Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **October/November 2019**

1 hour

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

1914870192

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.

This document consists of **19** printed pages and **1** blank page.

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1 Which word is the name of a scalar quantity?

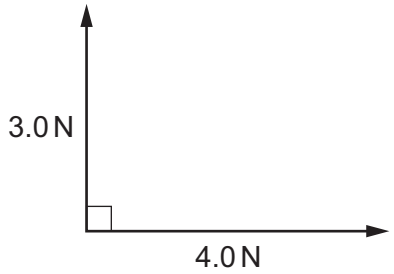
A acceleration

B force

C mass

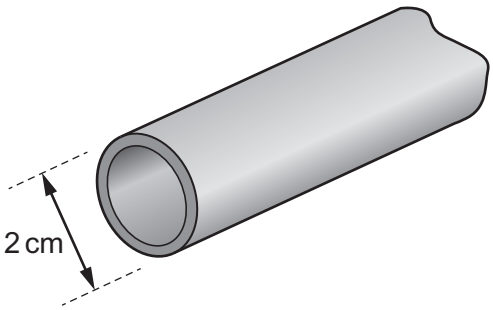
D velocity

2 What is the size of the resultant of the two forces shown in the diagram?



A 1.0 N **B** 3.5 N **C** 5.0 N **D** 7.0 N

3 A length of copper pipe, of uniform cross-section and several metres long, carries water to a tap.



Measurements are taken to determine accurately the volume of copper in the pipe.

Which instruments are used?

A micrometer and rule

B micrometer and calipers

C rule and tape

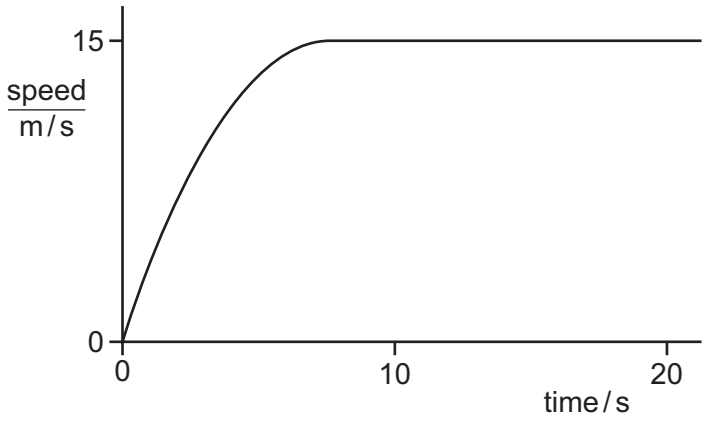
D tape and calipers

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4 What is the correct unit for the quantity shown?

	quantity	unit
A	electromotive force (e.m.f.)	N
B	latent heat	J
C	pressure	kg/m^3
D	weight	kg

5 The graph shows how the speed of a car varies with time.



Which statement about the acceleration of the car between the times 10 s and 20 s is correct?

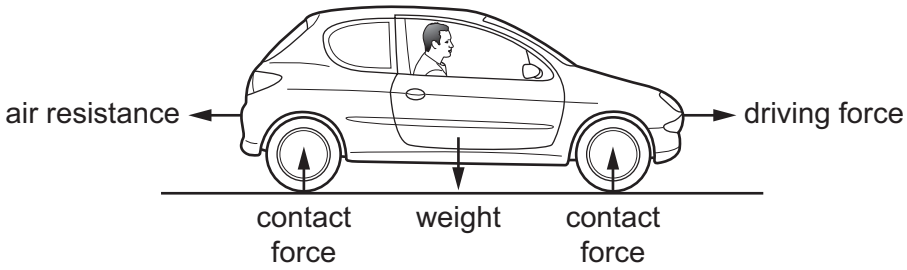
A The acceleration decreases.

B The acceleration increases.

C The acceleration is constant, but not zero.

D The acceleration is zero.

