Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **May/June 2018**

1 hour

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

* 4 4 8 8 2 5 7 2 8 1 *

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.

IB18 06_5054_11/3RP
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1 Which statement about electromagnetic waves is correct?

A All electromagnetic waves have speeds in air of approximately 3×10^8 m / s.

B In air, some electromagnetic waves travel faster than light.

C The electromagnetic waves with the largest wavelength are in the infra-red region.

D The electromagnetic waves with the smallest wavelength are in the X-ray region.

2 A student wishes to measure directly the circumference of a football.

Which is the most suitable instrument to use?

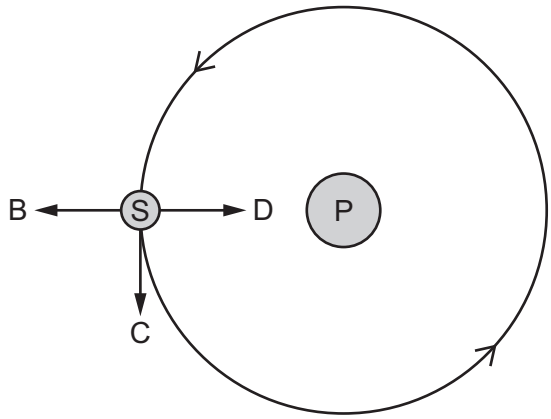
A calipers

B a measuring tape

C a micrometer

D a ruler

3 The diagram shows a satellite S travelling at a constant speed in a circular orbit around a planet P.



Which statement is correct?

A The resultant force on the satellite is zero.

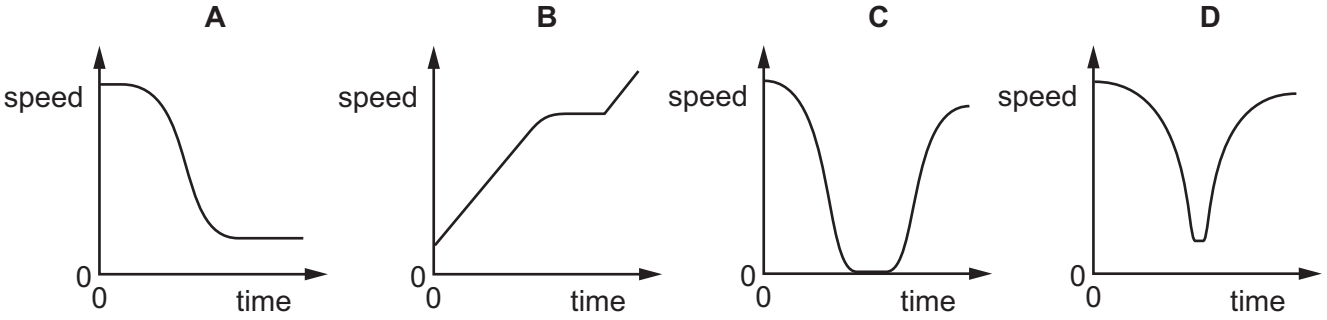
B The resultant force on the satellite is in direction B.

C The resultant force on the satellite is in direction C.

D The resultant force on the satellite is in direction D.

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



5 The minimum braking distance for a car is tested on a dry road.

The test is then repeated on a wet road.

What happens to the braking distance and to the frictional force between the tyres and the road?

	braking distance	frictional force
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

6 Which piece of equipment is used to measure mass?

A balance

B manometer

C measuring cylinder

D newton meter

7 A body of mass 10 kg falling freely in the gravitational field close to the Moon's surface has an acceleration of 1.6 m / s^2.

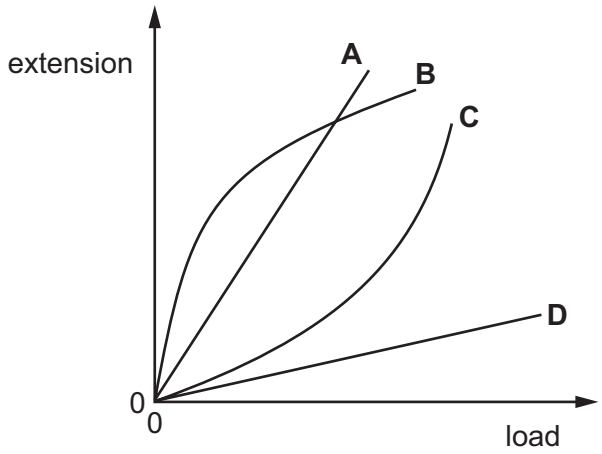
What is the gravitational field strength on the Moon?

