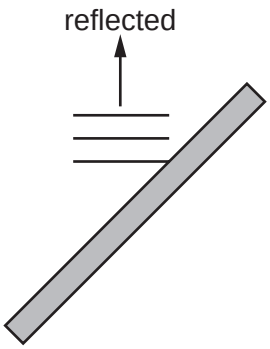
**A**



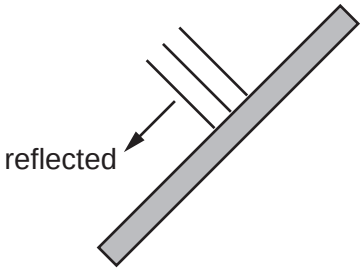

**B**



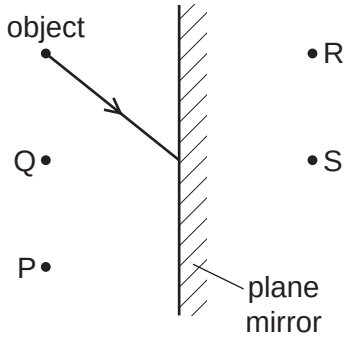

**C**




**D**



**21** The diagram shows an object in front of a plane mirror. A ray of light from the object is incident on the mirror.




Through which point does the reflected ray pass, and at which point is the image of the object formed?

| | point through which reflected ray passes | point at which image is formed |
|---|---|---|
| **A** | P | R |
| **B** | P | S |
| **C** | Q | R |
| **D** | Q | S |

**22** A laser is a source of light with a single frequency.

Which description of this type of light is correct?

**A** dispersed

**B** focused

**C** monochromatic

**D** refracted

**23** Visible light, X-rays and microwaves are all components of the electromagnetic spectrum.

Which statement about the waves is correct?

**A** In a vacuum, microwaves travel faster than visible light and have a shorter wavelength.

**B** In a vacuum, microwaves travel at the same speed as visible light and have a shorter wavelength.

**C** In a vacuum, X-rays travel faster than visible light and have a shorter wavelength.

**D** In a vacuum, X-rays travel at the same speed as visible light and have a shorter wavelength.

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**24** The Moon is 380 000 km from the Earth. A laser light beam is directed from the Earth to the Moon. The beam is reflected back to the Earth.

How long does it take for the light to travel to the Moon and back to the Earth?

**A** 1.27 ms **B** 2.53 ms **C** 1.27 s **D** 2.53 s

**25** Which wavefront is travelling at a speed closest to that of a sound wave through a solid?

**A** one that moves 10 m in 0.01 s

**B** one that moves 50 m in 0.5 s

**C** one that moves 1000 m in 100 s

**D** one that moves 2000 m in 2000 s

**26** Different waves travel through air.

Which waves have the greatest difference in speed?

**A** ultrasound waves and sound waves

**B** ultrasound waves and ultraviolet waves

**C** ultraviolet waves and light waves

**D** ultraviolet waves and radio waves

**27** A student stands 180 m in front of a vertical, flat cliff and bangs together two pieces of wood to make a short, loud sound.

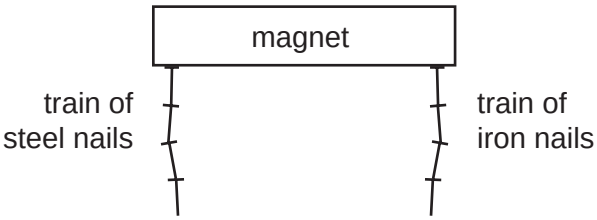
A timer records the echo of the sound 1.5 seconds after the pieces of wood are banged together.

Based on this result, what is the speed of sound?

**A** 120 m/s **B** 240 m/s **C** 270 m/s **D** 540 m/s

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**28** A train of steel nails and a train of iron nails hang from a strong magnet.




The trains are then carefully removed from the magnet.

What happens to the trains?

**A** Both trains fall apart.

**B** Both trains stay together.

**C** Only the train of iron nails falls apart.

**D** Only the train of steel nails falls apart.

**29** How can a permanent magnet be demagnetised?

**A** Cool the magnet for a long time.

**B** Place it next to another magnet.

**C** Slowly pull it out of a coil connected to an a.c. supply.

**D** Slowly pull it out of a coil connected to a d.c. supply.

**30** A positively-charged rod is held near to, but not touching, an uncharged metal sphere.

The sphere is briefly now connected to earth.

The rod is removed.

Which statement about the charge on the sphere is correct?