6 A car is accelerating along a straight, horizontal road. The diagram shows forces acting on the car.



Which forces are balanced?

A contact forces and air resistance

B contact forces and weight

C driving force and air resistance

D driving force and weight

7 A single force is applied to a body.

What **cannot** happen?

A a change in the direction of the moving body

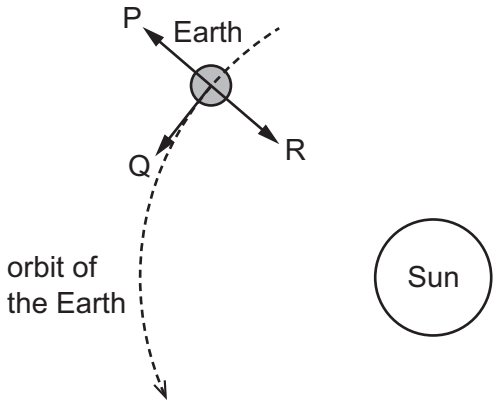
B a change in the mass of the body initially at rest

C a change in the position of the body initially at rest

D a change in the speed of the moving body

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8 The Earth travels at constant speed in a circular orbit around the Sun.



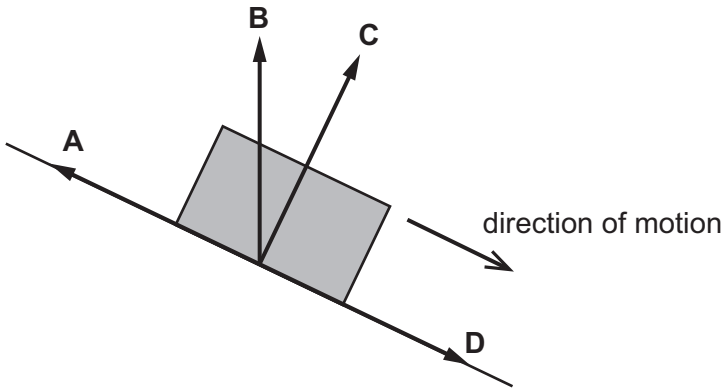
Which arrows show the direction of the acceleration of the Earth and the direction of the velocity of the Earth?

	direction of acceleration	direction of velocity
A	P	Q
B	Q	P
C	Q	R
D	R	Q

9 A body slides down a frictionless slope, as shown.

As the body presses on the surface, the surface pushes back on the body.

In which direction does the surface push back on the body?



10 There is no atmosphere on the Moon.

Two metal spheres of identical volume but different mass are at rest at the same height above the ground on the Moon. They are dropped at the same time.

How do the spheres move after release?

A The sphere with the larger mass has a smaller acceleration.

B The sphere with the larger mass hits the ground first.

C The sphere with the smaller mass has a smaller acceleration.

D The two spheres hit the ground together.

11 What is an expression for the moment of a force about a pivot?

A distance the force moves from the pivot ÷ force

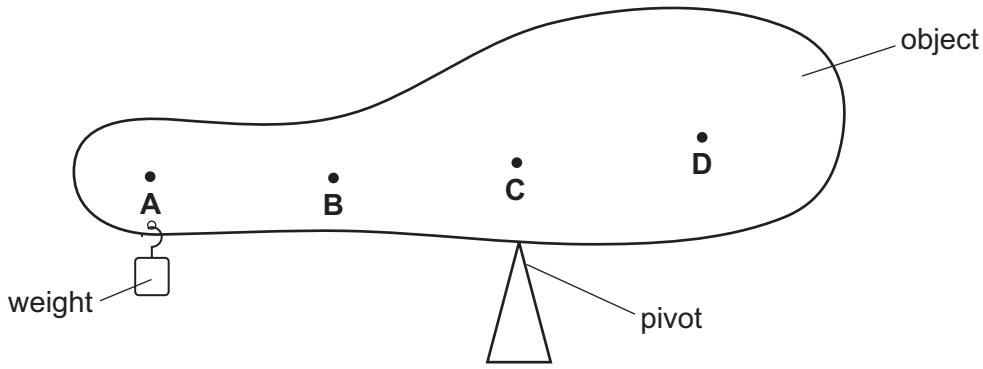
B force × distance the force moves from the pivot