A 0 N / kg **B** 1.6 N / kg **C** 10 N / kg **D** 16 N / kg

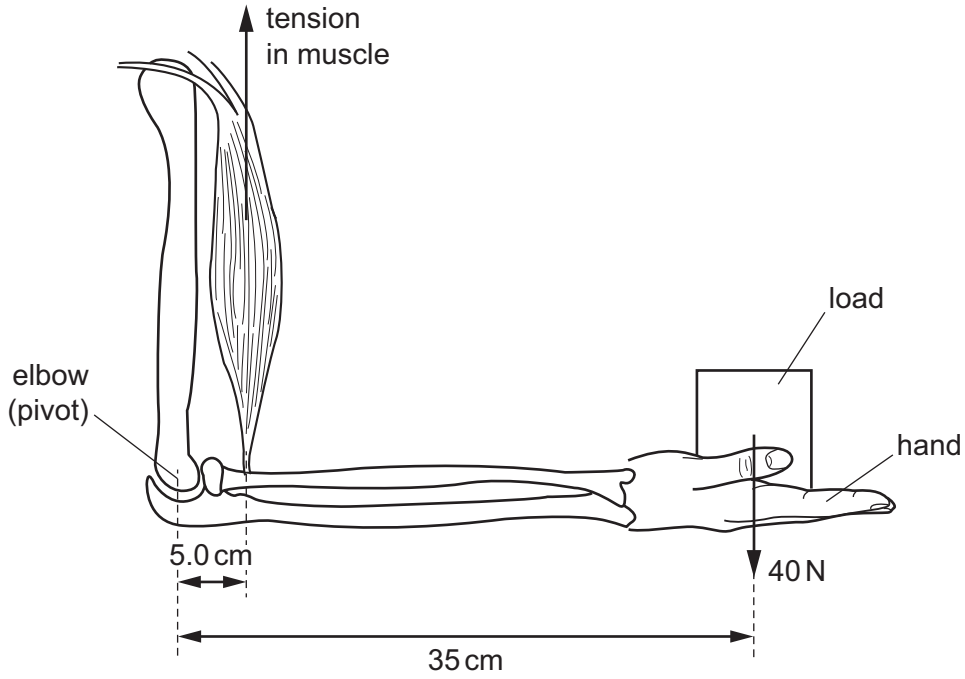
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8 The graph shows extension-load curves for four fibres.

Which fibre is the most difficult to stretch over the range of loads shown?



9 The diagram shows a muscle and bones in a person's arm. The hand holds a load of weight 40 N. The elbow acts as a pivot and the tension in the muscle keeps the lower part of the arm horizontal.

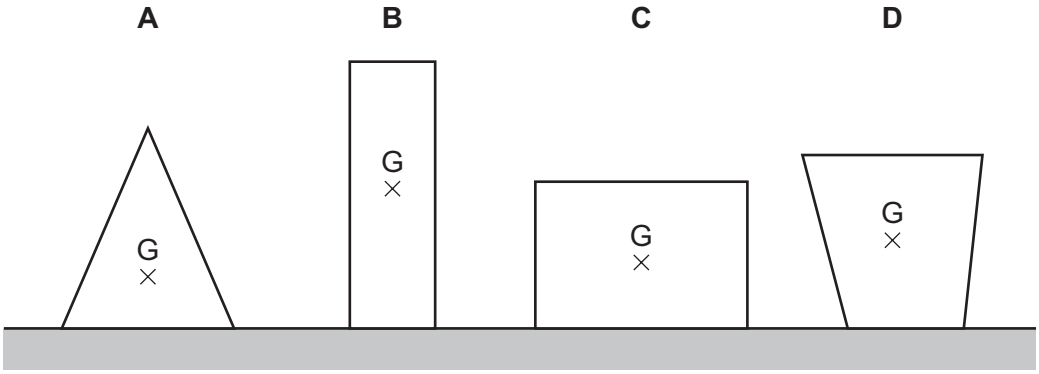


What is the tension in the muscle due to the load?

