Cambridge Assessment International Education

Cambridge O Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **October/November 2025**

1 hour

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.

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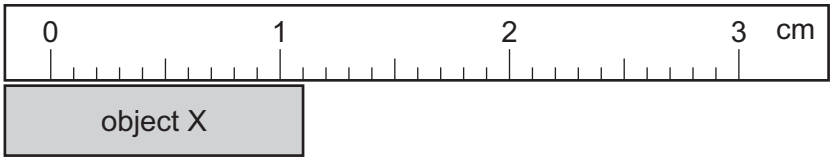
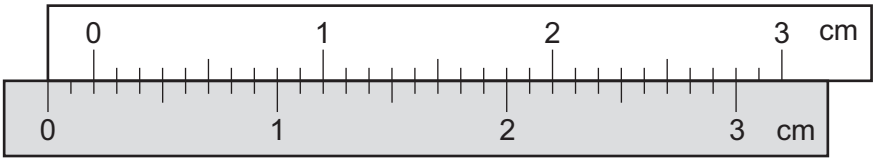
[Turn over

1 Object X is placed against a ruler.



This ruler is placed against another ruler to measure the end correction.



What is the length of the object X?

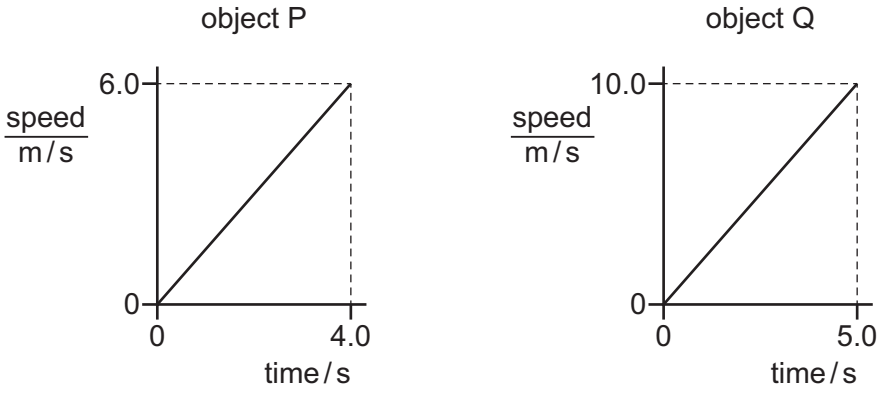
A 0.9 cm **B** 1.1 cm **C** 1.3 cm **D** 1.5 cm

2 Quantities can be described as scalar or vector.

Which row shows scalar quantities and vector quantities?

	scalar quantities	vector quantities
A	displacement, force, temperature	distance, weight, mass
B	displacement, mass, force	distance, weight, temperature
C	distance, force, weight	displacement, mass, temperature
D	distance, mass, temperature	displacement, force, weight

3 The diagram shows the speed–time graphs for two objects moving with uniform acceleration.



A student uses the graphs to make two conclusions.

1 The distance travelled by object P is 26 m less than the distance travelled by object Q.

2 The acceleration of object P is 0.50 m / s^2 less than the acceleration of object Q.

Which conclusions are correct?