C force × perpendicular distance of the force from the pivot

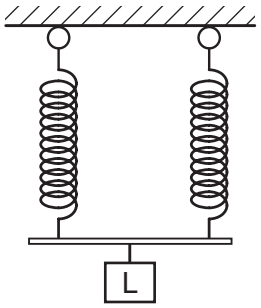
D force ÷ perpendicular distance of the force from the pivot

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.

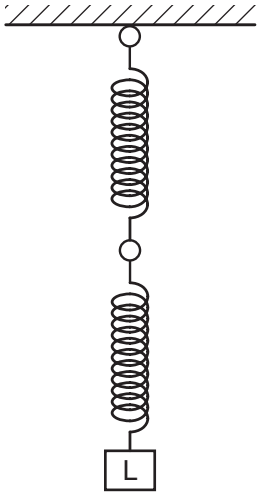
Where is the centre of mass of the object?



13 A load L is suspended from two springs that are in parallel. The extension of each spring is x.



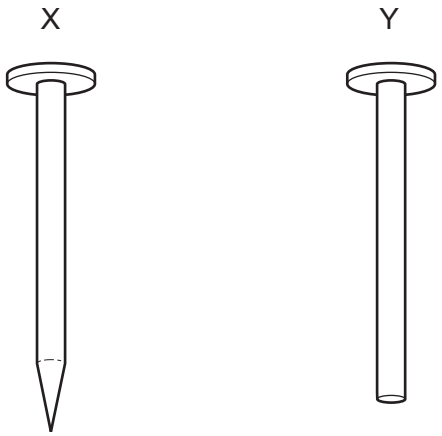
The springs are then arranged to hang vertically, one below the other.



In this new arrangement, what is the total extension of the two springs?

A $\frac{1}{2}x$ **B** x **C** $2x$ **D** $4x$

14 Nail X is tapped into wood. Nail Y is tapped into the same wood using the same force.



Which nail moves furthest into the wood and why?

	nail	why
A	X	X produces greater pressure on the wood
B	X	X produces smaller pressure on the wood
C	Y	Y produces greater pressure on the wood
D	Y	Y produces smaller pressure on the wood

15 The list gives the symbols for some physical quantities.

acceleration of free-fall g

atmospheric pressure P

density of water ρ

depth of water h

Which quantities from the list are used to calculate the total pressure at the bottom of a lake?

