Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/12**

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)

* 8 5 8 0 9 8 7 0 0 *

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 **18** printed pages and **2** blank pages.

© UCLES 2017

CAMBRIDGE
International Examinations

1 A car accelerates at 5.0 m / s^2 along a straight, horizontal road and reaches a velocity of 20 m / s in a time of 4.0 s.

During this time, its total displacement is 40 m.

Which quantity is a scalar?

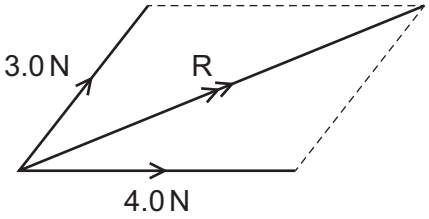
A a displacement of 40 m

B a time of 4.0 s

C a velocity of 20 m / s

D an acceleration of 5.0 m / s^2

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

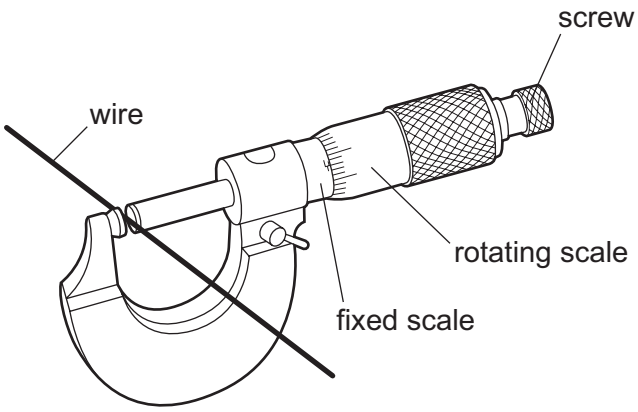


The angle between the 3.0 N force and the 4.0 N force can be any value from 0° to 90°.

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

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

3 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.

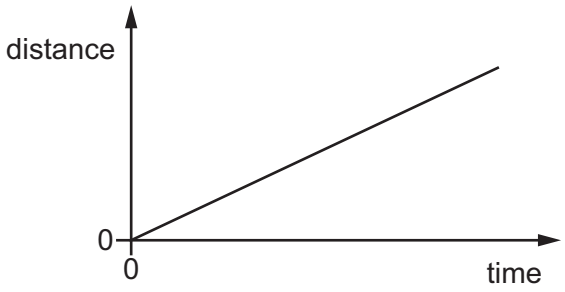
B Subtract the fixed-scale reading from the rotating-scale reading.

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.

© UCLES 2017

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?

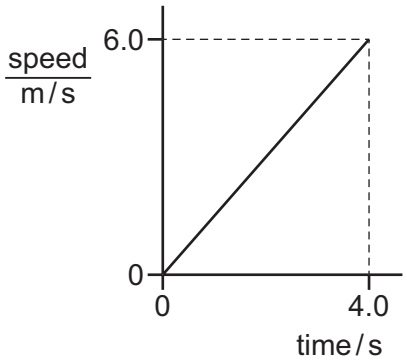
A acceleration

B gravitational potential energy

C kinetic energy

D resultant force

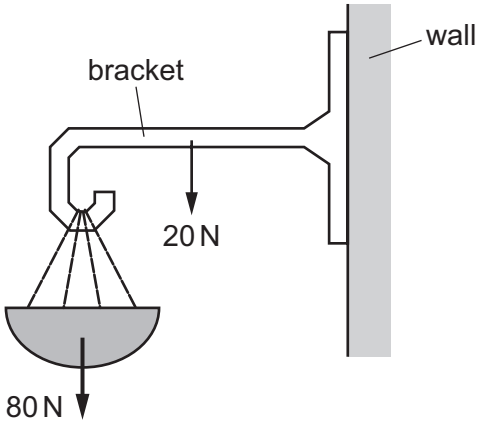
5 The diagram shows a speed-time graph for an object moving with uniform acceleration.



What is the distance travelled in the first 4.0 s?