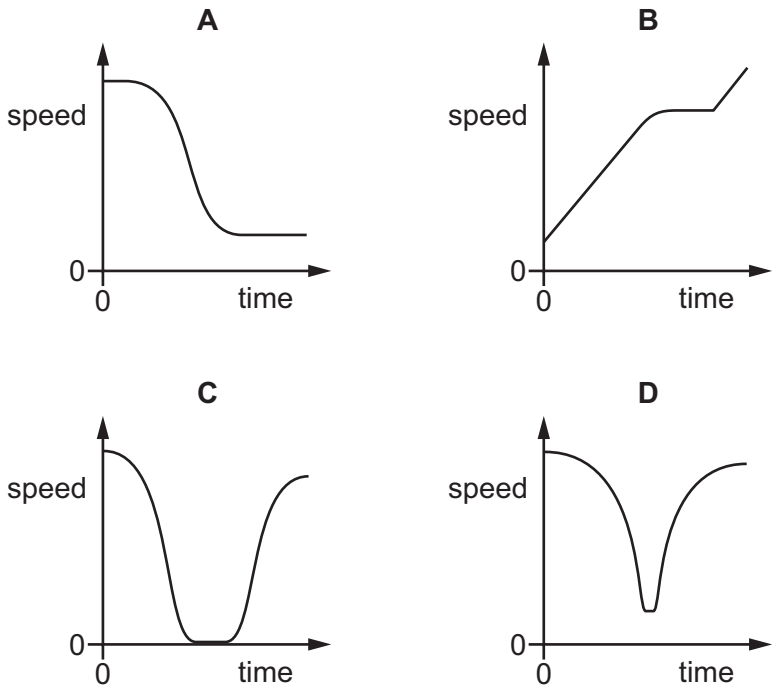
A neither 1 nor 2

B 1 only

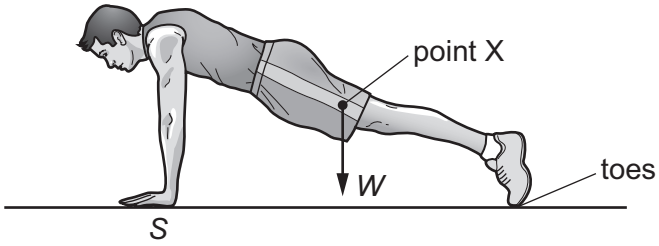
C 2 only

D both 1 and 2

4 Which speed–time graph represents the motion of a railway train making a short stop at a station?



5 The diagram shows an athlete doing press-ups on a floor. The athlete is using both hands. The area of contact of each hand with the floor is *S*. The athlete's toes act as a pivot during each press-up.



The athlete's weight *W* acts through point X. The distance between his toes and point X is three quarters of the distance between his toes and his shoulders.

What is the pressure exerted on the palm of each of the athlete's hands?

A $\frac{W}{8S}$ **B** $\frac{3W}{8S}$ **C** $\frac{W}{4S}$ **D** $\frac{3W}{4S}$

6 A parachutist falls towards the ground at constant speed with a fully open parachute.

Which statement is correct?

A There are **no** forces acting on the parachutist.

B The upward force on the parachute is equal to the weight of the parachutist.

C The upward force on the parachute is greater than the weight of the parachutist.

D The upward force on the parachute is less than the weight of the parachutist.

7 A student measures the density of an irregularly shaped stone.

Which items of equipment are needed?

A a balance and a measuring cylinder containing water

B a balance and a ruler

C a ruler and a measuring cylinder containing water

D a measuring cylinder containing water only

8 The table shows how the extension of a spring varies with load.

load / N	0	2	4	6	8	10	12	14	16
extension / cm	0	3	6	9	12	15	20	27	38

Between which two loads is the limit of proportionality?

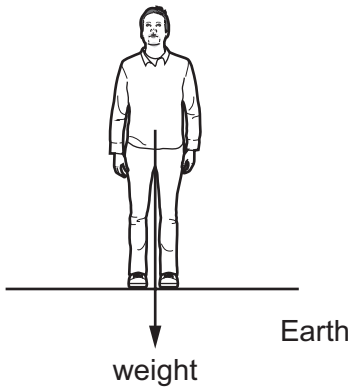
A 0 N and 2 N

B 8 N and 10 N

C 10 N and 12 N

D 14 N and 16 N

9 A man stands at rest on the surface of the Earth.



The weight of the man is the gravitational force that acts on him.

According to Newton's third law, the weight of the man is one force in a pair of forces.

Which force is the other force in the pair?

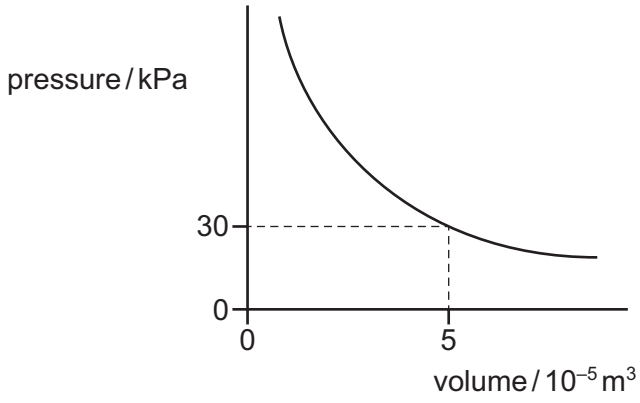
A a force downwards on the Earth

B a force downwards on the man

C a force upwards on the Earth

D a force upwards on the man

10 The pressure and volume of a sample of gas at constant temperature are measured and plotted on a graph.

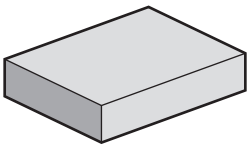


The pressure is decreased to 12.5 kPa.