A g, h, P and ρ

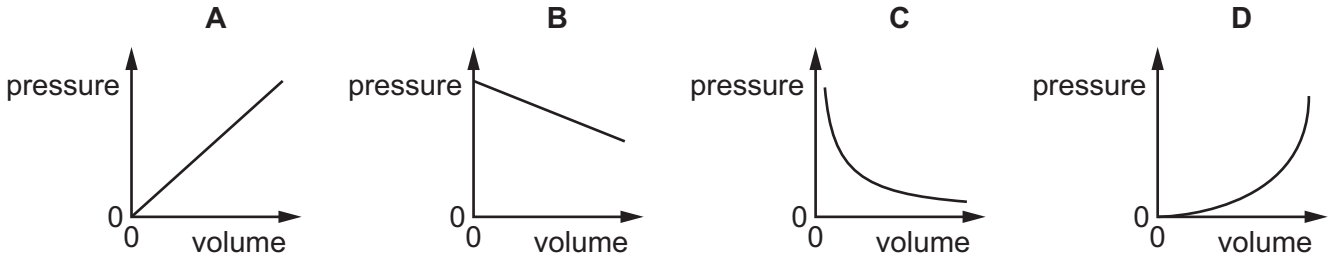
B g, h and P only

C h, P and ρ only

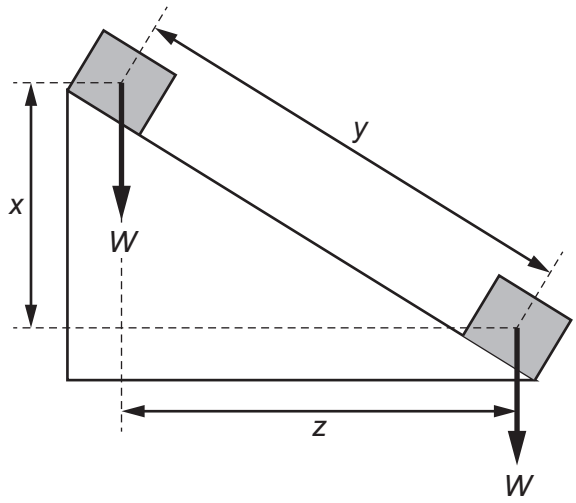
D g, h and ρ only

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



17 A heavy box of weight W slides down a frictionless slope.



What is the work done by the weight W in moving from top to bottom?

A Wx **B** Wy **C** $W(y - z)$ **D** $W(x + z)$

18 Where is energy released by the fusion of hydrogen nuclei to form helium?

A in a nuclear power station

B in a radioactive isotope emitting alpha-particles

C in the core of the Earth

D in the core of the Sun

19 Which change, on its own, increases the range of a liquid-in-glass thermometer?

A decrease the length of the capillary

B decrease the thickness of glass around the bulb

C increase the diameter of the capillary

D increase the volume of liquid in the bulb

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20 A student is given a thermometer that reads 1 °C in pure melting ice and 101 °C in pure boiling water. She uses it to measure the temperature of some water before and after it is heated.

How does the rise in temperature of the water calculated from her results compare with the correct value?

A It is 1 °C lower.

B It is the same.

C It is 1 °C higher.

D It is 2 °C higher.

21 What is the name of the change of state that occurs when a substance changes from a solid to a liquid?

A boiling

B condensation

C evaporation

D melting

22 A metal rod is heated.

What happens to the rod?

A Its density decreases and its mass decreases.

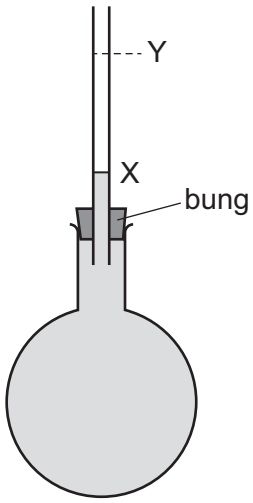
B Its density decreases and its volume increases.

C Its density increases and its mass decreases.

D Its density increases and its volume increases.

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23 The diagram shows a glass flask full of water at 10 °C. A long glass tube passes through the bung into the water. The water level in the tube is at X.



The flask is placed in hot water and the water level in the tube eventually rises to Y.

Why does the water level rise?

A The flask contracts and the water expands.

B The flask contracts more than the water contracts.

C The flask expands and the water contracts.

D The flask expands less than the water expands.

24 A glass beaker contains water in a warm room.

The water is initially at the same temperature as the room.

Which change does **not** affect the initial rate of evaporation of the water?