**A** It is charged negatively because negative charges have moved from earth to the sphere.

**B** It is charged negatively because positive charges have moved from the sphere to earth.

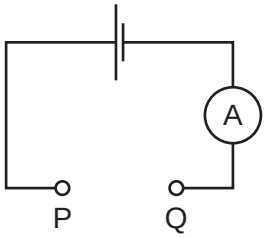
**C** It is charged positively because negative charges have moved from the sphere to earth.

**D** It is charged positively because positive charges have moved to earth from the sphere.

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**31** The diagram shows a circuit with a gap between points P and Q.

Four pieces of metal wire of the same material are connected, in turn, between points P and Q in the circuit.




The table gives the diameters and lengths of the wires.

In which wire is the current the largest?

| | diameter / mm | length / m |
|---|---|---|
| **A** | 0.10 | 1.0 |
| **B** | 0.10 | 2.0 |
| **C** | 0.20 | 1.0 |
| **D** | 0.20 | 2.0 |

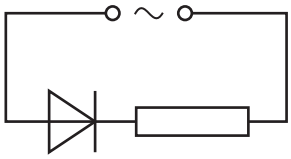
**32** A torch has a simple circuit with a 3.0 V battery and a lamp. There is a 20 mA current in the lamp.

How much energy is transferred to the lamp in 5.0 minutes?

**A** 0.30 J **B** 18 J **C** 60 J **D** 0.30 kJ

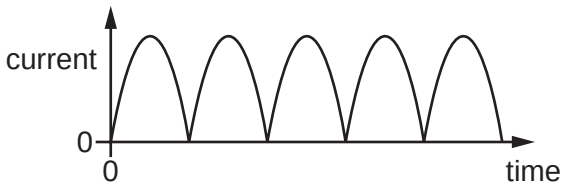
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**33** A student connects the circuit shown.

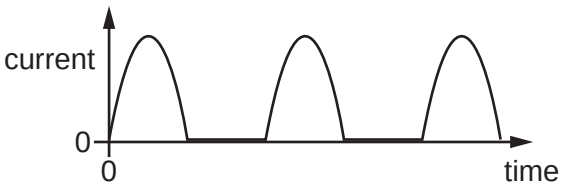


Which graph shows the variation with time of the current in the resistor?

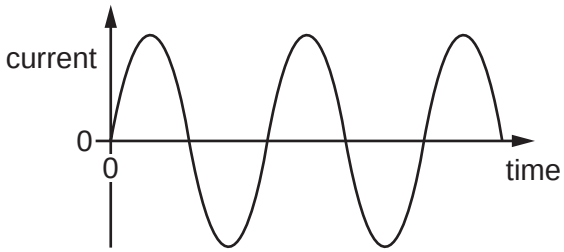
**A**



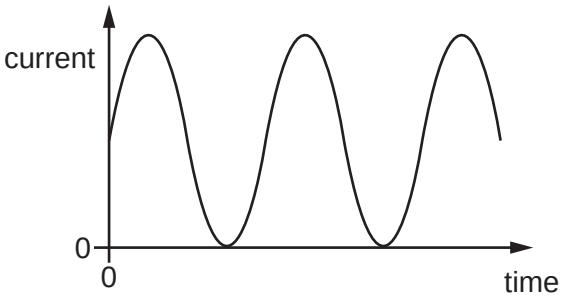

**B**




**C**

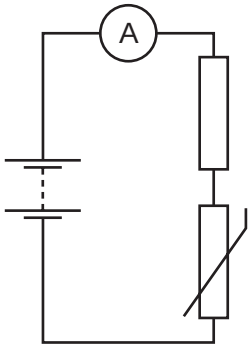



**D**




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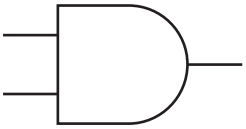
**34** The diagram shows a circuit with a fixed resistor connected in series with a thermistor and an ammeter.