What is the new volume of this sample of gas?

A $1.2 \times 10^{-4}\,m^3$ **B** $4.8 \times 10^{-4}\,m^3$ **C** $1.2 \times 10^{-2}\,m^3$ **D** $4.8 \times 10^{4}\,m^3$

11 The diagram shows a solid metal block.



Which equation is used to calculate the density of the metal from which the block is made?

A density = mass × volume

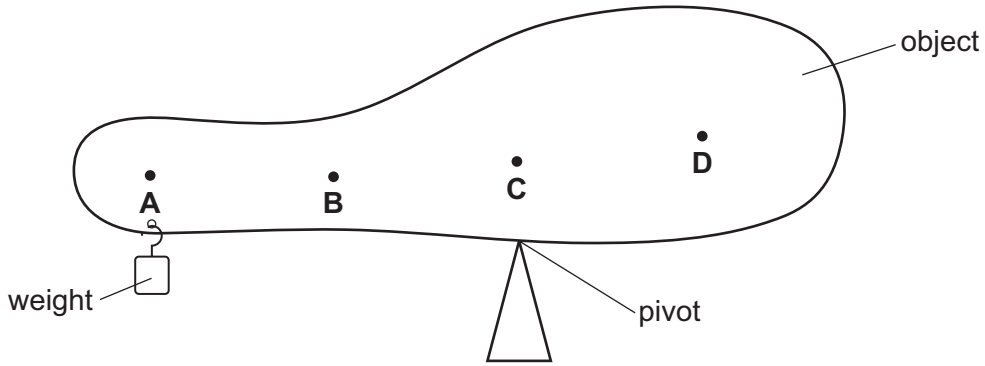
B $\text{density} = \dfrac{\text{mass}}{\text{volume}}$

C $\text{density} = \dfrac{\text{weight}}{\text{area}}$

D $\text{density} = \dfrac{\text{weight}}{\text{volume}}$

12 A student balances a non-uniform object on a pivot. To do this, a weight is suspended near the left-hand end of the object, as shown.

Where is the centre of gravity of the object?



13 Seven energy sources are listed.

fossil fuel **hydroelectric** **solar** **nuclear** **geothermal** **wind** **tides**

How many of these energy sources are renewable energy sources?

A 3 **B** 4 **C** 5 **D** 6

14 A student heats a substance in which the particles are in fixed positions and vibrate.

After a short period of heating, the particles start to flow past each other, but the forces between the particles remain strong.

What has happened to the substance?

A It has condensed.

B It has evaporated.

C It has frozen.

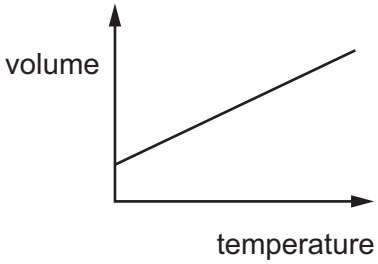
D It has melted.

15 A student investigates how changing the temperature of a gas affects the volume of the gas.

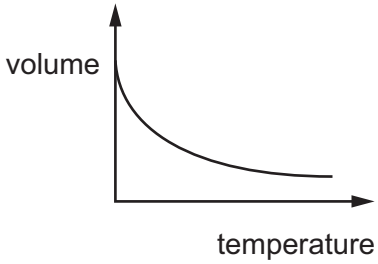
The gas is kept at a constant pressure.

Which graph shows the relationship between the temperature and the volume of a sample of gas at constant pressure?

