Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **May/June 2017**

1 hour

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

* 5 8 0 8 4 5 4 3 0 2 *

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.

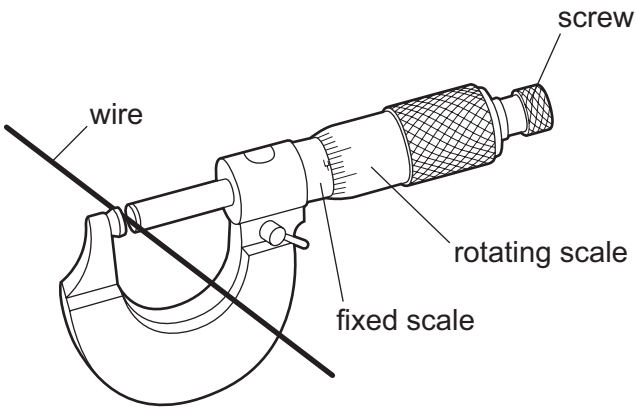
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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.

IB17 06_5054_11/3RP
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1 A micrometer is used to measure the diameter of a uniform wire.



What is done to obtain an accurate answer?

A Make the micrometer horizontal and then use the scales to find the reading.

B Subtract the fixed-scale reading from the rotating-scale reading.

C Subtract the rotating-scale reading from the fixed-scale reading.

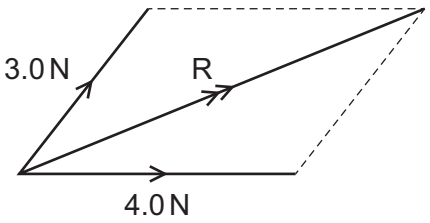
D Use the scales to find the reading and add or subtract any zero error.

2 A car's acceleration and maximum speed are improved by using an engine of smaller mass and greater driving force.

How many of the underlined quantities are vectors?

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

3 The diagram shows the resultant R of a 3.0 N force and a 4.0 N force acting at a point.



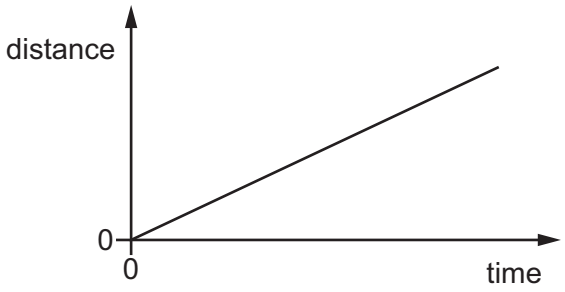
The angle between the 3.0 N force and the 4.0 N force can be any value from 0° to 90°.

Which value of R is **not** possible?

A 4.0 N **B** 5.0 N **C** 6.0 N **D** 7.0 N

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4 The diagram shows the distance-time graph of a car.



The car is travelling along a straight road up a hill.

Which quantity for the car is constant and greater than zero?