Which row shows how temperature change affects the resistance of the thermistor and the current in the circuit?

| | temperature | resistance of thermistor | current in circuit |
|---|---|---|---|
| **A** | decreases | decreases | increases |
| **B** | decreases | increases | decreases |
| **C** | increases | decreases | decreases |
| **D** | increases | increases | increases |

**35** What does the symbol shown represent?



**A** an AND gate

**B** a NOR gate

**C** a NOT gate

**D** an OR gate

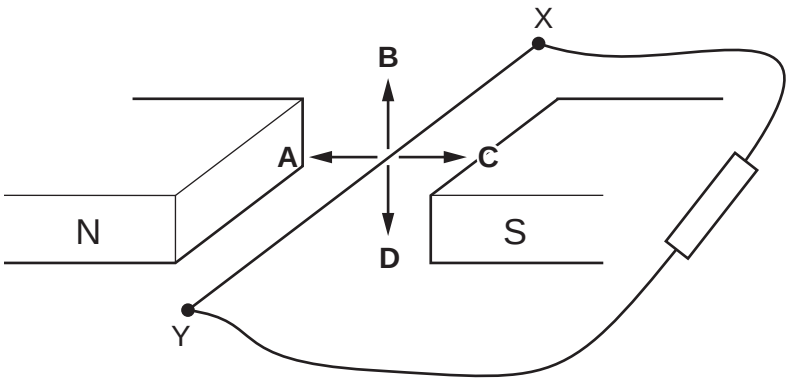
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**36** The diagram shows a copper wire XY connected to a resistor.

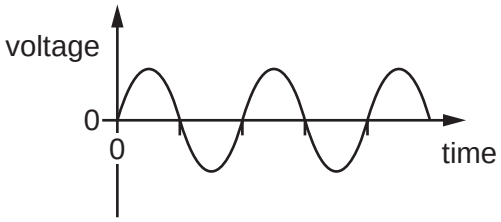
The wire is moved in the magnetic field between the poles of a magnet.

There is an induced current in the wire from X to Y.

In which labelled direction is the wire moving?



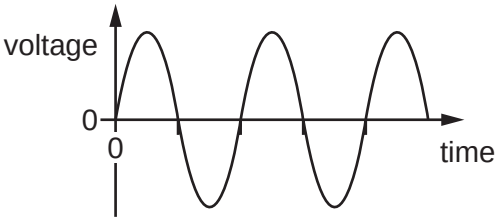

**37** The graph shows how the voltage induced across a coil changes with time as the coil spins in a magnetic field.



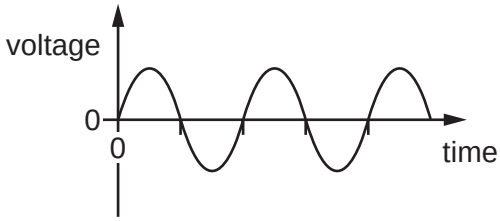

Which graph shows what happens when the coil spins more quickly?

(All graphs are drawn to the same scale.)

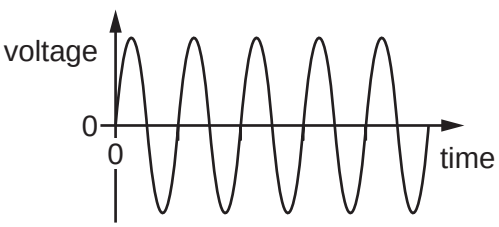
**A**



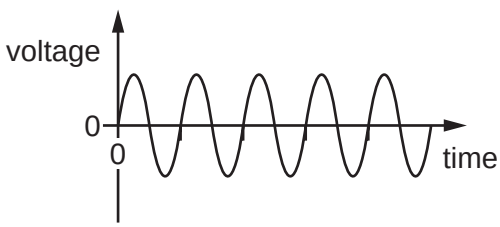

**B**




**C**

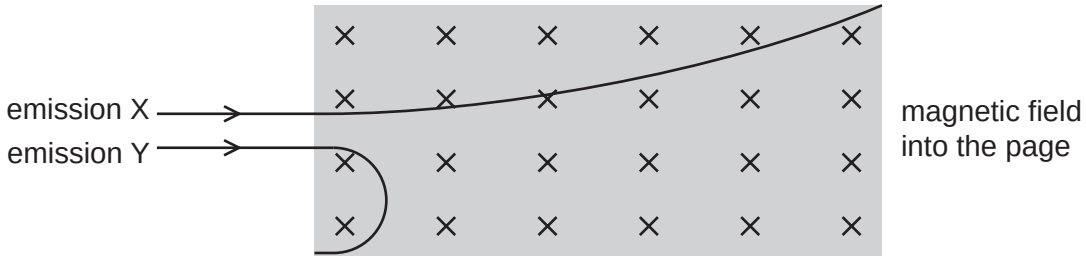



**D**




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**38** Emissions X and Y from radioactive material are passed through a magnetic field. The diagram shows the direction of the emissions, the direction of the magnetic field and the effect on the emissions.