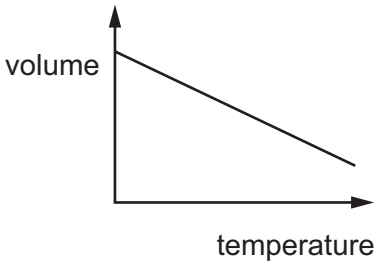
A



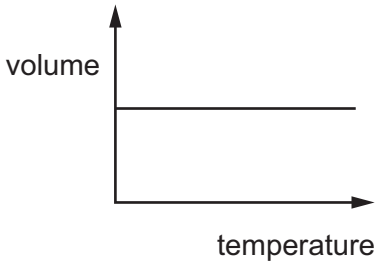
B



C



D



16 A sample of a solid melts and becomes a liquid.

Which statement about the sample during the process of melting is correct?

A Its temperature changes from a negative to a positive value.

B Its temperature is constant.

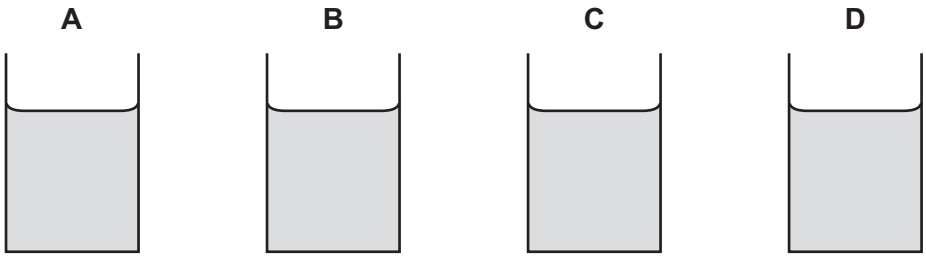
C The forces between its particles become stronger.

D The kinetic energy of its particles increases.

17 Four metal cans are identical except for the colour and the texture of their outer surfaces.

100 cm^3 of water at 70 °C is poured into each can.

Which can cools the most rapidly?



	A	B	C	D
description of outer surface:	black, rough	black, shiny	white, rough	white, shiny

18 The sentences describe sound waves. Three words have been omitted.

Sound waves are longitudinal waves that consist of regions of higher pressure called .....1..... and regions of lower pressure called .....2..... .

An echo occurs when a sound wave is .....3..... .

Which words complete gaps 1, 2 and 3?

	1	2	3
A	compressions	rarefactions	reflected
B	compressions	rarefactions	refracted
C	rarefactions	compressions	refracted
D	rarefactions	compressions	reflected

19 A ray of light strikes a plane mirror at an angle of incidence of 20°.

The angle of incidence is then increased by 5°.

What is the new angle between the incident ray and the reflected ray?

A 10° **B** 25° **C** 45° **D** 50°

20 The following lists show colours of the spectrum.

Which list shows these colours in order of increasing frequency?

A blue → violet → red → orange → yellow → green

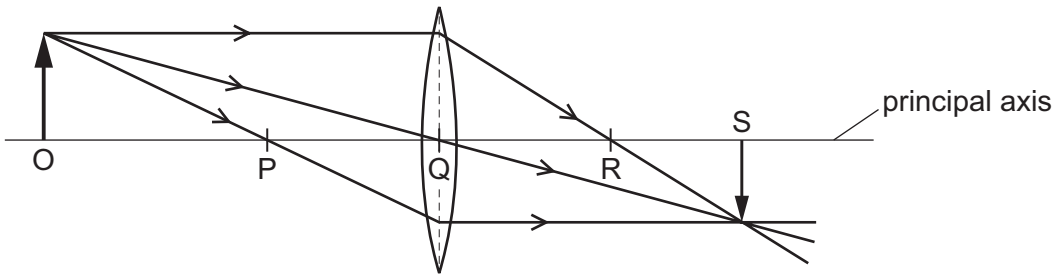
B green → blue → violet → red → orange → yellow