A acceleration

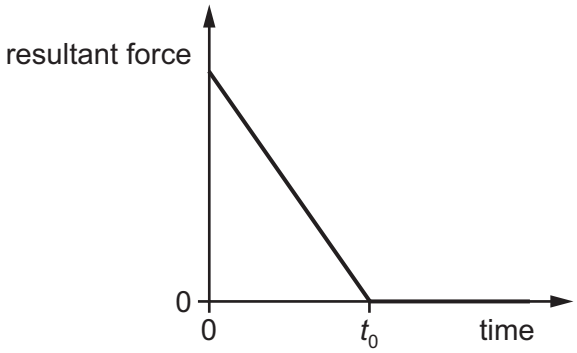
B gravitational potential energy

C kinetic energy

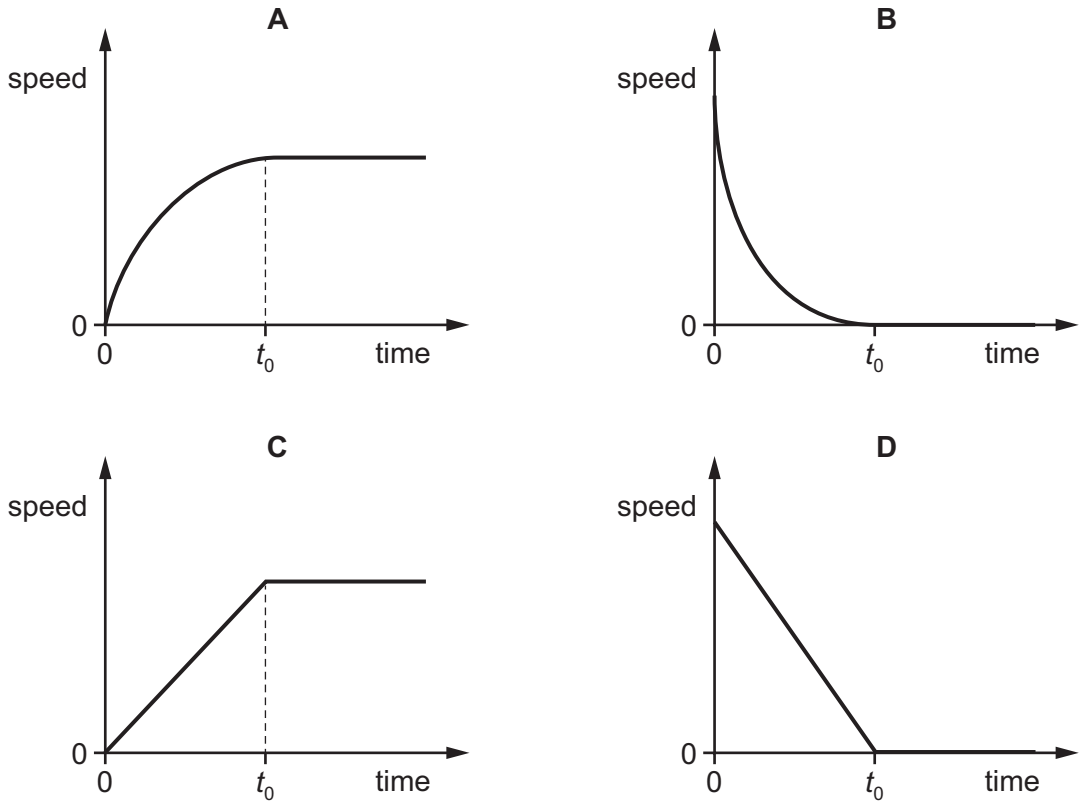
D resultant force

5 A resultant force acts on an object and causes it to move in a straight line.

The graph shows how the resultant force varies with time.



Which graph is the speed-time graph for the object?



6 A skydiver jumps from an aeroplane. After a few seconds, he reaches a terminal velocity without opening his parachute.

Why does he reach terminal velocity?

A Air resistance becomes greater than his weight and slows him down.

B Air resistance decreases and he speeds up.

C Air resistance increases and balances his weight so that his acceleration is zero.

D His weight decreases and balances the air resistance.

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7 A satellite is orbiting the Earth in a circular orbit.

Which two quantities are always in the same direction as each other?

A the acceleration of the satellite and the displacement of the satellite

B the acceleration of the satellite and the velocity of the satellite

C the resultant force on the satellite and the acceleration of the satellite

D the resultant force on the satellite and the velocity of the satellite

8 A satellite is in a circular orbit around a planet.

Which statement is correct?

A Its acceleration is constant in direction but not in size.

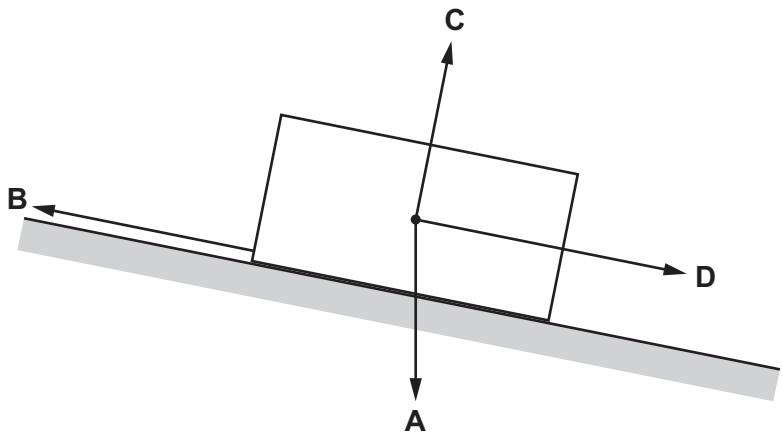
B Its acceleration is constant in size but not in direction.