A 0.67 m **B** 1.5 m **C** 12 m **D** 24 m

6 A hanging basket is fixed to a wall by a bracket.



The weight of the basket is 80 N. The weight of the bracket is 20 N.

What is the size of the upwards force exerted on the bracket by the wall?

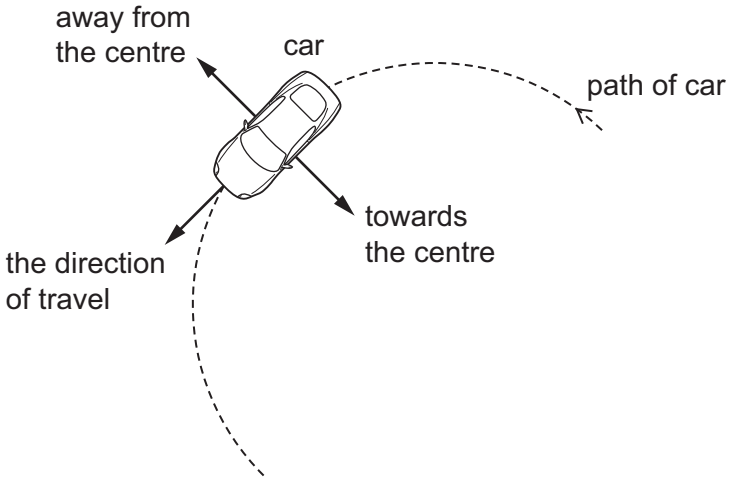
A 60 N **B** 70 N **C** 90 N **D** 100 N

7 A train of mass 240 000 kg is travelling at a speed of 60 m / s. The brakes are applied and it decelerates for 10 minutes until it comes to rest.

What is the average resultant force?

A 24 000 N **B** 40 000 N **C** 480 000 N **D** 720 000 N

8 A car travels at a constant speed along a circular, horizontal path.



Which statement describes the forces acting on the car?

A They are balanced as the car is moving at constant speed.

B They are unbalanced with a resultant in the direction away from the centre.

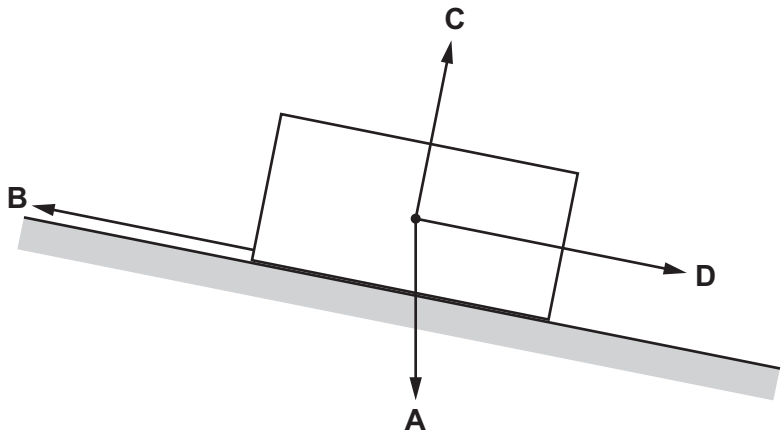
C They are unbalanced with a resultant in the direction of travel of the car.

D They are unbalanced with a resultant in the direction towards the centre.

© UCLES 2017

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 On the Earth's surface, the gravitational field strength is 10 N / kg.

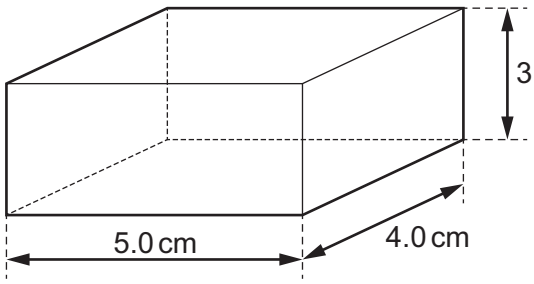
On the surface of Mars, the gravitational field strength is 3.8 N / kg.

A robot vehicle has a weight of 2000 N on Earth.