A 200 N **B** 240 N **C** 280 N **D** 1400 N

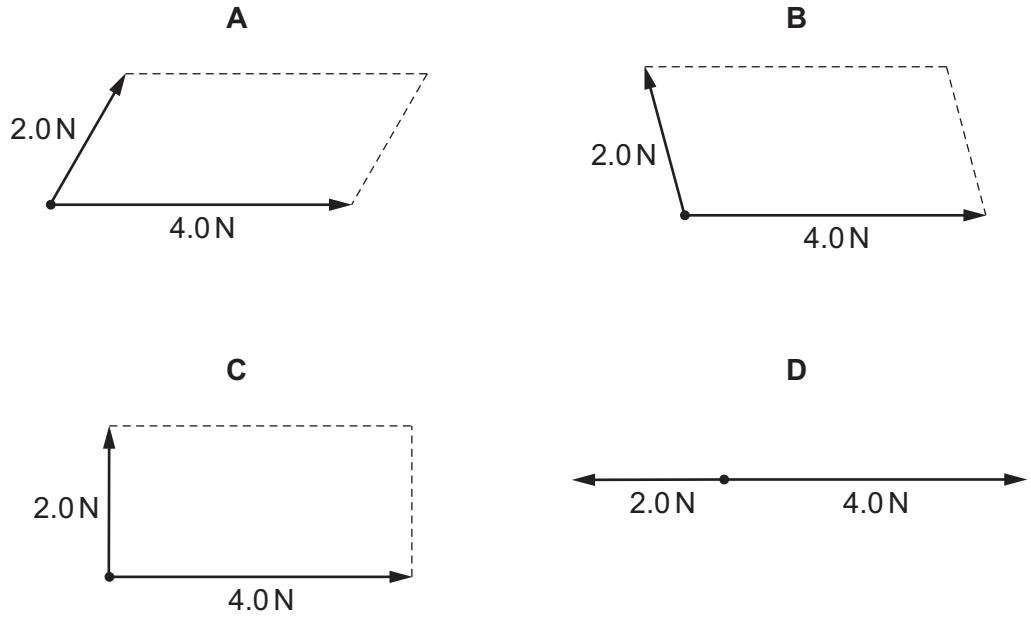
10 Four objects of equal mass rest on a table. The centre of mass of each object is labelled G.

Which object is the least stable?



11 Forces of 4.0 N and 2.0 N act at a point.

Which scale diagram shows the forces that have a resultant of 4.0 N?



12 A student calculates his power in running up a flight of stairs. He measures the vertical height of the stairs, the time taken to run up the stairs and his weight.

How does he calculate his power?

A height × time × weight

B $\frac{\text{height} \times \text{weight}}{\text{time}}$

C $\frac{\text{time} \times \text{weight}}{\text{height}}$

D $\frac{\text{weight}}{\text{height} \times \text{time}}$

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13 How does an oil-fired power station differ from a nuclear power station?

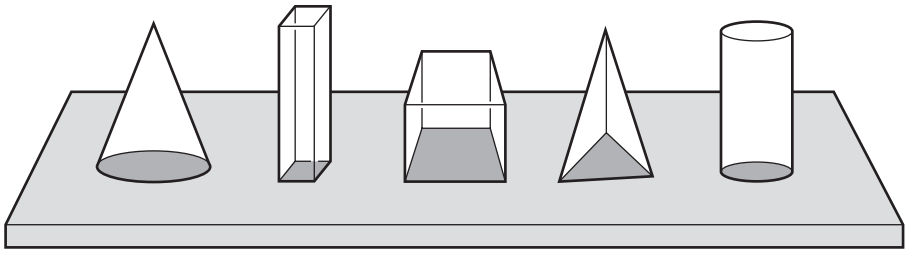
A Gases emitted by hot fuel are emitted into the atmosphere.

B Steam is produced in a boiler using hot fuel.

C The hot steam is used to turn a turbine.

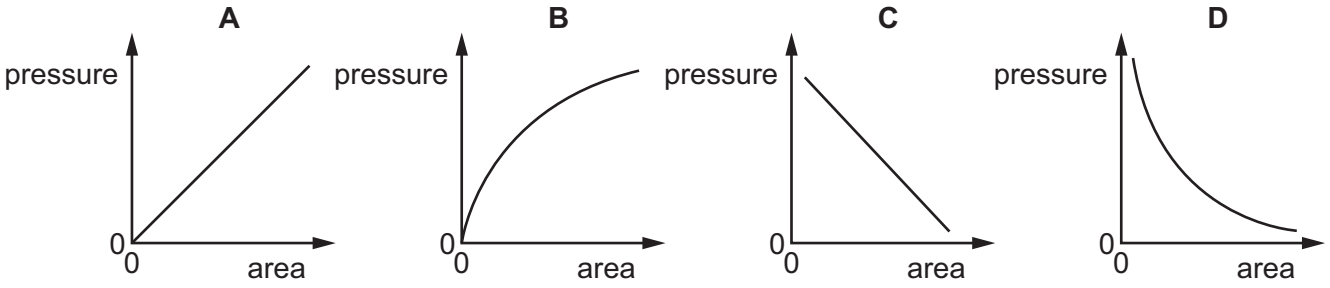
D Turbines are used to drive an electric generator.

