1 Which is a vector quantity?

A a mass of 2.0 kg

B a temperature of -10 °C

C a weight of 15 N

D an average speed of 20 m/s

2 What must change when a body is accelerating?

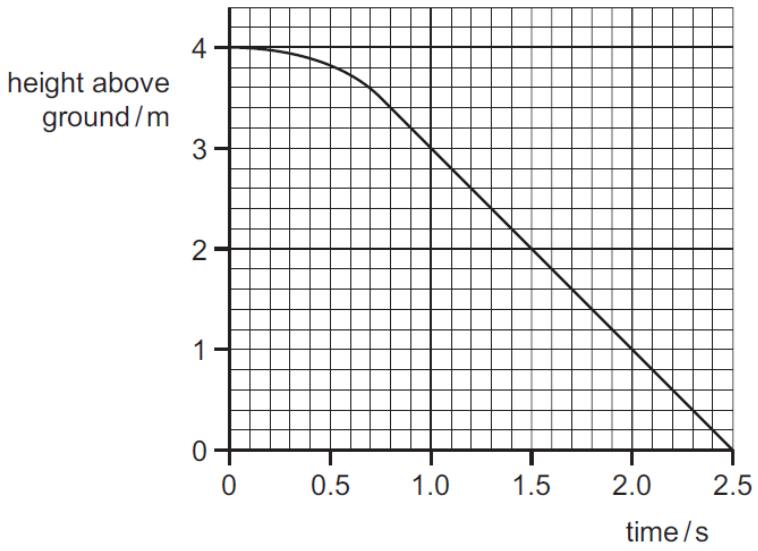
A the force acting on the body

B the mass of the body

C the speed of the body

D the velocity of the body

3 The graph shows how the height of an object above the ground changes with time.



What is the terminal velocity of the object?

A 1.0 m/s

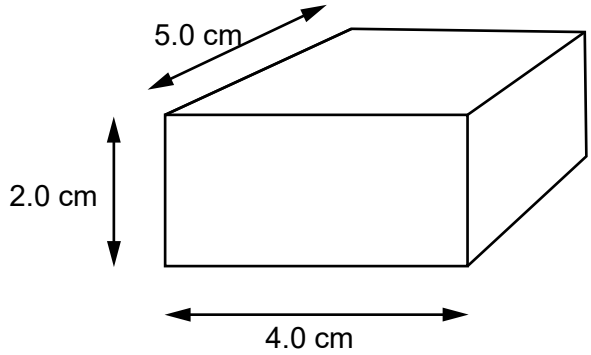
B 1.3 m/s

C 1.6 m/s

D 2.0 m/s

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4 The diagram shows a material with dimensions 5.0 cm × 4.0 cm × 2.0 cm. It has a mass of 100 g.



What is the density of the material?

A 0.40 g/cm^3

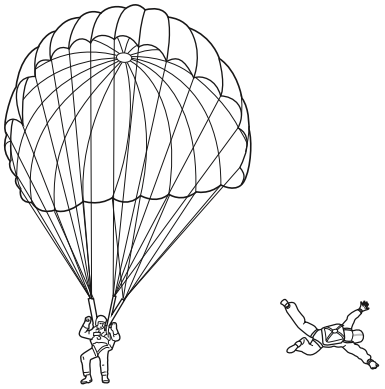
B 2.5 g/cm^3

C 5.0 g/cm^3

D 10 g/cm^3

5 Two men simultaneously jump out of an airplane at the same time.

One of the men is in free-fall and the other man opens his parachute.



Why is the man in free-fall moving faster than the parachutist?

A The man in free-fall experiences greater air resistance.

B The man in free-fall has a greater mass.

C The parachutist experiences greater air resistance.

D The parachutist has not reached terminal velocity.

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6 A body resists changes to its motion.

Which property of a body is responsible for this?

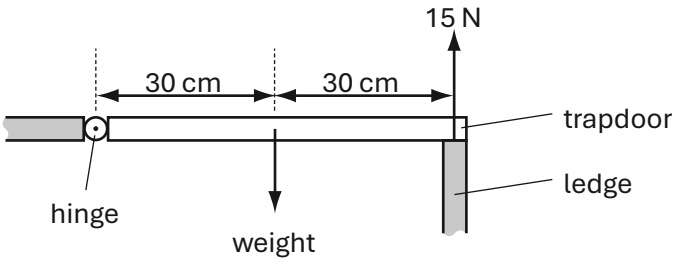
A density

B gravitational potential energy

C inertia

D kinetic energy

7 A trapdoor is hinged along one side and, when closed, is supported on the other side by a ledge.



When the trapdoor is closed, the ledge exerts an upward force of 15 N on the trapdoor. The gravitational field strength is 10 N/kg.

