UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS **5054/12**

Paper 1 Multiple Choice **October/November 2013**

1 hour

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

7085772345

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, 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.

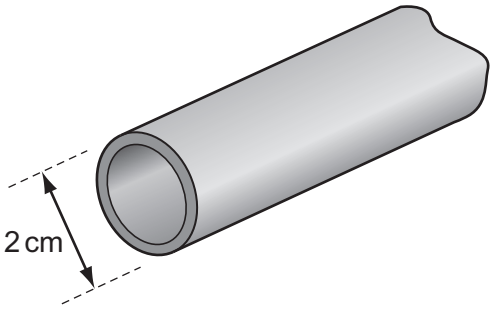
Read the instructions on the Answer Sheet very carefully.

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 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 calipers and micrometer

B micrometer and rule

C rule and tape

D tape and calipers

2 An object moves from P to Q in 10 s with uniform acceleration.

velocity at P = 5 m / s

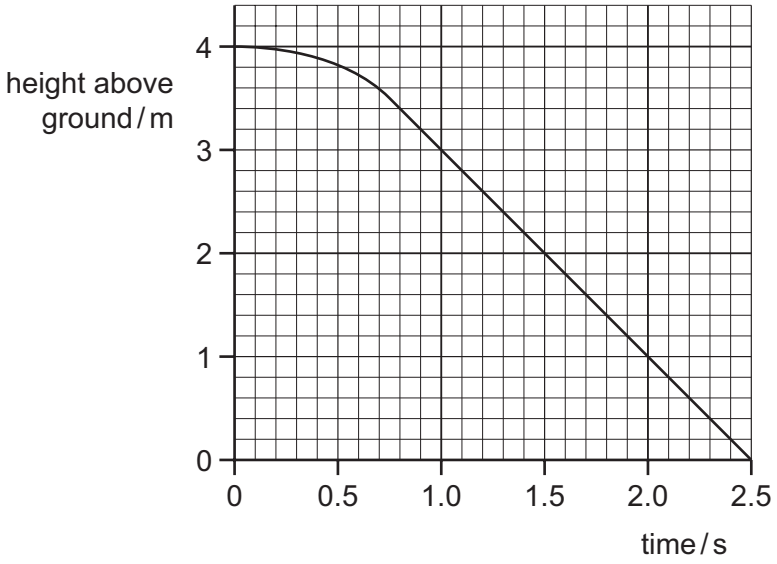
velocity at Q = 12 m / s

What is the acceleration?

A $0.5\,m/s^2$ **B** $0.7\,m/s^2$ **C** $1.2\,m/s^2$ **D** $1.7\,m/s^2$

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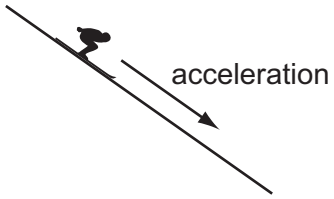
3 The graph shows how the height of an object above the ground changes with time.



What is the terminal velocity?

A 1.0 m / s **B** 1.3 m / s **C** 1.6 m / s **D** 2.0 m / s

4 A skier of mass 80 kg accelerates down a slope at 2 m / s^2.



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

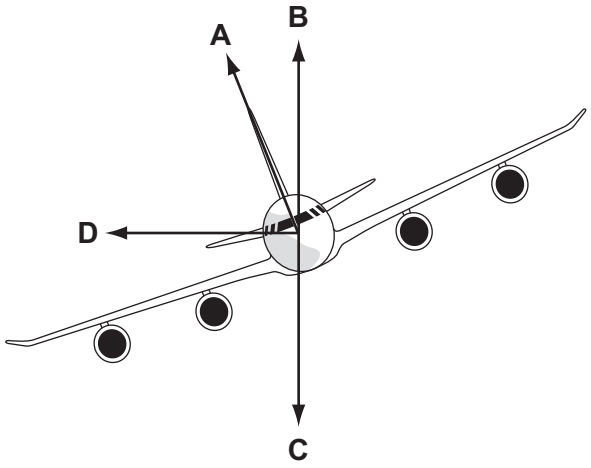
What is the weight of the skier and the resultant force on the skier?

	weight / N	resultant force / N
A	8	168
B	80	240
C	800	160
D	800	640

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5 The diagram shows an aeroplane turning in a horizontal circle at constant speed.