C Its gravitational potential energy varies.

D Its velocity is constant.

9 The diagram shows a block of wood resting on a sloping board.

Which arrow shows the direction of the gravitational force acting on the block?

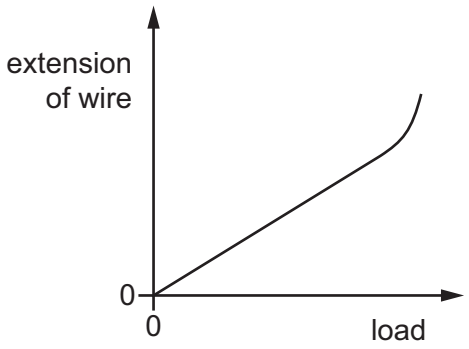


10 An astronaut travels to the International Space Station.

Which row describes how his mass and his weight compare with their sizes on Earth?

	mass	weight
A	different	different
B	different	the same
C	the same	different
D	the same	the same

11 The graph shows the extension of a piece of copper wire as the load on it is increased.



What does the graph show?

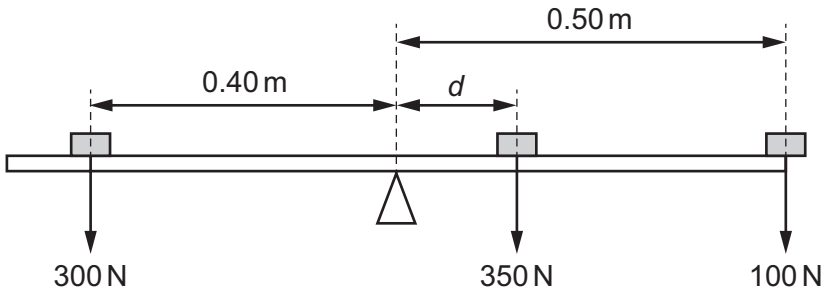
A At a certain load, the wire becomes easier to extend.

B At a certain load, the wire becomes harder to extend.

C The load and the extension are directly proportional for all loads.

D The load and the extension are inversely proportional for all loads.

12 A uniform beam is pivoted at its centre. The beam is balanced by three weights in the positions shown.



What is the length *d*?

A 0.020 m **B** 0.050 m **C** 0.20 m **D** 0.48 m

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13 The work done by a force on a body is calculated by multiplying the force by a quantity.

Which quantity?

A the distance travelled in the direction of the force

B the distance travelled perpendicular to the direction of the force

C the speed in the direction perpendicular to the force

D the velocity in the direction of the force

14 A small motor has an input power rating of 10 W and is run for 5.0 minutes.

What is the electrical energy input to the motor in this time?

A 2.0 J **B** 50 J **C** 300 J **D** 3000 J

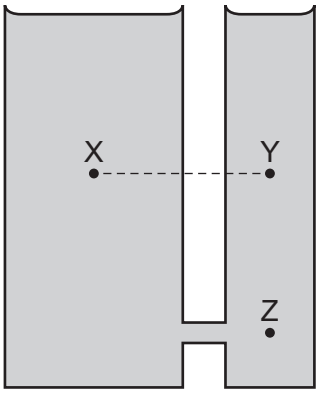
15 A small hydroelectric power station diverts water from a river. Every second, 20 kg of water flows through a pipe and falls through a vertical drop of 15 m. The efficiency of the power station is 0.60 (60%).

The gravitational field strength *g* is 10 N / kg.

What is the power output?

A 0.18 kW **B** 1.8 kW **C** 3.0 kW **D** 180 kW

16 Two cylindrical vessels are joined together and filled with water as shown.

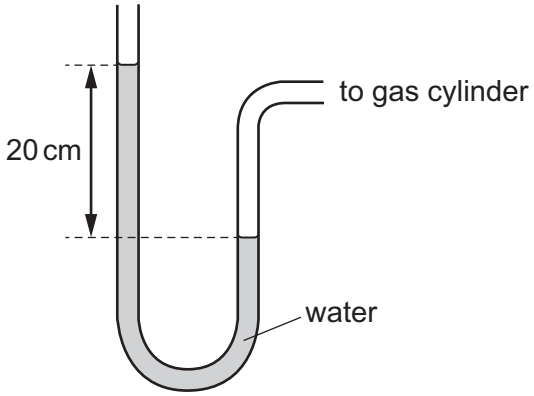


How does the pressure at point X compare to the pressure at points Y and Z?

	compared to Y	compared to Z
A	pressure at X is higher	pressure at X is lower
B	pressure at X is higher	pressure at X is the same
C	pressure at X is the same	pressure at X is lower
D	pressure at X is the same	pressure at X is the same

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17 The pressure of a gas in a cylinder is measured using a water manometer.