What is the mass of the trapdoor?

A 1.5 kg

B 3.0 kg

C 30 kg

D 150 kg

8 What affects the stability of an object?

A its base area and location of its centre of gravity

B its weight and its base area

C only the location of its centre of gravity

D only its weight

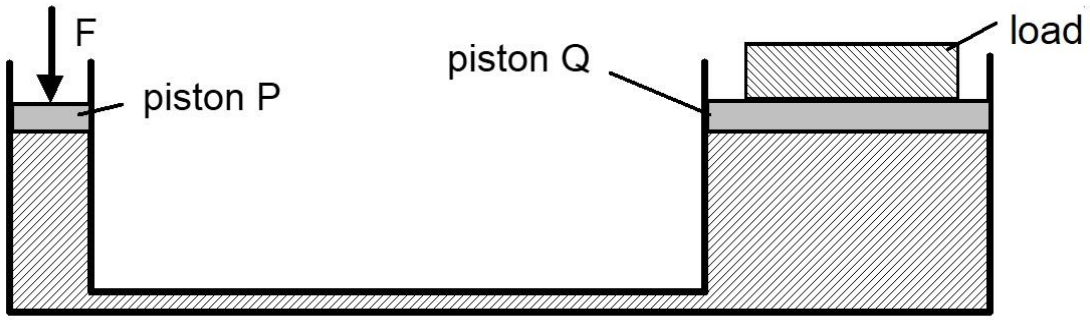
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9 Objects of different weights are placed on a rigid, horizontal surface.

Which row shows the correct pressure acting on the surface?

	weight / N	area in contact / m^2	pressure / Pa
A	10	0.1	1
B	20	0.2	0.01
C	30	0.1	300
D	40	0.2	8

10 The diagram shows a hydraulic pump.



Which of the following is correct?

A The force *F* is the same as the weight of the load.

B The force *F* is greater than the weight of the load.

C The pressure on piston P is the same as the pressure on piston Q.

D The pressure on piston P is smaller than the pressure on piston Q.

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11 Two beakers X and Y are filled to the same level with water. The area of the base of X is less than that of Y.



X Y

Which statement is correct?

A The force due to the liquid on the base of X is greater than the force on the base of Y.

B The force due to the liquid on the base of X is the same as the force on the base of Y.

C The pressure on the base of X is less than the pressure on the base of Y.

D The pressure on the base of X is the same as the pressure on the base of Y.

12 A small rock is dropped vertically from a height of 1.0 m. The gravitational field strength is 10 N/kg.

If air resistance is negligible and there is no transfer of thermal energy to the surrounding air molecules, what is the speed of the rock just before it hits the ground?

A 4.5 m/s

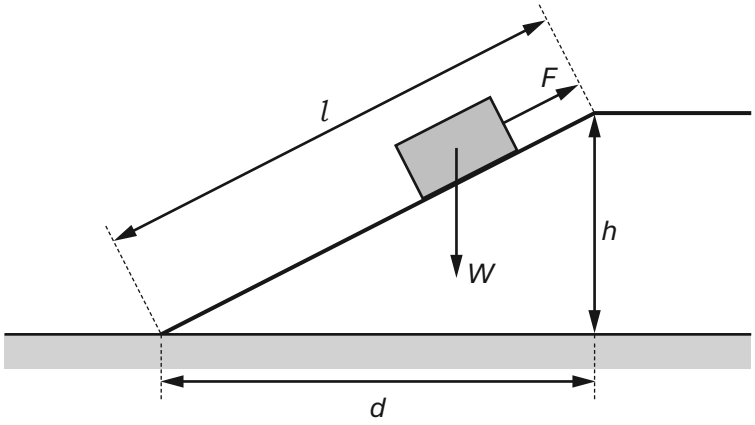
B 5.3 m/s

C 6.0 m/s

D It cannot be determined.