In which direction is there a resultant force?



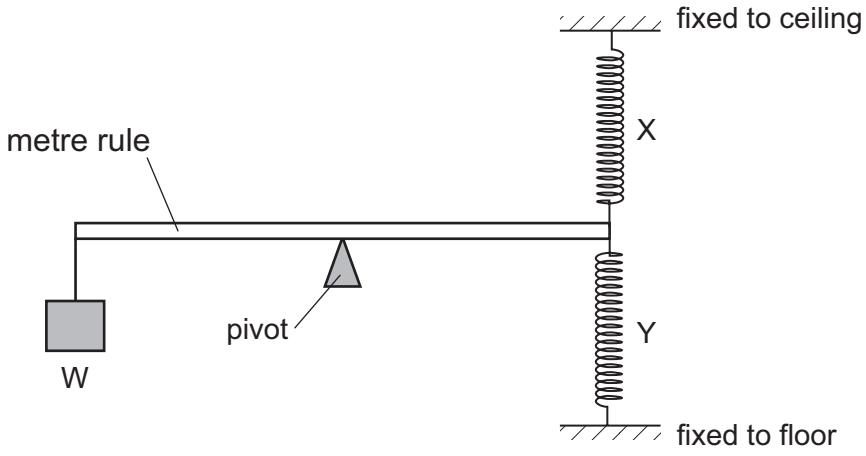
6 The weight of a cylinder on the Moon is less than its weight on the Earth.

How do the gravitational field strength and the mass of the cylinder on the Moon compare with their values on the Earth?

	gravitational field strength on Moon	mass on Moon
A	the same	less
B	the same	the same
C	less	the same
D	zero	zero

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7 Two stretched springs X and Y are attached to one end of a metre rule as shown. A weight W is hung from the other end. A pivot is at the centre of the rule.



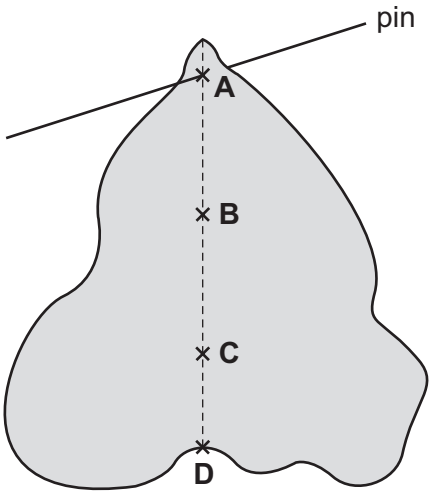
The weight W is moved towards the pivot.

How does the extension of each spring change?

	spring X	spring Y
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

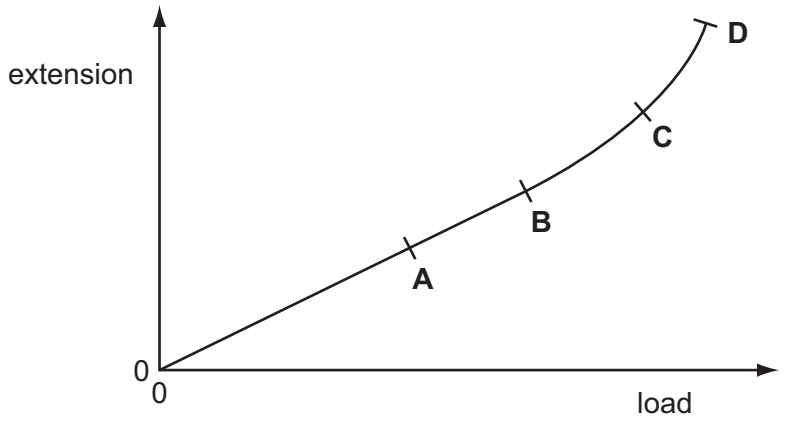
8 A piece of uniform card is suspended freely from a horizontal pin.

Which point is its centre of mass?