The density of water is 1000 kg / m^3 and the gravitational field strength *g* is 10 N / kg.

What is the pressure, above atmospheric pressure, of the gas in the cylinder?

A 200 Pa **B** 2000 Pa **C** 20 000 Pa **D** 200 000 Pa

18 Four beakers contain equal volumes of water at two different temperatures. The beakers are placed in the open air.

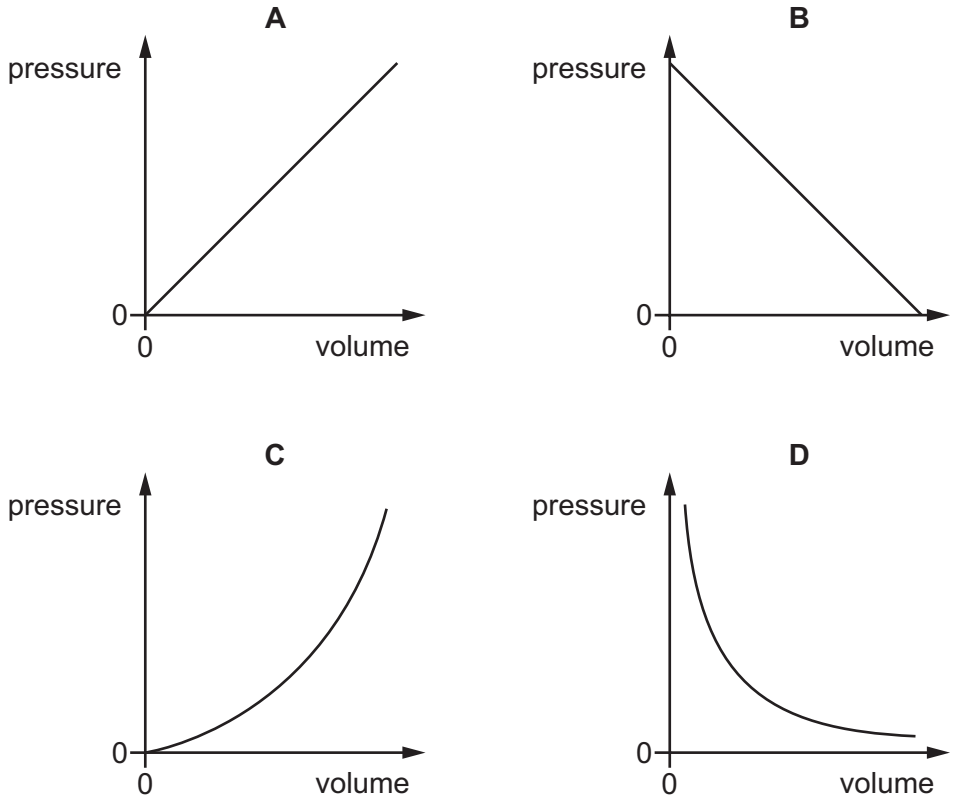
From which beaker does water evaporate the fastest?

	surface area of beaker / cm^2	temperature of water / °C
A	20	20
B	20	40
C	40	20
D	40	40

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19 A fixed mass of gas undergoes a change of volume at constant temperature.

Which diagram shows the relationship between the volume and the pressure of the gas?



20 A substance consists of particles that are close together and moving past each other at random. The average speed of the particles is gradually increasing.

What best describes the substance?