Which type of emission is X, and which type of emission is Y?

| | emission X | emission Y |
|---|---|---|
| **A** | $\alpha$-particles | $\beta$-particles |
| **B** | $\alpha$-particles | $\gamma$-rays |
| **C** | $\beta$-particles | $\alpha$-particles |
| **D** | $\beta$-particles | $\gamma$-rays |

**39** What is meant by the *half-life* of a radioactive isotope?

**A** half of the time taken for all of the original nuclei to decay

**B** the time taken for half of the original nuclei to decay

**C** the time taken for the charges on all the nuclei to halve

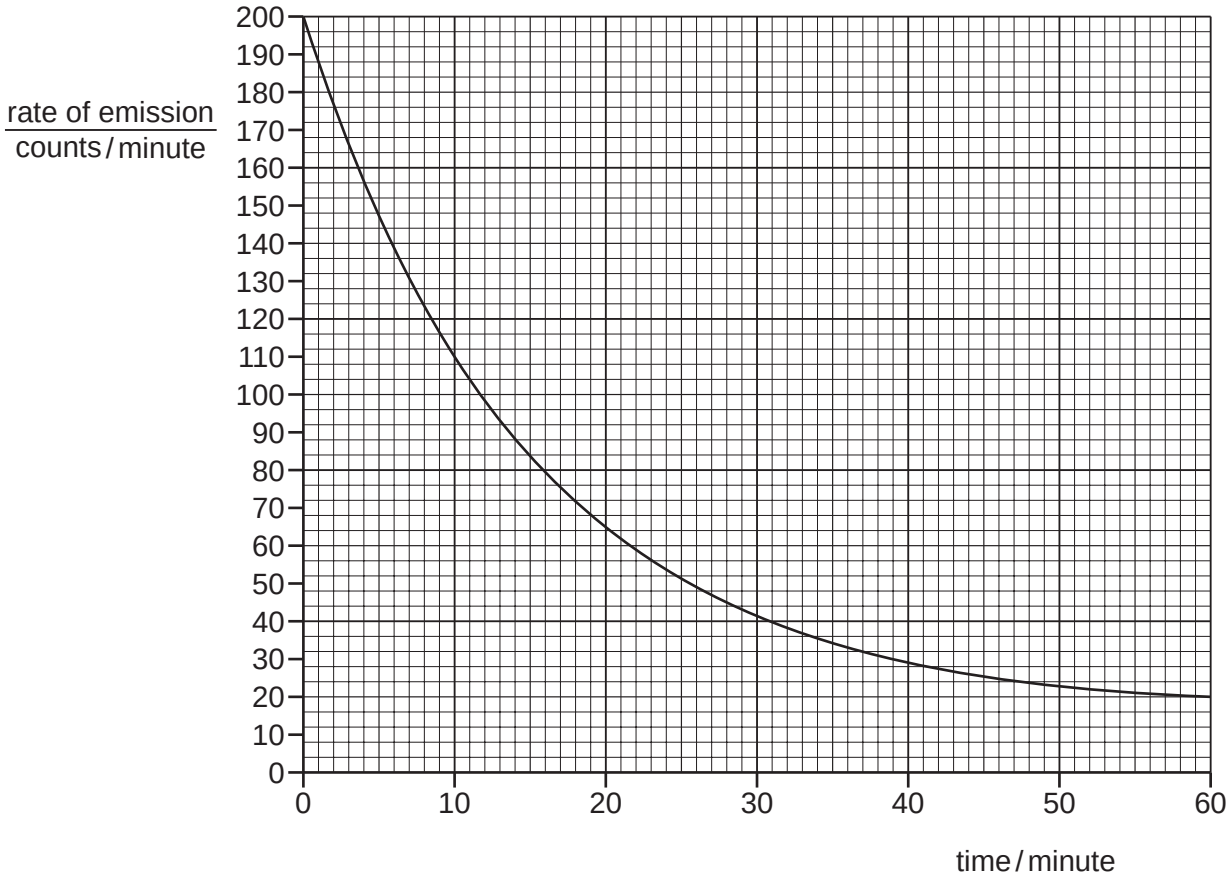
**D** the time taken for the mass of each nucleus to halve

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**[Turn over**

**40** The rate of emission of a radioactive source is measured until the reading reaches the background rate of 20 counts per minute.

The results are shown.




What is the best estimate of the half-life of the source?

**A** 10 minutes

**B** 12 minutes

**C** 14 minutes

**D** 30 minutes

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