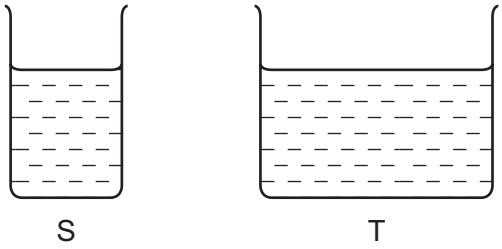


9 An extension-load graph is plotted to show the result of increasing the load on a spring.

Which point marks the limit of proportionality for this spring?



10 Two vessels S and T are filled to the same level with the same liquid. The area of the base of S is less than that of T.



Which statement is correct?

A The force on the base of S is greater than the force on the base of T.

B The force on the base of S is the same as the force on the base of T.

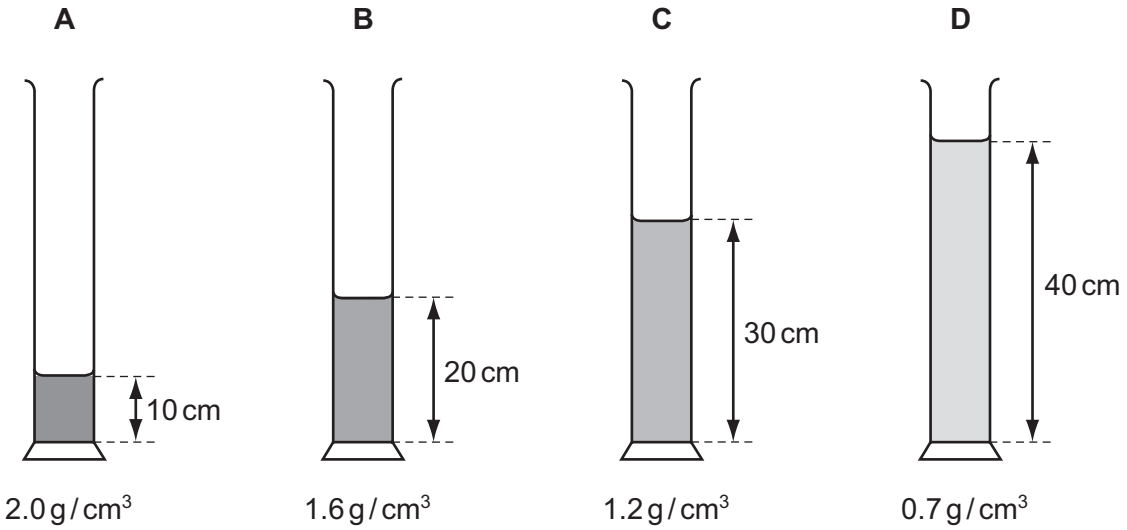
C The pressure on the base of S is greater than the pressure on the base of T.

D The pressure on the base of S is the same as the pressure on the base of T.

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11 Four different liquids are poured into identical measuring cylinders. The diagrams show the depths of the liquids and their densities.

Which liquid causes the largest pressure on the base of its measuring cylinder?



12 The conditions at the bottom and at the surface of a lake are given in the table.

	bottom of lake	surface of lake
temperature	10 °C	10 °C
pressure	500 kPa	100 kPa

A bubble of volume 1.0 cm^3 forms at the bottom of the lake.

What is the volume of the bubble as it reaches the surface?

A 0.20 cm^3 **B** 0.25 cm^3 **C** 4.0 cm^3 **D** 5.0 cm^3

13 When exposed to light, a solar cell generates electrical energy.

Two solar cells of equal area are tested. Each cell is exposed to sunlight of different brightness for the same time.

Which statement could apply to the more efficient cell?

A It generates less electrical energy from light of greater brightness.