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13 A constant force *F* pulls a block up a slope shown.



How much work is done in pulling the block up the slope?

A *F* x *h*

B *F* x *l*

C *W* x *d*

D *W* x *l*

14 One end of a copper rod is heated.

Which statement describes how transfer of thermal energy happens in the copper?

A Energetic copper atoms move from the cooler end to the hotter end.

B Energetic copper atoms move from the hotter end to the cooler end.

C Energetic free electrons move from the cooler end to the hotter end.

D Energetic free electrons move from the hotter end to the cooler end.

15 What is the colour and the texture of a good absorber of infrared radiation?

A black and shiny

B black and dull

C white and shiny

D white and dull

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16 A dish of liquid is left on a laboratory bench. Some of the liquid evaporates.

What happens to the remaining liquid and why?

A The liquid cools because the liquid molecules have more potential energy than gas molecules.

B The liquid cools because the faster-moving molecules escape.

C The liquid warms because liquid molecules have less potential energy than gas molecules.

D The liquid warms because slower-moving molecules are left behind.

17 Equal masses of copper and water are heated to the same temperature. As they cool down, the copper and the water lose thermal energy at the same rate.

The temperature of the copper falls faster.

Why is this?

A Copper has a larger specific heat capacity.

B Copper has a larger specific latent heat.

C Copper has a smaller specific heat capacity.

D Copper has a smaller specific latent heat.

18 The temperature of a gas is increased.

Which property of the gas **must** also increase?

A volume

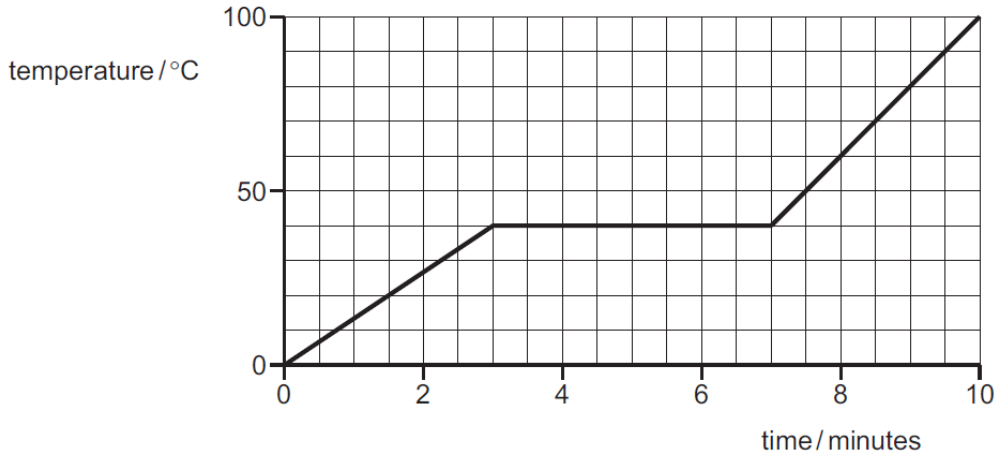
B pressure

C density

D internal energy

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19 The graph is the temperature-time graph for a sample of wax that is heated so that it melts.



The mass of the wax is 0.20 kg.

Thermal energy is supplied to the wax at a constant rate of 12 kJ/min.

What is the specific latent heat of fusion of the wax?