A changing the temperature of the water

B using a beaker made of thicker glass

C using a beaker with a larger cross-sectional area

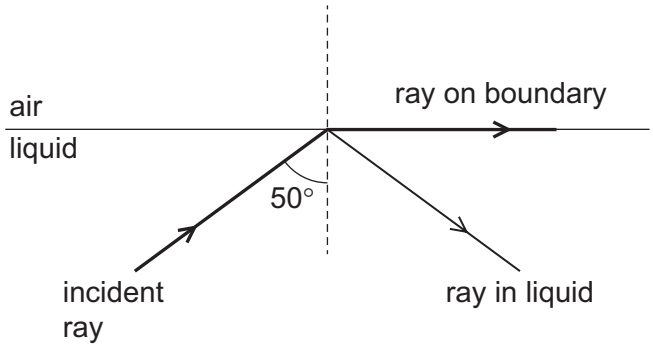
D using a fan to blow air over the beaker

25 The frequency of microwaves used in an experiment is 3.0×10^9 Hz. Their speed in air is 3.0×10^8 m/s.

What is a possible frequency and a possible speed in air of a radio wave?

	frequency / Hz	speed in air / m/s
A	3.0×10^5	1500
B	3.0×10^5	3.0×10^8
C	3.0×10^{14}	1500
D	3.0×10^{14}	3.0×10^8

26 The diagram shows a ray of light in liquid incident on the boundary with air. Two other rays are observed. One is in the liquid and the other is in the air on the boundary.

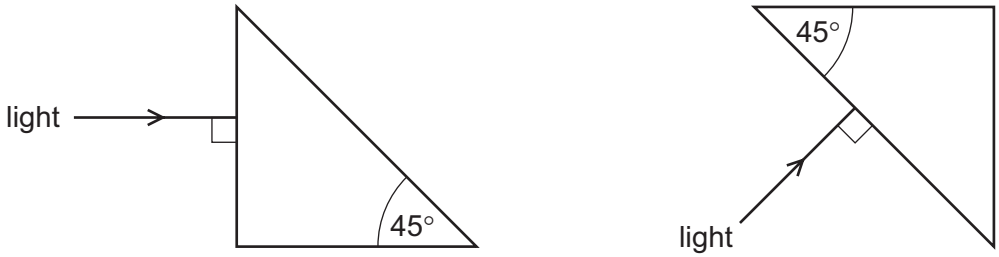


What is the angle of refraction?

A 0° **B** 40° **C** 50° **D** 90°

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27 Light is incident at 90° on the surfaces of two glass prisms P and Q.



glass prism P glass prism Q

The critical angle for light travelling from glass into air is 42°.

Where does total internal reflection occur?

A in P and in Q

B in P only

C in Q only

D in neither P nor Q

28 A person hears an echo after a sound hits a solid cliff face.

What causes the echo?

A absorption

B dispersion

C reflection

D refraction

29 What is a typical value for the speed of sound in air?

A $3.3 \times 10^4\,\text{cm/s}$

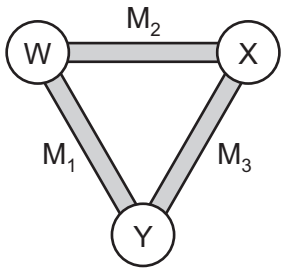
B $3.3 \times 10^4\,\text{m/s}$

C $3.3 \times 10^2\,\text{km/s}$

D $3.3 \times 10^8\,\text{m/s}$

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30 Magnets M_1, M_2 and M_3 are joined by iron balls W, X and Y as shown.



Magnetic poles are induced in the iron balls W and X as shown.



Which diagram shows the poles induced in ball Y?

A



B



C



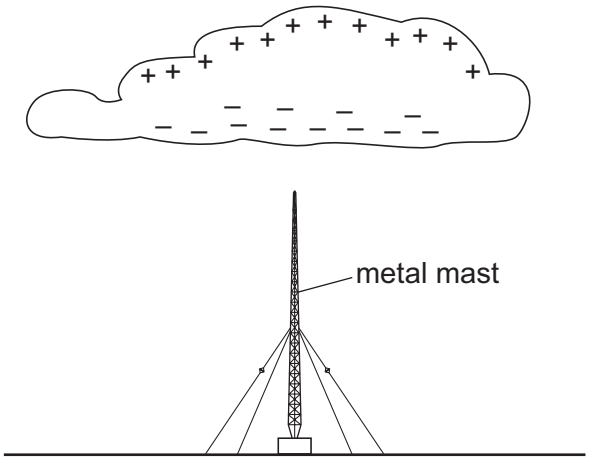
D



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31 The base of a cloud is negatively charged.