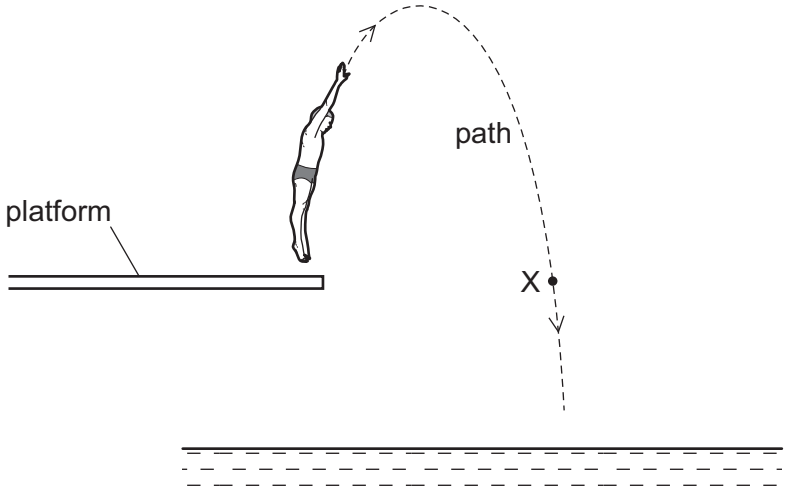
B It generates less electrical energy from light of the same brightness.

C It generates the same electrical energy from light of greater brightness.

D It generates the same electrical energy from light of lower brightness.

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14 The diagram shows the path of a diver after leaving a platform and before entering the water in a swimming pool.



The gravitational potential energy of the diver is zero when he is at the surface of the water.

Which statement about the diver's energy along the path is correct?

A At point X he has only gravitational potential energy.

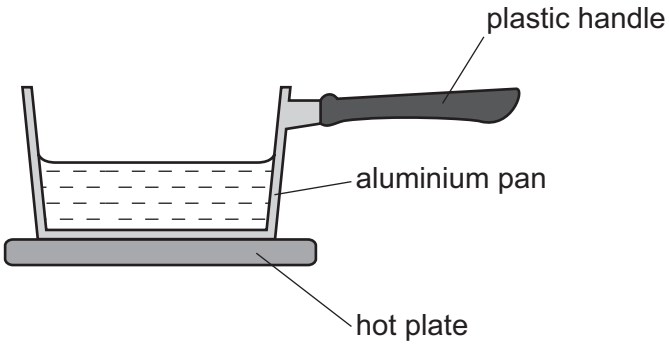
B At point X he has only kinetic energy.

C His gravitational potential energy is always more than his kinetic energy.

D The sum of his gravitational potential energy and kinetic energy is constant.

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15 A saucepan is used to heat up some water.



How is heat transferred through the aluminium pan and through the plastic handle?

	heat is transferred through the aluminium pan by	heat is transferred through the plastic handle by
A	the movement of free electrons and the vibration of atoms	the movement of free electrons and the vibration of molecules
B	the movement of free electrons and the vibration of atoms	the vibration of molecules only
C	the movement of free electrons only	the movement of free electrons and the vibration of molecules
D	the movement of free electrons only	the vibration of molecules only

16 A silver cup is filled with boiling water from a kettle.

A man touches the outside surface of the cup and finds that it is extremely hot.

Why is the surface so hot?

A Convection takes place in the boiling water.

B Silver is a good conductor of heat.

C The boiling water gives out latent heat.

D The shiny surface is a good emitter of infra-red radiation.

17 The temperature shown by a mercury-in-glass thermometer increases.

Which of the following is constant?

A the density of the mercury

B the internal energy of the mercury

C the mass of the mercury

D the volume of the mercury

18 Different amounts of energy are supplied to copper blocks of different masses.

Which block experiences the greatest temperature change?

	mass of block / kg	energy supplied / J
A	0.1	200
B	0.2	200
C	0.4	600
D	0.8	400

19 A fixed mass of gas is kept at constant pressure. Its temperature is raised.

What happens to the volume of the gas and to its molecules?

	volume	molecules
A	decreases	move more slowly
B	increases	stay the same distance apart
C	increases	move further apart
D	no change	move at the same speed

20 Air is heated in a sealed container with constant volume.

Why does the air pressure increase when the temperature increases?

A The air molecules expand.

B The air molecules bounce off each other more frequently.

C The air molecules bounce off the walls more frequently.

D The number of air molecules increases.

21 The more energetic molecules in a liquid may escape from its top surface.

What is this process called?

A boiling

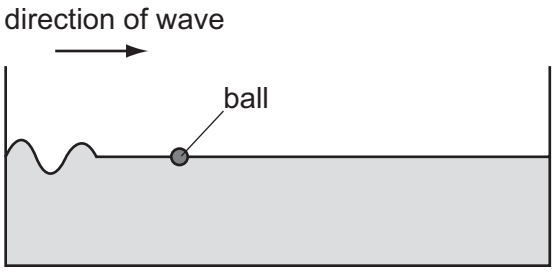
B Brownian motion

C convection

D evaporation

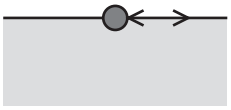
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22 The diagram shows a ball floating in a tank of water.