C red → orange → violet → yellow → green → blue

D red → orange → yellow → green → blue → violet

21 An object O is placed near to a thin converging lens.

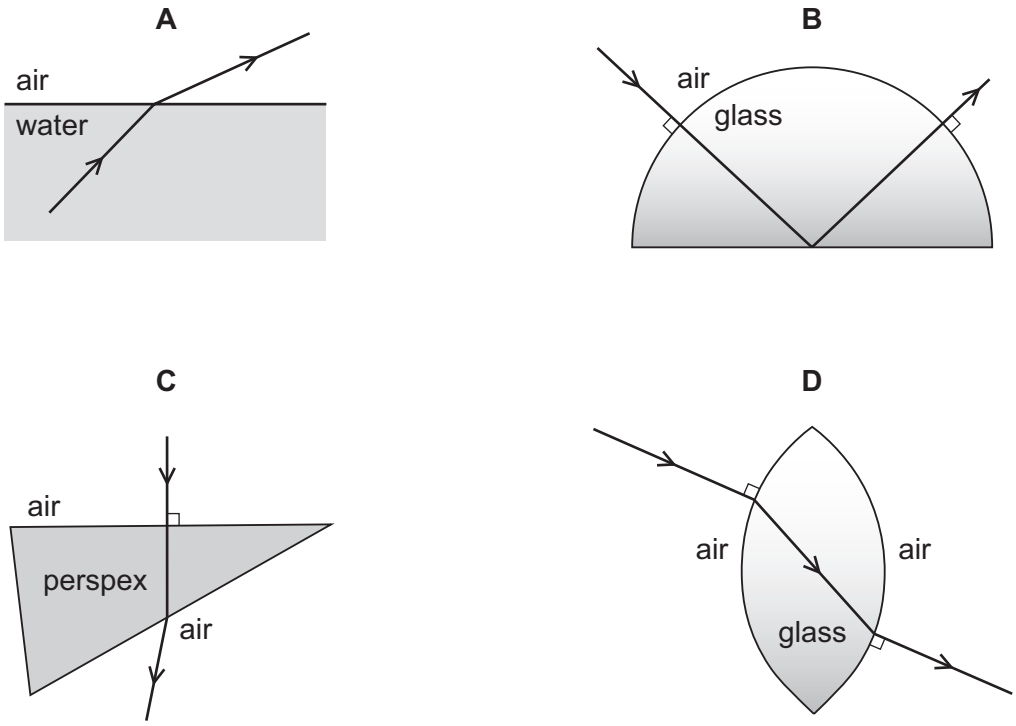
The diagram shows three rays of light from the object passing through the lens.



Which row describes the image formed and gives the position of a principal focus (focal point) of the lens?

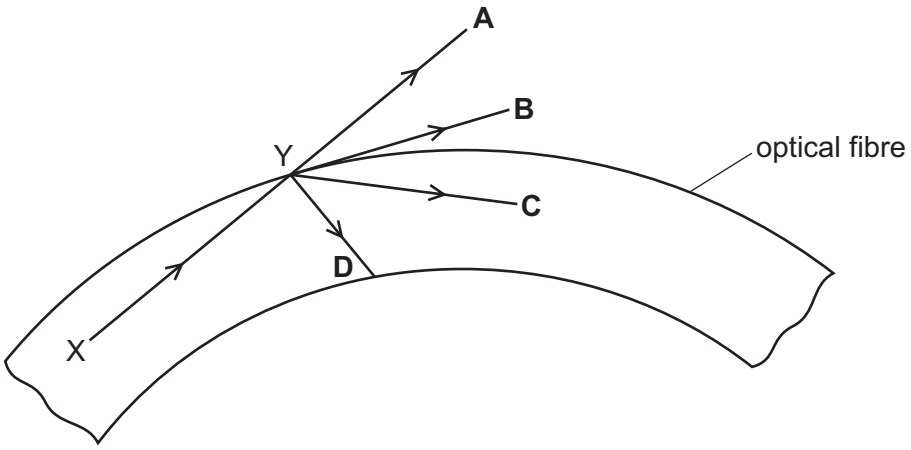
	image formed	position of principal focus
A	real	R
B	real	Q
C	virtual	P
D	virtual	S

22 In which diagram is the path of the light ray **not** correct?



23 A ray of light travels from X to Y along an optical fibre. The angle of incidence at Y is greater than the critical angle.

In which direction does the ray of light travel after reaching point Y?



24 A firework is launched vertically from the ground.

When the firework reaches a height of 360 m, the firework explodes, producing coloured light.

A student on the ground below the firework incorrectly measures the time between seeing the coloured light and hearing the explosion. The student obtains a value of 1.8 s.

What is the speed of sound that the student's value suggests?