14 Five blocks have the same mass but different base areas. They all rest on a horizontal table.



A graph is plotted to show the relationship between the pressure exerted on the table and the base area of the block.

Which graph shows this relationship?



15 Each tyre of a car has an area of 100 cm^2 in contact with the ground.

The car has a mass of 1600 kg. The weight of the car is equally distributed amongst the four tyres.

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

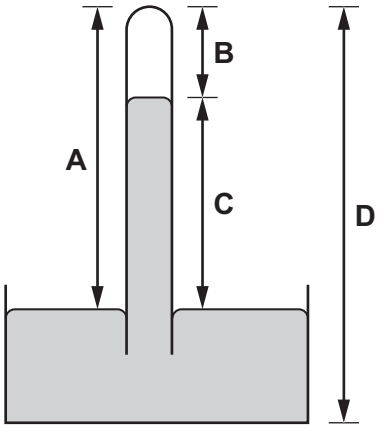
What is the pressure exerted on the ground?

A 4.0 N / cm^2 **B** 16 N / cm^2 **C** 40 N / cm^2 **D** 160 N / cm^2

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16 The diagram shows a simple mercury barometer.

Which height is a measure of the atmospheric pressure?



17 What is described as 'the escape of more energetic molecules from the surface of a liquid'?

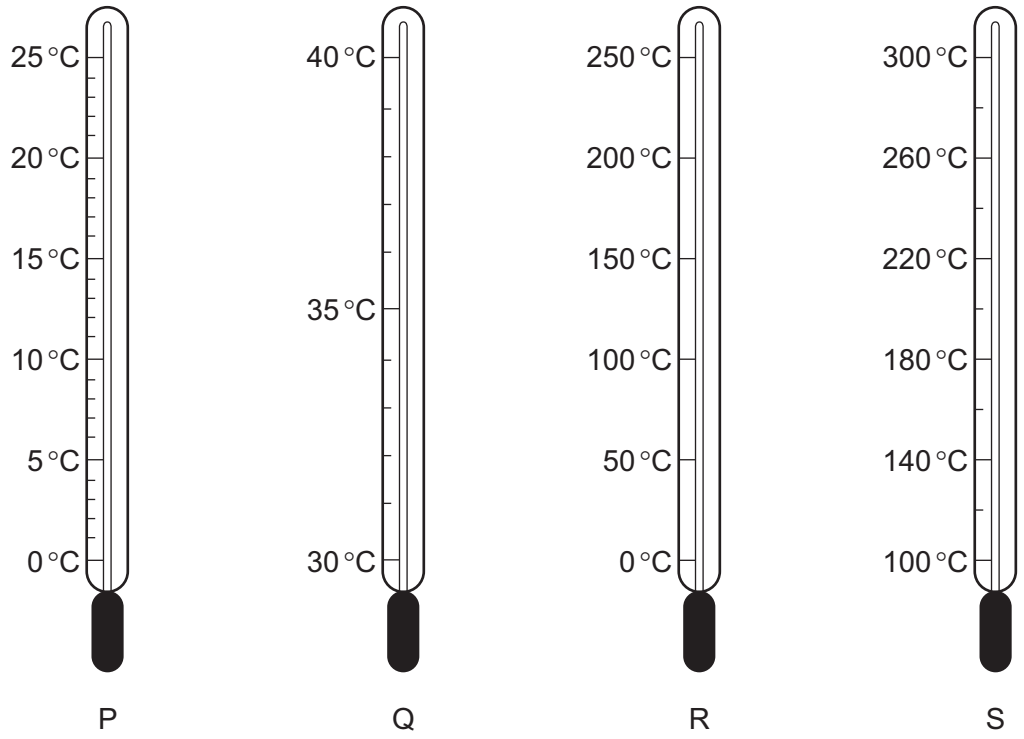
A condensation

B evaporation

C melting

D radiation

18 The diagrams represent four thermometers.



Which thermometer has the greatest sensitivity and which thermometer has the greatest range?

	greatest sensitivity	greatest range
A	P	R
B	P	S
C	Q	R
D	Q	S

19 What happens when a solid is heated and expands?

A The molecules do not change size and the spaces between the molecules become larger.