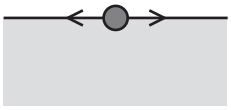


Which diagram shows the movement of the ball as the wave passes?

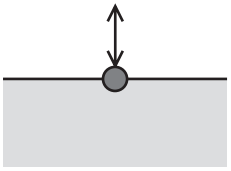
A



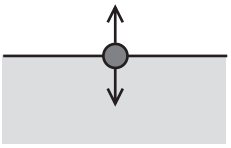
B



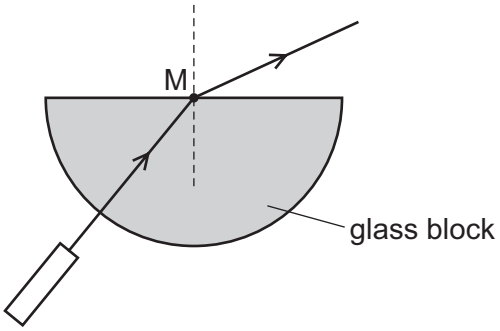
C



D



23 A ray of red light from a laser passes into a semi-circular glass block.



What is shown at M?

A dispersion

B rarefaction

C reflection

D refraction

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24 A ray of light strikes the surface of a glass block at an angle of incidence of 45°.

The refractive index of the glass is 1.8.

What is the angle of refraction inside the block?

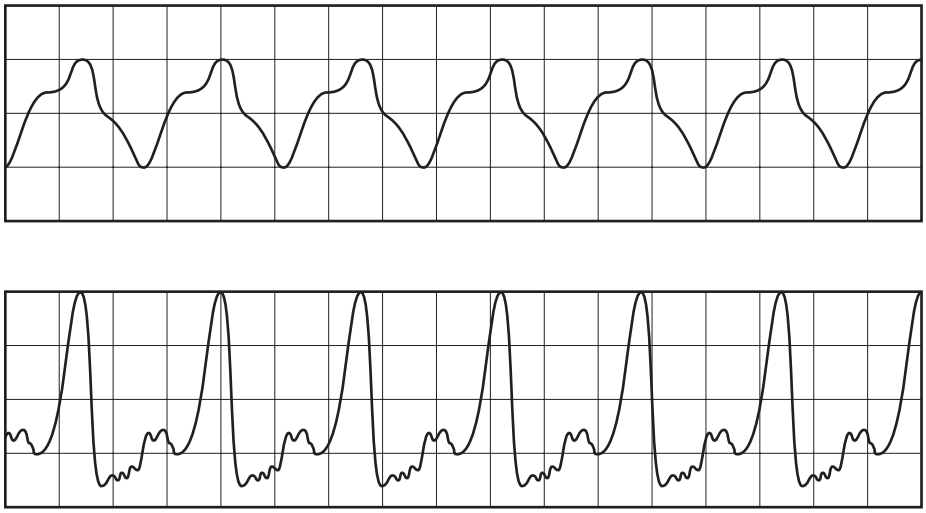
A 23° **B** 25° **C** 45° **D** 81°

25 Two campers are woken up in the middle of the night by a thunderstorm. Their tent is lit up by a flash of lightning and they hear the thunderclap 5.0 s later. The speed of sound is 340 m / s.

How far away from the tent is the lightning?

A 68 m **B** 850 m **C** 1700 m **D** 3400 m

26 The sounds produced by two musical instruments are directed towards a microphone connected to an oscilloscope (c.r.o.). The waveforms produced on the screen are shown.



The waveforms show that the sounds produced have a different property.

What is the property?

A frequency

B speed

C timbre (quality)

D wavelength

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27 Which material is best for magnetic screening?