A a gas being heated

B a liquid being heated

C a liquid undergoing solidification

D a solid being heated

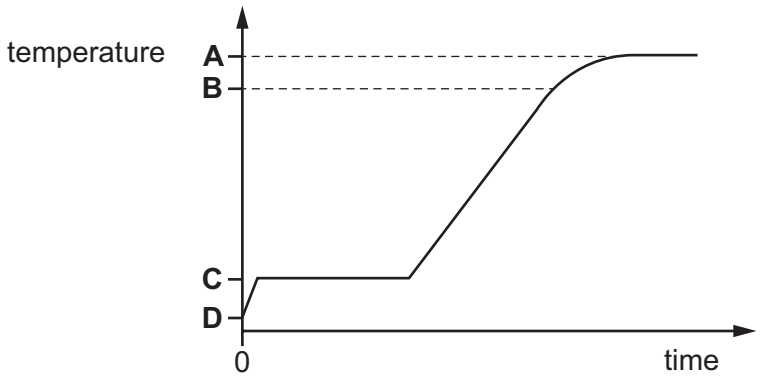
21 The table shows the melting points and the boiling points of some elements.

Which element is a liquid over the largest range of temperature?

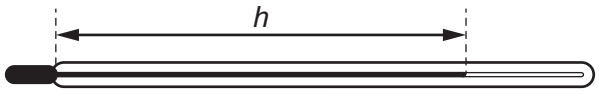
	element	melting point / °C	boiling point / °C
A	bromine	–7	59
B	chlorine	–102	–34
C	fluorine	–220	–188
D	iodine	114	184

22 Some ice cubes are taken from a freezer and heated in a container. The readings of temperature and time are recorded on the graph.

Which temperature is 0 °C?



23 The mercury-in-glass thermometer shown has a linear scale.



At a temperature of 100 °C, *h* has a value of 28 cm.

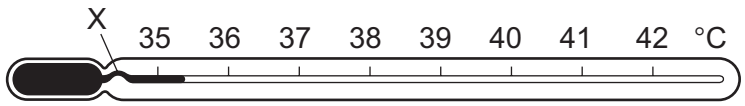
At 80 °C, *h* has a value of 24 cm.

What is the value of *h* when the temperature is 0 °C?

A 0.0 cm **B** 2.8 cm **C** 4.0 cm **D** 8.0 cm

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24 The diagram shows a clinical thermometer.



How does the diagram show that this is a **sensitive** thermometer?

A It has a range of 7 °C.

B There are equal distances between each °C mark on the scale.

C There is a constriction in the tube at X.

D There is a large distance between each °C mark on the scale.

25 There is a tight metal lid on a glass jar. The lid is loosened by pouring hot water over it.

Which physics property explains this?

A convection

B evaporation

C expansion

D radiation

26 Which waves are longitudinal?

A sound waves in water

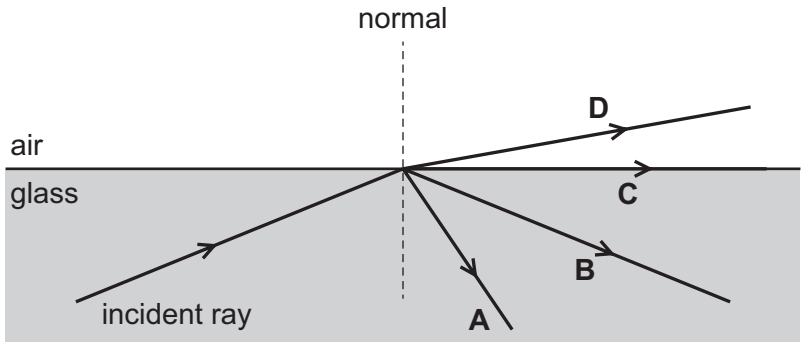
B ultra-violet waves in air

C waves on the surface of water

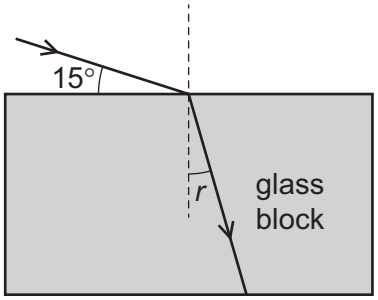
D X-rays in a vacuum

27 Light travelling in glass is incident on a glass-air boundary. The angle of incidence of the light is greater than the critical angle.

Which arrow shows the direction of the light after it is incident on the boundary?



28 Light strikes the top surface of a glass block at an angle of 15° as shown.



(not to scale)

The refractive index of glass is 1.5.