A 180 J/g

B 240 J/g

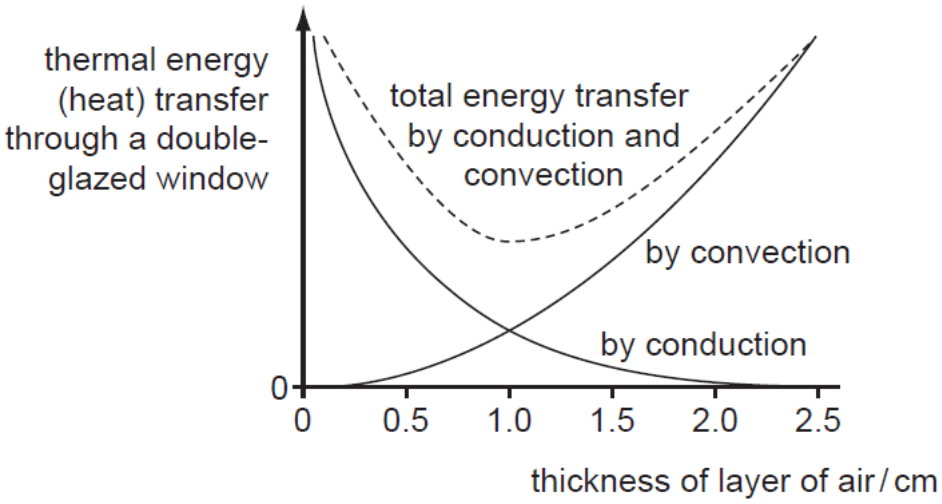
C 480 J/g

D 600 J/g

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20 A double-glazed window has two panes of glass with a layer of air in between them.

Thermal energy is transferred by conduction and convection through the layer of air. The amount of conduction and convection varies with the thickness of the layer of the air, as shown in the graph.



Which thickness of layer of air results in the least transfer of thermal energy, and why?

A 0.45 cm because there is not much convection.

B 1.0 cm because the total thermal energy transfer is least.

C 1.5 cm because the total thermal energy transfer is small and conduction is low.

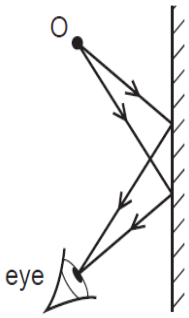
D 2.0 cm because there is little conduction.

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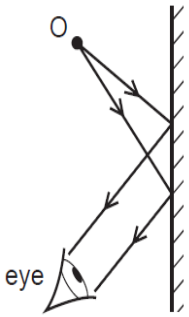
21 An eye views an object O by reflection in a plane mirror.

Which is the correct ray diagram?

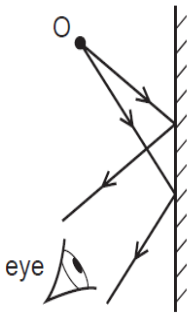
A



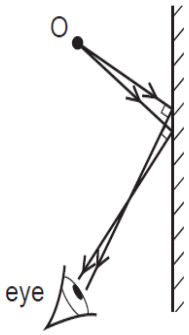
B



C



D



22 What is the refractive index of a medium?

A The ratio of the speed of light in air to speed of light in the medium.

B The ratio of the speed of light in the medium to speed of light in air.

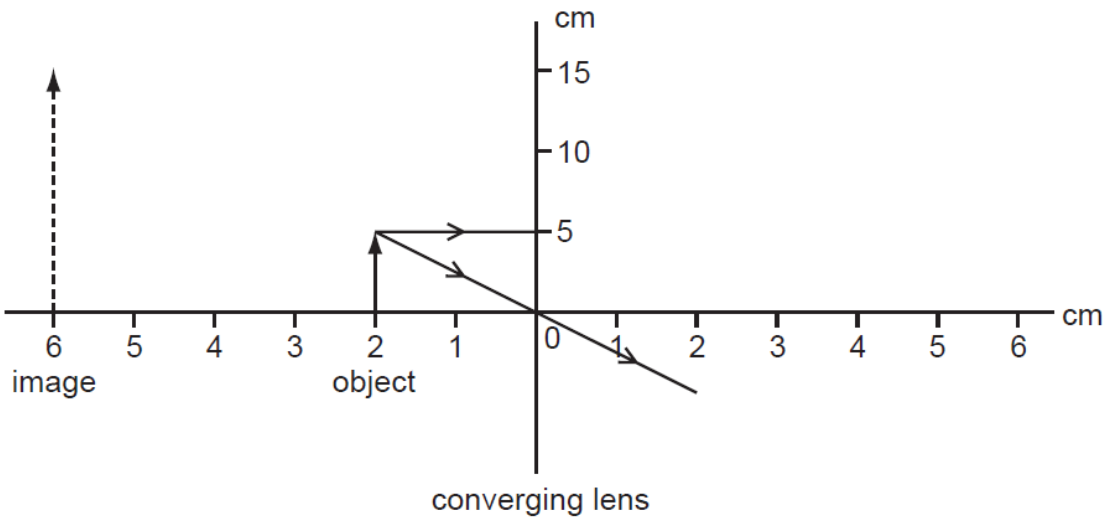
C The ratio of the speed of light in vacuum to speed of light in the medium.

D The ratio of the speed of light in the medium to speed of light in vacuum.