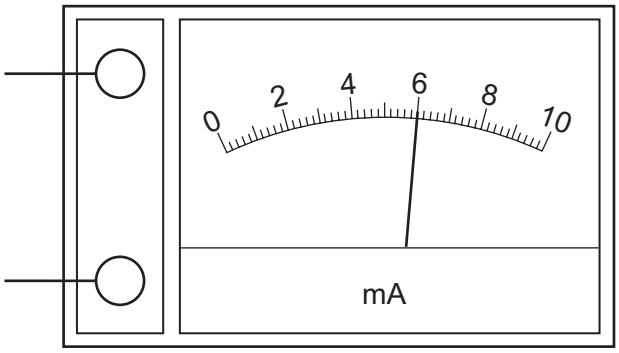
A copper

B iron

C lead

D plastic

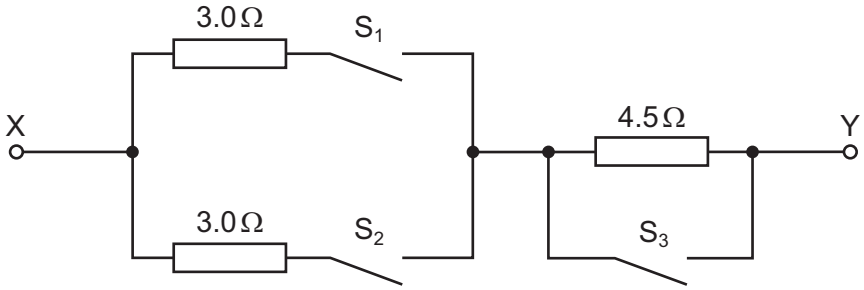
28 An ammeter is used to measure the current in a 300 Ω resistor. The ammeter is shown below.



What is the potential difference across the resistor?

A 0.050 V **B** 1.8 V **C** 50 V **D** 1800 V

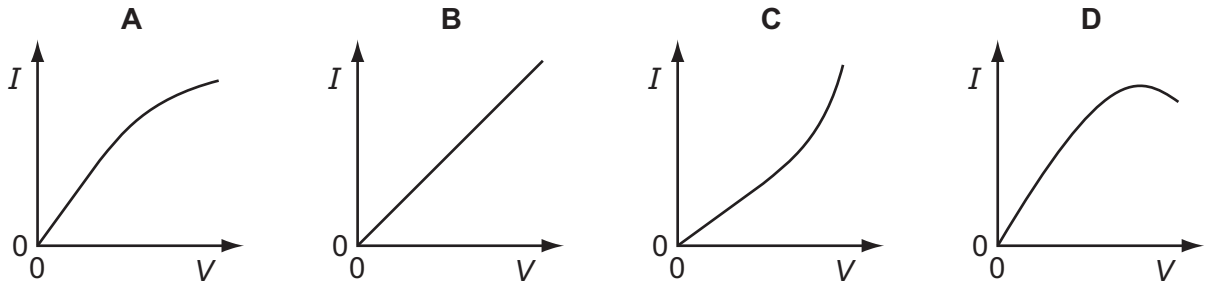
29 The diagram shows a circuit in which all the switches are open.



Which switch positions give a resistance of 6.0 Ω between X and Y?

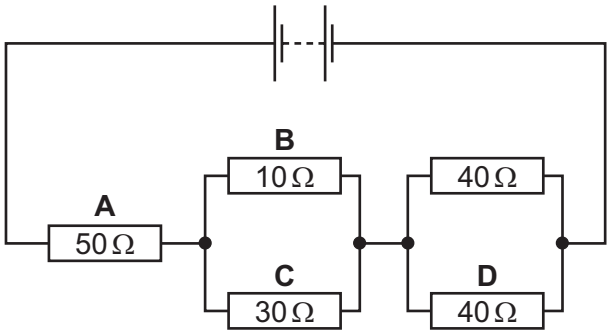
	S_1	S_2	S_3
A	closed	closed	closed
B	closed	closed	open
C	closed	open	closed
D	closed	open	open

30 Which is the current / voltage (I / V) graph of a filament lamp?



31 The diagram shows a circuit containing five resistors connected to a battery.

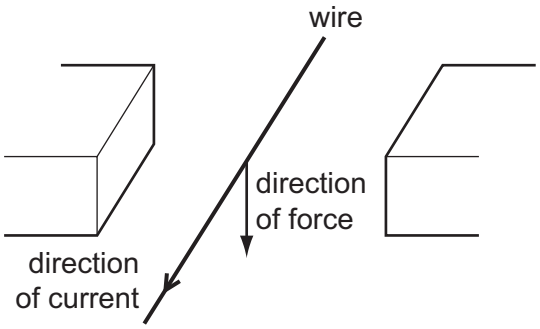
In which resistor is the current the smallest?