What is the angle of refraction *r*?

A 10° **B** 23° **C** 40° **D** 50°

29 A wall poster showing the electromagnetic spectrum is displayed in a laboratory.



A section of the electromagnetic spectrum has been accidentally ripped from this wall poster.

Which piece is missing?

A infra-red visible light microwave

B microwave infra-red visible light

C visible light infra-red microwave

D visible light microwave infra-red

30 Which type of wave is used to send television signals to a satellite?

A infra-red waves

B light waves

C microwaves

D sound waves

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31 A ship that is stationary on the surface of the sea sends pulses of sound vertically downwards towards the sea bed.

Each pulse that reflects from the sea bed is received 1.0 s after it is sent out.

A whale swims under the boat and a pulse is received 0.60 s after it is sent out.

The speed of sound in sea water is 1500 m / s.

What is the distance of the whale above the sea bed?

A 300 m **B** 450 m **C** 600 m **D** 750 m

32 A charged plastic ball is at rest.

Which fields are found in the region surrounding the ball?
(Ignore the magnetic field of the Earth.)

A electric, gravitational and magnetic

B electric and gravitational only

C electric and magnetic only

D gravitational and magnetic only

33 What proves that a metal bar is a permanent magnet?

A It attracts both ends of a compass needle.

B It attracts one end of another magnet.

C It conducts electricity.

D It repels one end of another magnet.

34 Electrical apparatus is protected from magnetic fields by placing the apparatus in a box.

What is the box made from?

A aluminium

B iron

C rubber

D steel

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35 A shoe becomes positively charged by friction when it rubs against a carpet.

What happens as the shoe becomes charged?

A Negative electrons are transferred to the carpet.

B Negative electrons are transferred to the shoe.

C Positive electrons are transferred to the carpet.

D Positive electrons are transferred to the shoe.

36 During a thunderstorm, a lightning flash occurs when charge flows between a cloud and the Earth. On average, 20 C of charge flows during each flash and there are three flashes every minute.

What is the average current between the cloud and the Earth during the thunderstorm?

A 1.0 A **B** 36 A **C** 60 A **D** 1800 A

37 Why are batteries sometimes made from several identical cells arranged in parallel?

A The battery has a greater e.m.f. than a single cell on its own.

B The battery has a lower e.m.f. than a single cell on its own.

C The battery lasts longer than a single cell on its own.

D The battery supplies a smaller current than a single cell on its own.

38 A cylinder of conducting material has resistance R.

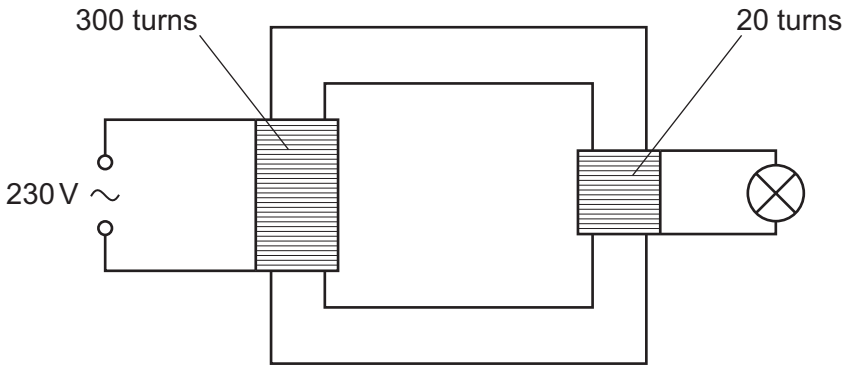
A second cylinder of the same material is twice as long but has half the cross-sectional area.

What is the resistance of the second cylinder?

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

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39 A student uses a transformer to light a filament lamp using a 230 V a.c. supply. The lamp has a maximum voltage rating of 6.0 V.



What happens when the circuit is switched on?

A The lamp does not light at all.

B The lamp lights dimly.

C The lamp lights at normal brightness.

D The lamp lights up brightly and then goes out.

40 Which row is correct for nuclear fission and for nuclear fusion?

	fission	fusion
A	produces larger nuclei	is the energy source of a star
B	produces larger nuclei	releases energy in a power station
C	produces smaller nuclei	is the energy source of a star
D	produces smaller nuclei	releases energy in a power station

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