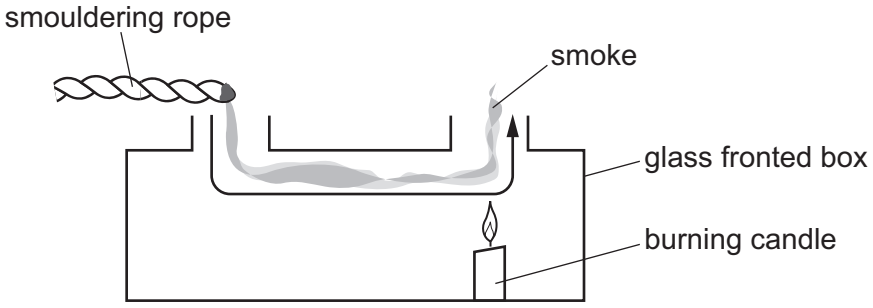
B The molecules expand and the spaces between the molecules become larger.

C The molecules expand and the spaces between the molecules become smaller.

D The molecules expand and the spaces between the molecules do not change size.

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20 When a piece of smouldering rope is held at the opening of the box in the diagram, smoke moves in the direction indicated.



What is responsible for the movement of the smoke?

A convection

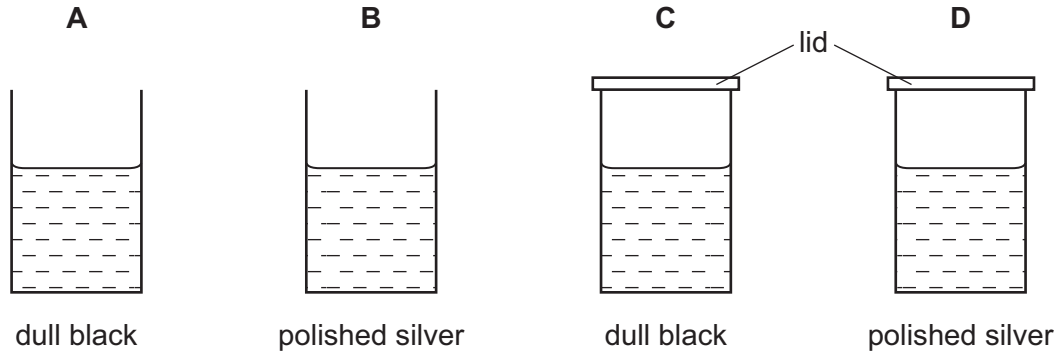
B movement of free electrons

C radiation

D vibration of molecules

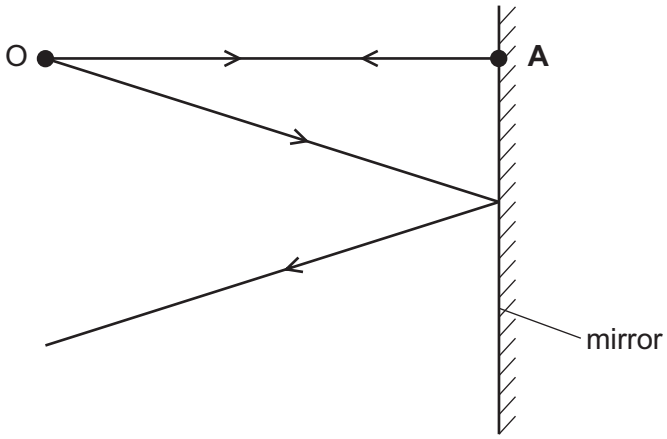
21 The diagrams show four identical cans with their outside surfaces either polished silver or painted dull black. Each can contains the same volume of water, initially at 80 °C.

After five minutes in a cool room, which can contains the coolest water?



22 The diagram shows two divergent rays of light from an object O being reflected from a plane mirror.

At which position is the image formed?



● **B**

● **C**

● **D**

23 Which statement is correct?

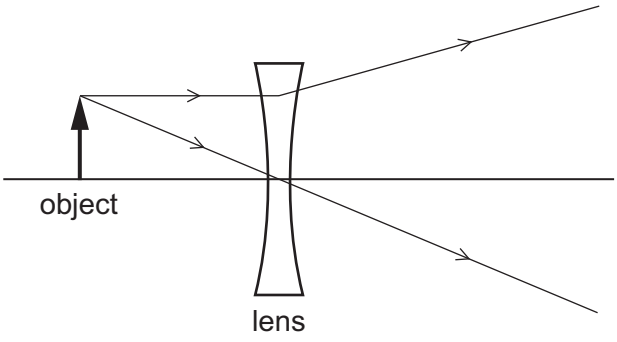
A Total internal reflection only occurs when light travels from air into glass.

B The larger the refractive index of glass, the larger is the critical angle.

C When total internal reflection occurs, the angle of incidence is equal to the angle of reflection.