A 200 m / s **B** 360 m / s **C** 400 m / s **D** 650 m / s

25 A loudspeaker produces a sound wave of frequency 50 Hz.

The amplitude of the sound wave is increased.

What is heard?

A a louder sound of a higher pitch

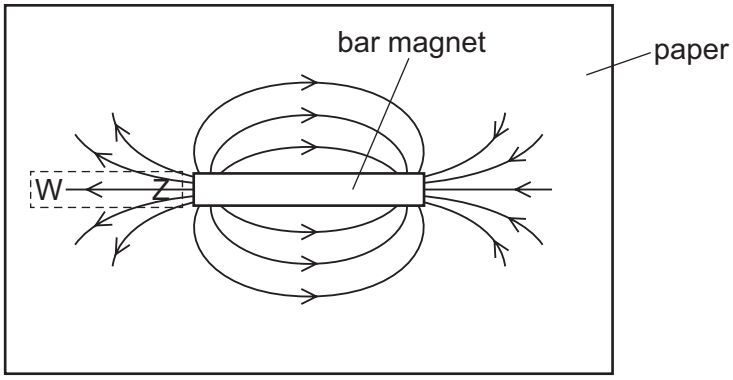
B a louder sound of the same pitch

C a sound of higher pitch but the same loudness

D a sound of the same pitch and same loudness

26 A bar magnet is placed on a sheet of paper.

The diagram shows the field lines due to the magnet.



A soft-iron bar is placed on the paper on the rectangle marked WZ. The soft-iron bar becomes an induced magnet.

What are the magnetic poles at the ends of the soft-iron bar?

	pole at W	pole at Z
A	N	N
B	N	S
C	S	N
D	S	S

27 Which material is an electrical conductor at room temperature?

A aluminium

B glass

C plastic

D rubber

28 A student investigates electrostatic charge using a balloon and a cloth. The balloon and cloth are initially uncharged.

The student rubs the balloon with the cloth. The balloon gains a negative charge of magnitude *Q*.

The cloth becomes charged and a force acts between the balloon and the cloth.

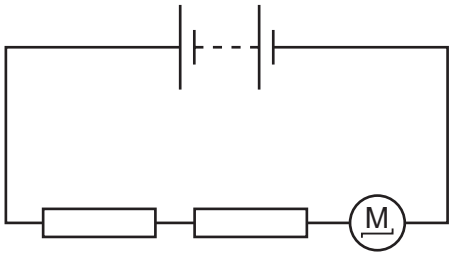
Which row correctly describes the magnitude and sign of the charge on the cloth and the type of force between the balloon and the cloth?

	magnitude of charge on cloth	sign of charge on cloth	type of force
A	equal to *Q*	positive	attraction
B	equal to *Q*	negative	repulsion
C	greater than *Q*	positive	repulsion
D	greater than *Q*	negative	attraction

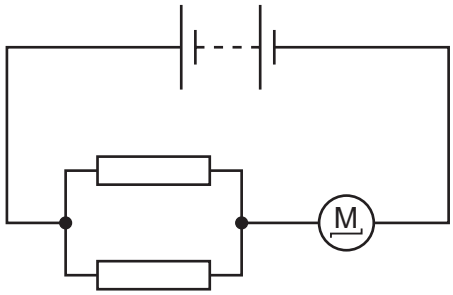
29 A student connects four circuits using two identical cells, two identical resistors and a motor.

In which circuit does the coil of the motor rotate the fastest?