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32 The diagram shows a wire placed between two magnetic poles of equal strength.

A current passes through the wire in the direction shown. The current causes a downward force on the wire.



What is the arrangement of the magnetic poles?

A



B



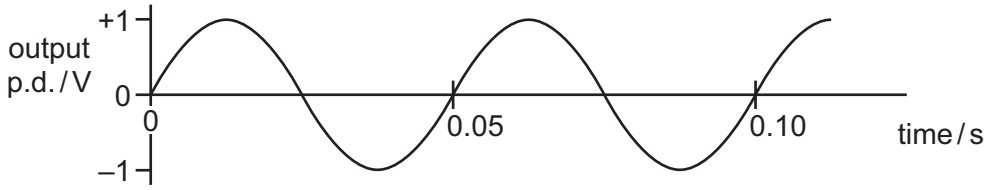
C



D



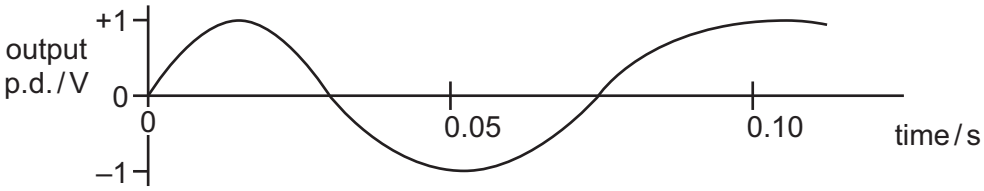
33 The graph shows the output of an a.c. generator. The coil in the generator rotates 20 times in one second.



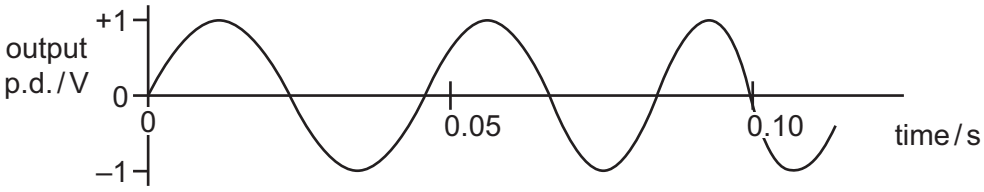
The speed of rotation of the coil steadily increases.

Which graph best shows how the output changes?