D When total internal reflection occurs, the angle of incidence is less than the critical angle.

24 The diagram shows the paths of two rays from the top of an object through a lens.



The object is viewed from the opposite side of the lens to the object.

How does the image compare with the object?

A larger and inverted

B larger and the same way up

C smaller and inverted

D smaller and the same way up

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25 A young person with healthy ears can hear a range of frequencies.

What is the approximate range of frequencies?

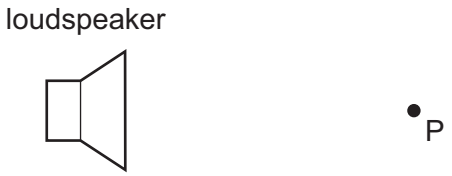
A 2 Hz to 2000 Hz only

B 2 Hz to 20 000 Hz only

C 20 Hz to 2000 Hz only

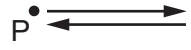
D 20 Hz to 20 000 Hz only

26 The diagram shows a loudspeaker that is producing a continuous sound wave of frequency 200 Hz in air.

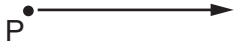


Which diagram best shows how the sound wave causes a molecule at P to move during $\frac{1}{200}$ s ?

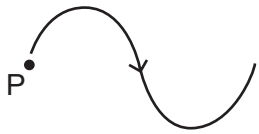
A



B



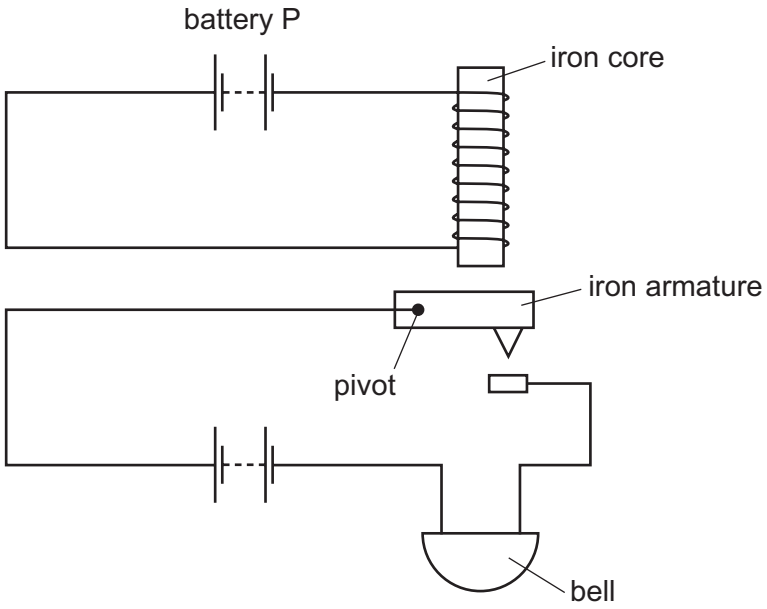
C



D



27 The diagram shows an alarm system.

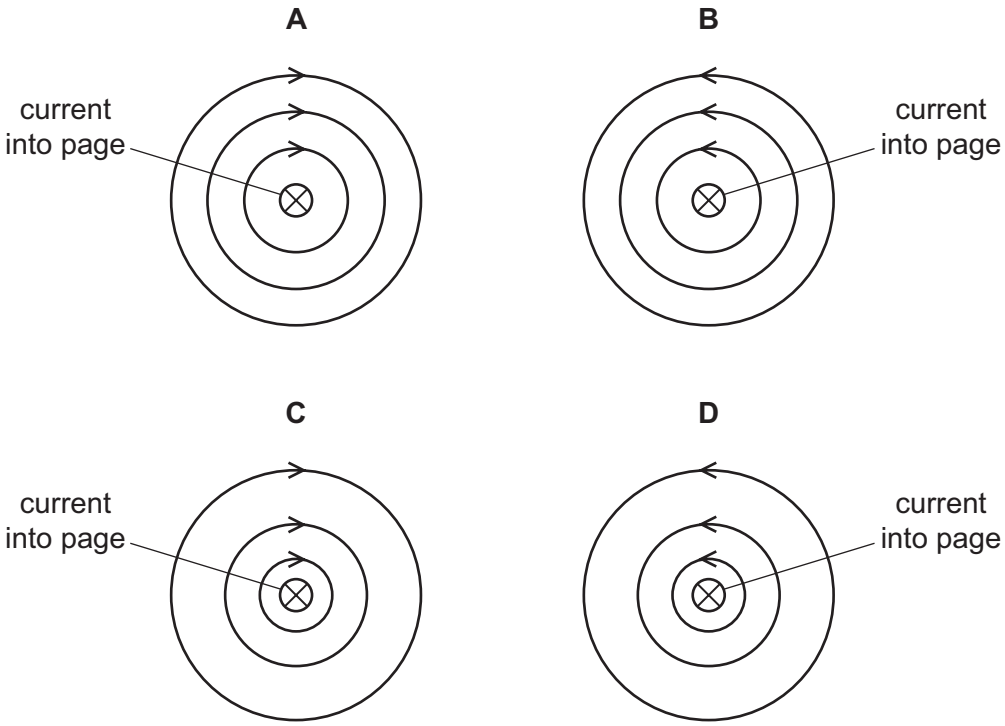


What happens when battery P is disconnected?