The cloud is over a metal mast as shown.



Which row describes the charge induced at the top of the mast and how it is produced?

	charge at the top of the mast	charge at the top of mast is produced by
A	negative	electrons moving to the top of the mast
B	negative	protons moving to the bottom of the mast
C	positive	electrons moving to the bottom of the mast
D	positive	protons moving to the top of the mast

32 An aircraft flying through the air becomes electrically charged.

What causes this to happen?

A background radiation in the aircraft

B friction of the aircraft with the air

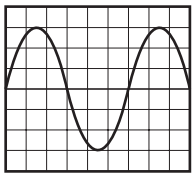
C heating of the aircraft surface

D radio waves emitted by the aircraft

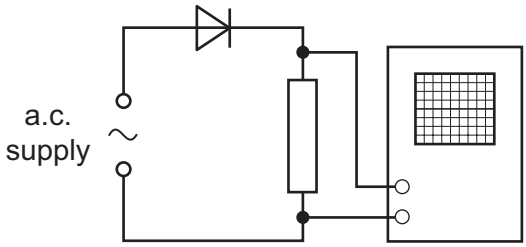
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[Turn over

33 An a.c. supply connected to an oscilloscope produces the trace shown.

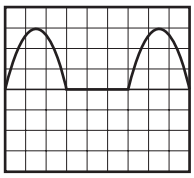


A diode is now connected in series to the circuit as shown.

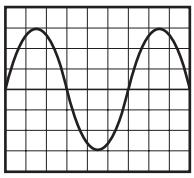


What is the new trace on the screen?

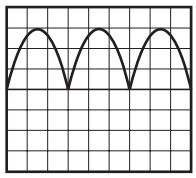
A



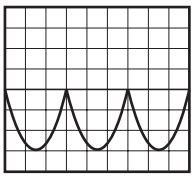
B



C



D



34 Resistors of different resistances are connected to a power supply in either a parallel circuit or a series circuit. Which statement is correct?

A The current is the same in all resistors connected in parallel.

B The current is the same in all resistors connected in series.

C The voltage across each resistor is different for all resistors connected in parallel.

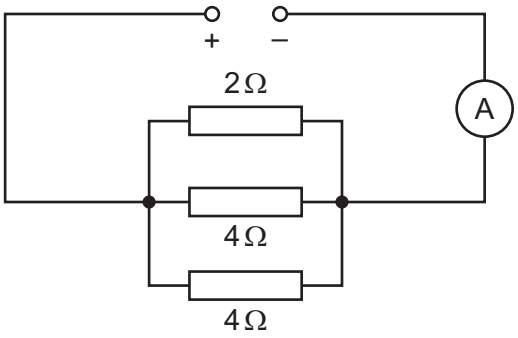
D The voltage across each resistor is the same for all resistors connected in series.

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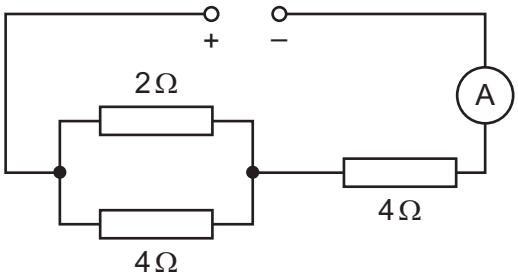
35 An ammeter is connected to three resistors and a power supply.

Which arrangement of resistors gives the greatest ammeter reading?