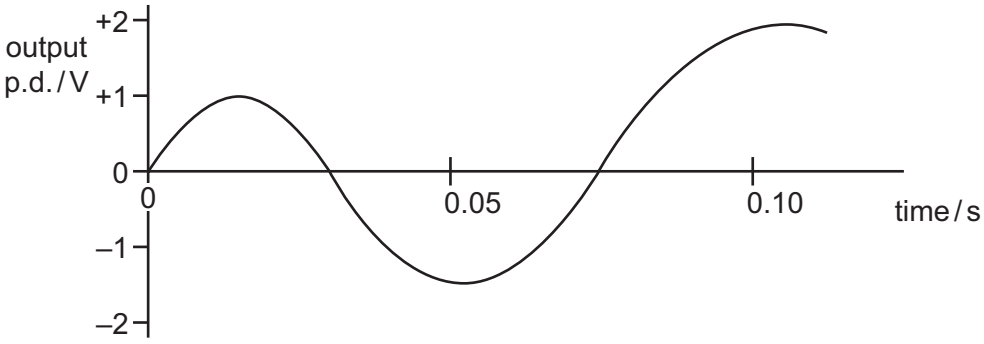
A



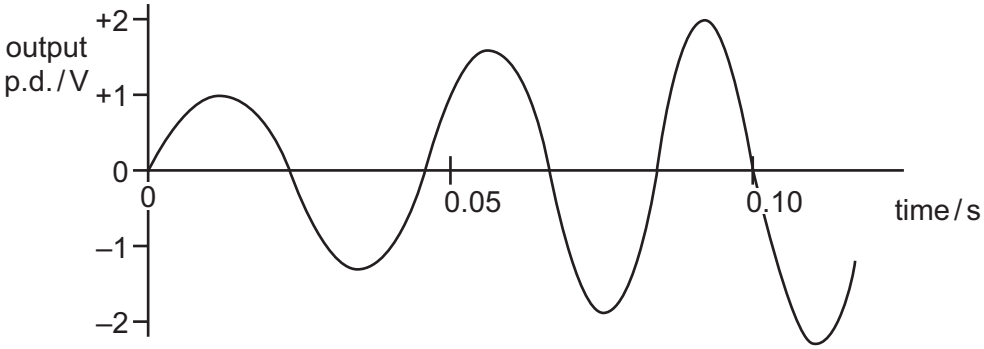
B



C



D



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34 There is a bright spot on the screen of a cathode-ray oscilloscope (c.r.o.). This is caused by fast-moving particles.

What are these particles?

A alpha-particles

B electrons

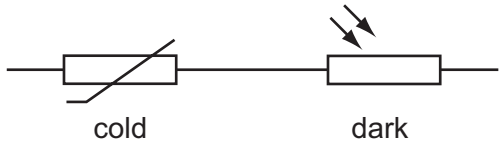
C neutrons

D protons

35 A thermistor and a light-dependent resistor are connected in series.

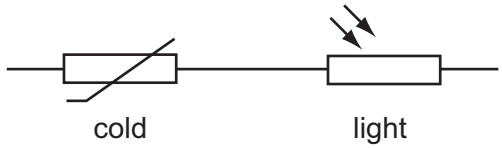
Which conditions give the largest resistance?

A



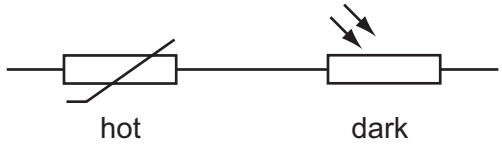
cold dark

B



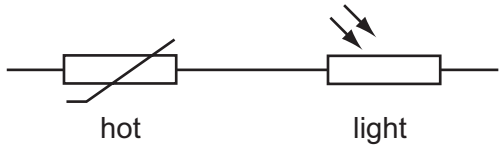
cold light

C



hot dark

D



hot light

36 Three types of radiation emitted by unstable nuclei are helium nuclei, short wavelength electromagnetic waves and electrons.

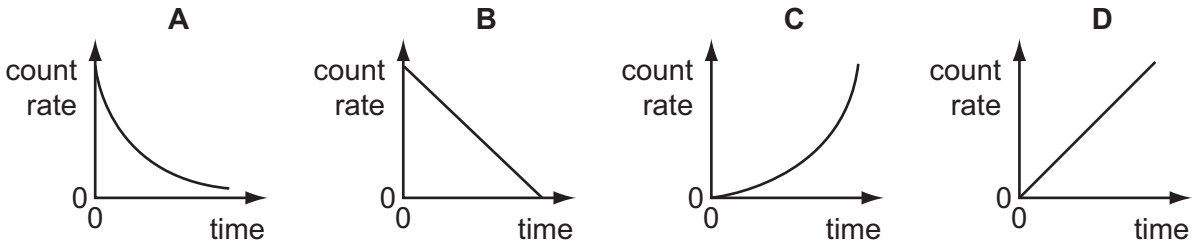
What are these three types of radiation?

	helium nuclei	electromagnetic waves	electrons
A	alpha	gamma	beta
B	beta	gamma	alpha
C	gamma	alpha	beta
D	gamma	beta	alpha

37 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

38 Which graph shows how the count rate of a radioactive isotope varies with time?



39 For which purpose is the radioactive isotope carbon-14 used?

A dating of ancient bones

B fuel for a nuclear power station

C killing cancerous cells

D operating mobile telephones

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40 A nucleus of phosphorus $^{32}_{15}P$ emits a beta-particle to form a new nucleus.

What is the nucleon number and what is the proton number of the new nucleus?

	nucleon number (mass number)	proton number (atomic number)
A	28	13
B	31	14
C	31	15
D	32	16

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