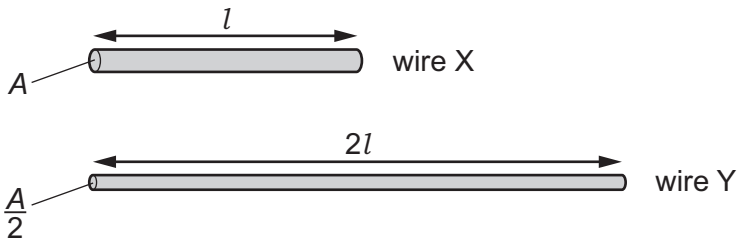
	iron armature	bell
A	falls	rings
B	falls	stops ringing
C	moves up	rings
D	moves up	stops ringing

28 An electric current in a wire is into the page.

Which diagram shows the shape and direction of the magnetic field around the wire?



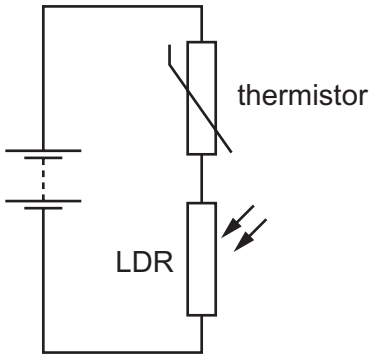
29 A copper wire X has resistance R. Another copper wire Y has twice the length and half the cross-sectional area of X.



What is the resistance of Y?

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

30 In the circuit shown, the temperature of the room and the amount of light affect the current.



Under which conditions is the current in the circuit the largest?

	temperature	amount of light
A	high	in bright light
B	high	in the dark
C	low	in bright light
D	low	in the dark

31 An electrical appliance is plugged into a socket in the wall. The plug contains a fuse.

What is the main purpose of the fuse?

A to earth the appliance

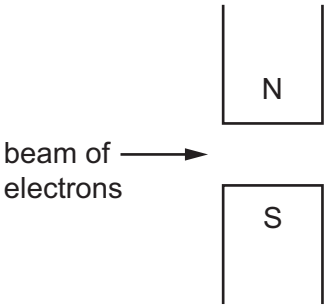
B to earth the plug

C to protect the user from electric shock

D to protect the wiring from overheating

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32 A horizontal beam of electrons passes between the two poles of a magnet.



In which direction is the beam deflected?