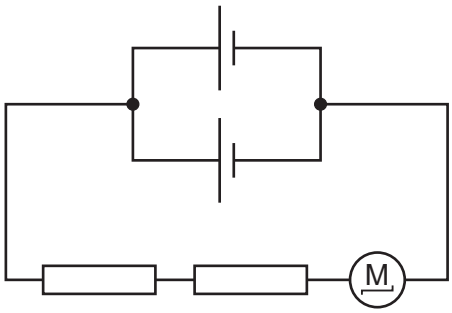
A



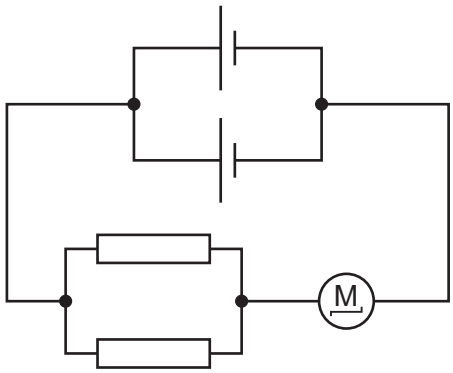
B



C

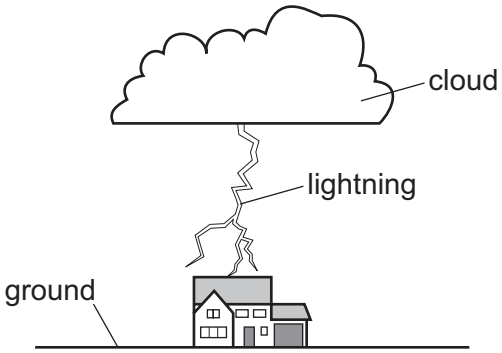


D



30 The diagram shows a lightning strike.

Charge flows between the cloud and objects on the ground.



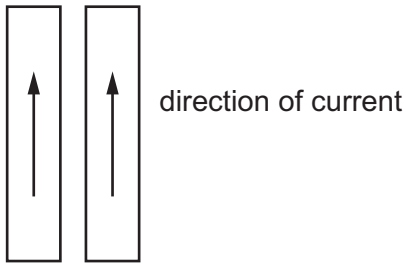
not to scale

During the lightning strike, there is a current of 2.8×10^4 A between the cloud and the house for 52 ms.

How much charge flows during the lightning strike?

A 1500 C **B** 15 000 C **C** 24 000 C **D** 54 000 C

31 Two current-carrying conductors are placed next to each other. The current in the conductors is in the same direction.



current-carrying conductors

Which statement about the forces experienced by the conductors is correct?

A The forces are in the same direction, and the conductors are forced apart.

B The forces are in opposite directions, and the conductors are forced apart.

C The forces are in the same direction, and the conductors are forced towards each other.

D The forces are in opposite directions, and the conductors are forced towards each other.

32 Which component is **not** needed to make a simple d.c. motor work?

A battery

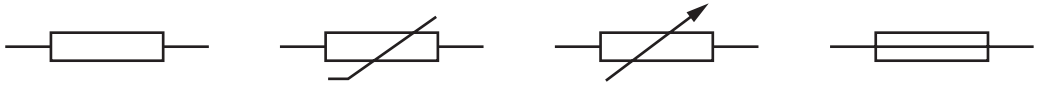
B brushes

C diode

D split-ring commutator

33 Which component is used in an electric circuit to detect changes in temperature?

A **B** **C** **D**



34 A kettle of power 2.0 kW is powered by the 230 V mains supply.

What is the appropriate rating for the fuse in the circuit?

A 1 A **B** 5 A **C** 13 A **D** 20 A

35 A student uses a simple iron-cored transformer. The primary coil has 250 turns. The secondary coil has 200 turns.

The input voltage to the primary coil is 12 V.

What is the output voltage?

A 0.069 V **B** 0.11 V **C** 9.6 V **D** 15 V

36 Four statements about an atom are listed.

1 The atom has a nucleus surrounded by positively charged electrons.

2 Most of the atom is empty space.

3 The nucleus is positively charged.

4 The nucleus is very large compared with the rest of the atom.

Which statements are correct?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

37 A smoke alarm contains a radioactive source, S. The useful emissions from S are blocked by a few centimetres of air.

What is the useful radioactive radiation emitted by S?

A alpha and gamma

B alpha only

C beta and gamma

D beta only

38 The planets in the Solar System orbit the Sun.

Which statement is correct?

A There is a force on each planet away from the Sun.

B There is a force on each planet in the direction in which it travels.

C There is a force on each planet opposite to the direction in which it travels.

D There is a force on each planet towards the Sun.

39 A star is a distance of 4.2 light-years from the Earth.

What is 4.2 light-years in metres?

A 1.1×10^{13} m **B** 6.6×10^{14} m **C** 9.5×10^{15} m **D** 4.0×10^{16} m

40 What is a protostar?

A a cloud of gas that is collapsing and decreasing in temperature

B a cloud of gas that is collapsing and increasing in temperature

C a star that is expanding and decreasing in temperature

D a star that is expanding and increasing in temperature