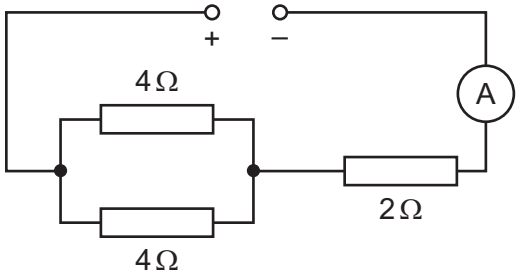
A



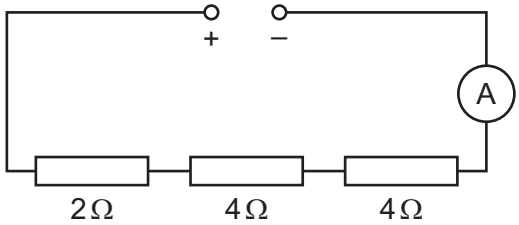
B



C



D



36 A lamp is connected to a mains plug.

Where are the switch and the fuse connected so that the lamp is safe to use?

	switch	fuse
A	live wire	live wire
B	live wire	neutral wire
C	neutral wire	live wire
D	neutral wire	neutral wire

37 The input voltage to a transformer is 24 V a.c. and the output voltage is 6.0 V.

The input coil has 720 turns.

How many turns are on the output coil?

A 5 **B** 180 **C** 2900 **D** 100 000

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38 A student suggests four conditions for the production of a continuous flow of electrons from a metal filament.

1 The filament is hot.

2 A high-pressure gas is present.

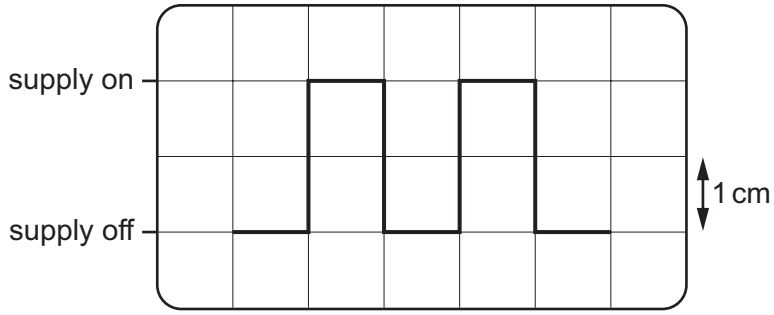
3 A high positive electrical potential is present.

4 A strong magnetic field is present.

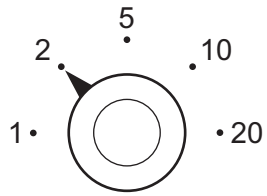
Which of the four conditions are needed?

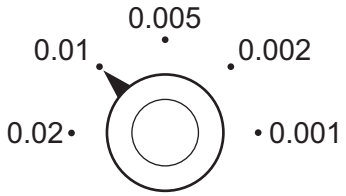
A 1 and 4 **B** 2 and 3 **C** 1 and 3 **D** 2 and 4

39 The diagram shows the trace on an oscilloscope screen when connected to a d.c. supply which is being switched on and off.



The settings of the Y-gain control and the time base control are shown.





The voltage of the supply is *v*.

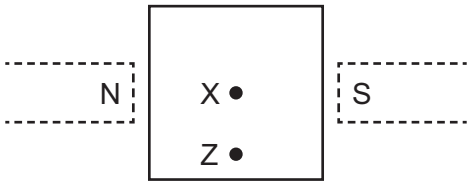
The supply is switched on *f* times per second.

What are the values of *v* and of *f*?

	v / V	*f*
A	2	50
B	2	100
C	4	50
D	4	100

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40 A narrow beam of radiation from a radioactive source travels out of the page through the point X.



The poles of a magnet are placed on either side of the beam. Radiation is now detected both at X and at Z.

Which types of radiation are present in the beam?

A alpha and beta radiation

B alpha and gamma radiation

C alpha, beta and gamma radiation

D beta and gamma radiation

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