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23 An object 5.0 cm high is placed 2.0 cm from a converging (convex) lens which is being used as a magnifying glass.

The image produced is 6.0 cm from the lens and is 15 cm high.



What is the focal length of the lens?

A 2.0 cm

B 3.0 cm

C 4.0 cm

D 6.0 cm

24 Which shows correct applications for X-rays, ultraviolet light and microwaves?

	X-rays	ultraviolet light	microwaves
A	mobile phone	fluorescent tube	intruder alarm
B	killing cancerous cells	sunbed	satellite television
C	medical imaging	television controller	sunbed
D	sterilising surgical instruments	television controller	detecting cracks in metal

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25 An earthquake wave travels through the solid surface of the Earth from east to west. The solid surface vibrates in a north-south direction.

How can the earthquake wave be described?

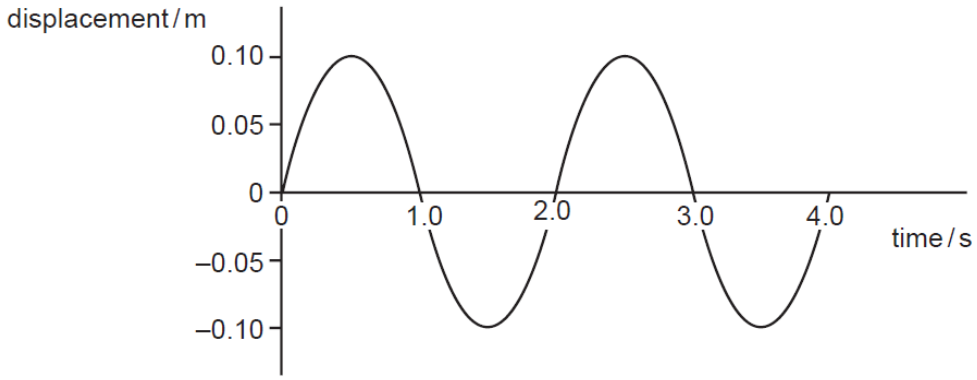
A electromagnetic

B longitudinal

C sound

D transverse

26 The diagram shows how displacement varies with time as a wave passes a fixed point.



What is the frequency of this wave?

A 0.25 Hz

B 0.50 Hz

C 1.0 Hz

D 2.0 Hz

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27 Two sound waves X and Y are compared.

X has the greater frequency.

Y has the greater amplitude.

How do the loudness and pitch of sound wave Y compare to those of X?

A Y is louder and higher pitch.

B Y is louder and lower pitch.

C Y is quieter and higher pitch.

D Y is quieter and lower pitch.

28 A pupil charged a metal ball by induction using a strip of polythene. She uses the following steps but not in the following order.

1 the metal ball is earthed momentarily
2 the polythene strip is brought up to the ball
3 the polythene strip is removed
4 the polythene strip is rubbed with a woolen cloth

To charge the ball correctly, in which order should she carry out the steps?

A 2 → 3 → 4 → 1

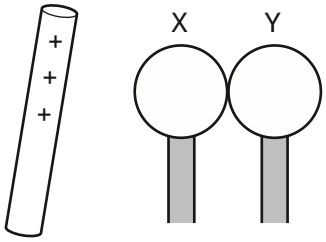
B 2 → 4 → 3 → 1

C 4 → 1 → 2 → 3

D 4 → 2 → 1 → 3

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29 Two insulated and uncharged metal spheres X and Y are touching.
A positively charged rod is held near X and then the spheres are moved apart. X now has a negative charge.



What is the charge on Y?

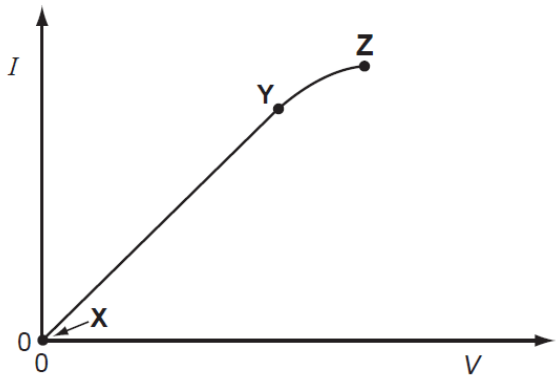
A negative and smaller than that on X

B negative and the same size as that on X

C positive and smaller than that on X

D positive and the same size as that on X

30 A graph of current I against voltage V is plotted for a length of resistance wire.



Which part of the graph is Ohm's law not applicable?