A into the page

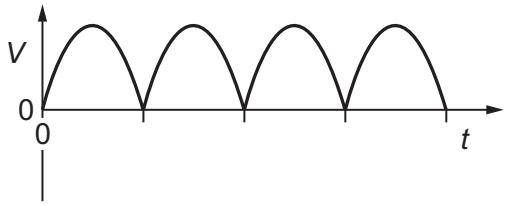
B out of the page

C towards the north pole

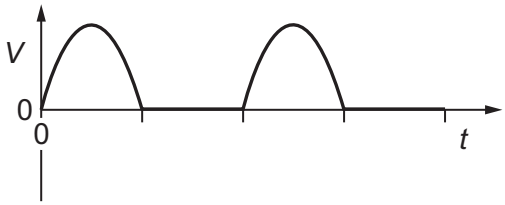
D towards the south pole

33 Which graph shows the voltage output *V* against time *t* for an a.c. generator?

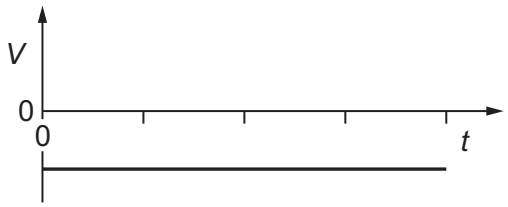
A



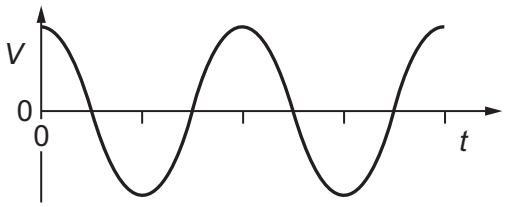
B



C



D

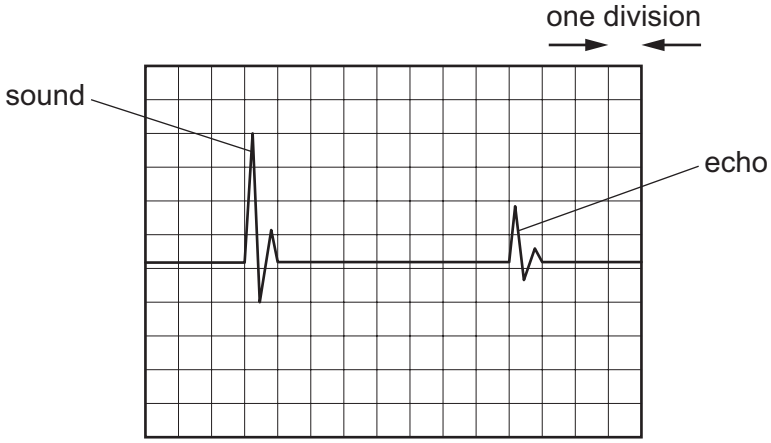


34 A loudspeaker and a microphone are placed in front of a wall.



The loudspeaker makes a sound which is detected by the microphone.

The microphone is connected to an oscilloscope which is set so that each division on the screen represents 0.01 s. The microphone detects the original sound and the echo.



display on oscilloscope

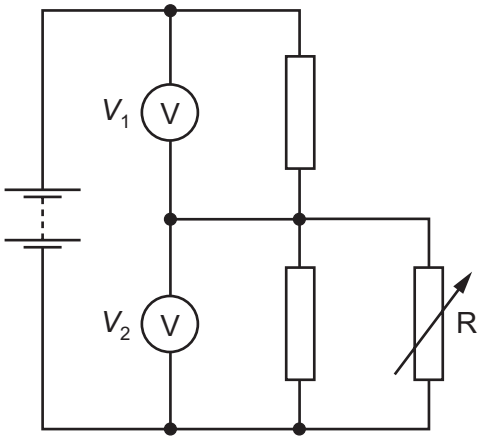
The speed of sound in air is 300 m / s.

What is the distance between the loudspeaker and the wall?

A 6.0 m **B** 12 m **C** 24 m **D** 48 m

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35 The circuit diagram shows a variable resistor R connected in parallel to the lower half of a potential divider.



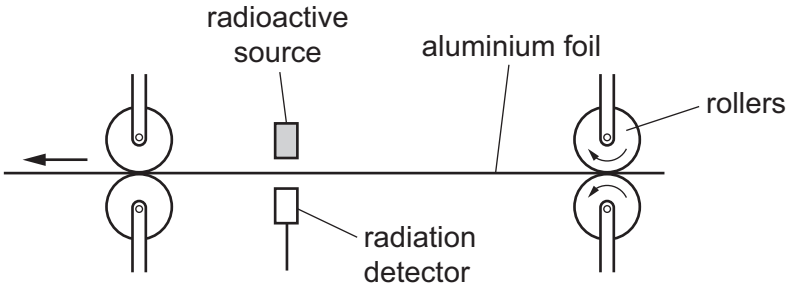
The resistance of R increases.

What happens to the two voltmeter readings?

	V_1	V_2
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

36 Thin aluminium foil is used in cooking.

The diagram shows a system used to control the thickness of aluminium foil being made in a factory.



What is the most suitable radioactive source for the system?

	source	half-life of source
A	beta	1 hour
B	beta	6 years
C	gamma	1 hour
D	gamma	6 years

37 Which of alpha, beta and gamma radiations are waves?

A alpha only

B beta only

C gamma only

D alpha and beta

38 A radioactive isotope of hydrogen has a half-life of 12 years.

A sample contains 40 million atoms of this isotope.

How many atoms of this isotope are left after 24 years?

A 20 million

B 10 million

C 5 million

D zero

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39 How many nucleons are in one neutral atom of the krypton isotope $^{84}_{36}Kr$?

A 36 **B** 48 **C** 84 **D** 120

40 A radioactive nucleus is represented as $^{230}_{92}U$.

Which row represents another isotope of the same element?

	number of protons in nucleus	number of neutrons in nucleus
A	90	140
B	91	138
C	92	139
D	93	136

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