A at Y only

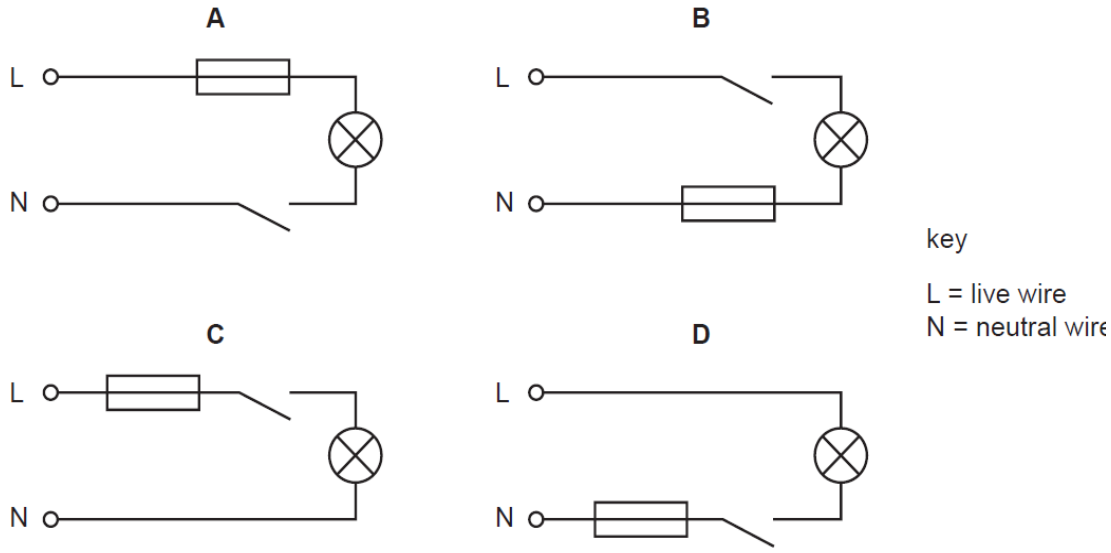
B at Z only

C from Y to Z

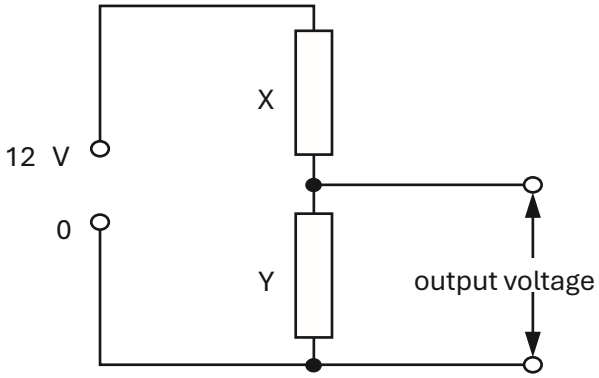
D from X to Y

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31 Which circuit shows the correct positions for the fuse and the switch in the lighting circuit of a house?



32 A potential divider uses a power supply of voltage 12 V.
The resistors X and Y initially have equal resistances.



The resistance of Y is doubled.

What is the change in the output voltage?

A -4.0 V

B -2.0 V

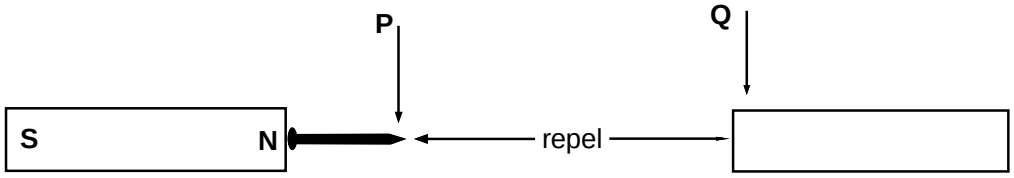
C +2.0 V

D +8.0 V

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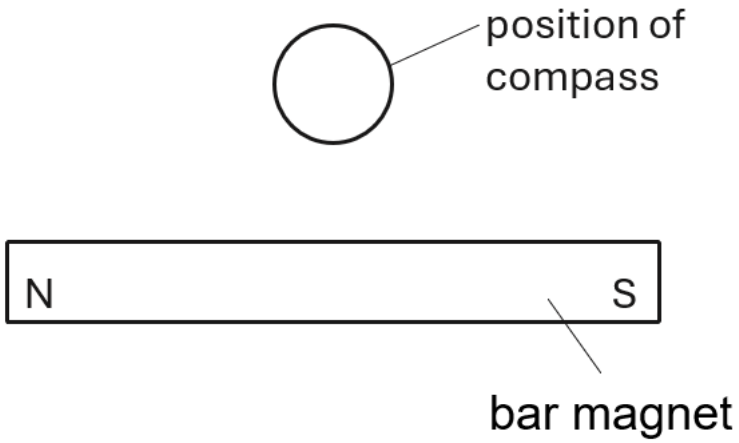
33 A student sets up the experiment below. P and Q repel each other.

Which of the following correctly gives the poles at P and Q?



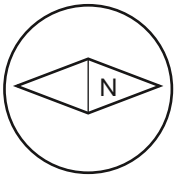
	P	Q
A	north	south
B	north	north
C	south	north
D	south	south

34 A small plotting compass is placed near to a bar magnet as shown.

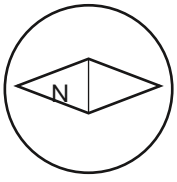


Which diagram shows the direction in which the compass needle points?

A



B



C



D



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35 The diagram shows a beam of electrons entering a magnetic field.



What will be the initial direction of the deflection of the electrons as the beam passes through the field?

A into the page

B out of the page

C towards the bottom of the page

D towards the top of the page

36 What does not alter the size of the turning effect on the coil of an electric motor?

A the direction of the current in the coil

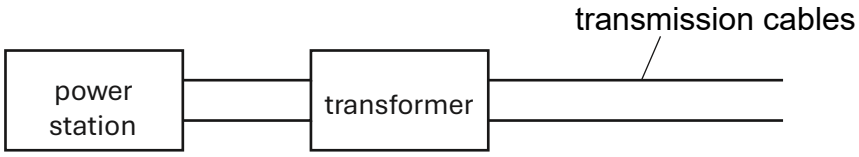
B the number of turns in the coil

C the size of the current in the coil

D the strength of the magnetic field

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37 Transformers are used to transmit electrical energy between power stations and transmission cables, as shown.



What is the purpose of the transformer in the diagram?

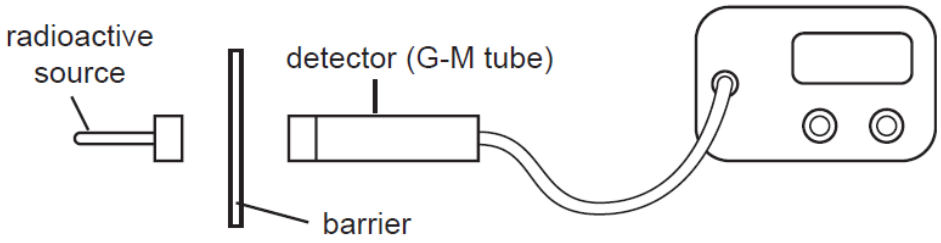
A to decrease the current and potential difference from the power station

B to decrease the current and increase the potential difference from the power station

C to increase the current and the potential difference from the power station

D to increase the current and decrease the potential difference from the power station

38 The diagram shows the apparatus used in an experiment in which barriers of various materials are placed in turn between different radioactive sources and a detector.



The table shows the count rates recorded by the detector for four sources.

Which source emits alpha-particles only?

source	count rate / counts per minute			
	no barrier	paper	thin aluminium	thick lead
A	250	250	250	35
B	250	35	35	35
C	1200	600	250	35
D	1200	1200	35	35

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39 An isotope P is radioactive and has a half-life of 7.0 years.
A sample initially contains 0.016 kg of P.

After how long will the sample contain 0.0020 kg of P?

A 7.0 years

B 14 years

C 21 years

D 28 years

40 Which row shows the atomic structure of a neutral atom with a nucleon number of 9?

	number of neutrons	number of protons	number of electrons
A	4	5	4
B	4	5	5
C	5	4	5
D	5	5	4

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