What is the weight of the robot vehicle on Mars?

A 200 N **B** 760 N **C** 7600 N **D** 76 000 N

11 The diagram shows a rectangular block.



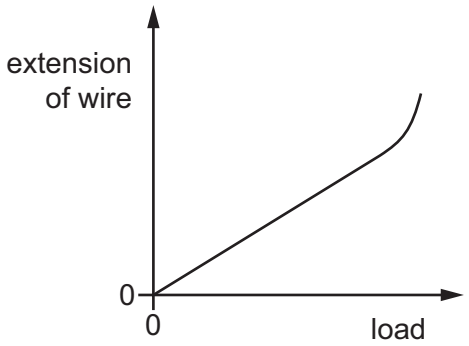
(not to scale)

The density of the block is 2.5 g / cm^3.

What is the mass of the block?

A 18 g **B** 24 g **C** 50 g **D** 150 g

12 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.

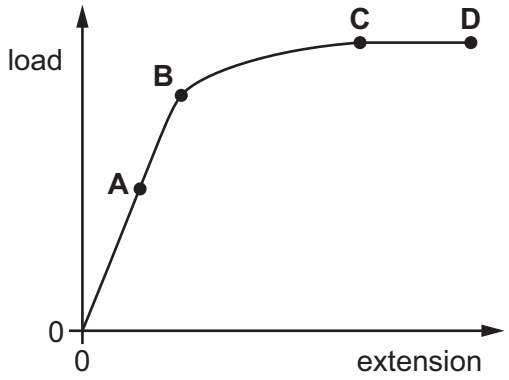
B At a certain load, the wire becomes harder to extend.

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

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

13 The diagram shows a load-extension graph for a wire.

Which point is the limit of proportionality?



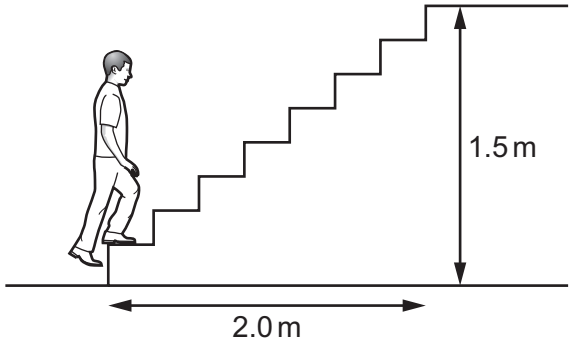
14 A small motor has an input power rating of 10 W and is run for 5.0 minutes.

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

© UCLES 2017

15 A student of mass 60 kg climbs some steps. He travels a horizontal distance of 2.0 m and a vertical distance of 1.5 m. The gravitational field strength g is 10 N / kg.



(not to scale)

What is the work done against the force of gravity?

A 90 J **B** 120 J **C** 900 J **D** 1200 J

16 Which energy source is non-renewable?

A nuclear energy

B solar energy

C tidal energy

D wind energy

17 In a coal-fired power station, the coal is burnt and thermal energy (heat) is produced. The thermal energy is used to produce electrical energy.

In which order does the energy pass through parts of the power station?

A boiler → generator → turbine

B boiler → turbine → generator

C turbine → boiler → generator

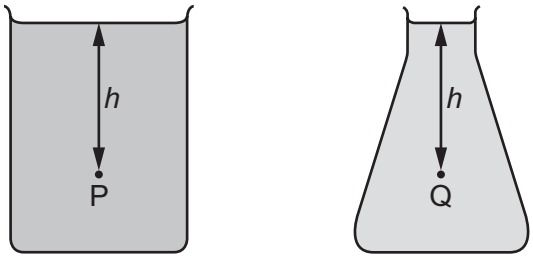
D turbine → generator → boiler

© UCLES 2017

18 Two glass containers filled with different liquids are placed next to each other.

Point P is a distance *h* below the surface of the liquid in one container.

Point Q is a distance *h* below the surface of the liquid in the other container.



Why is the pressure at P different from the pressure at Q?

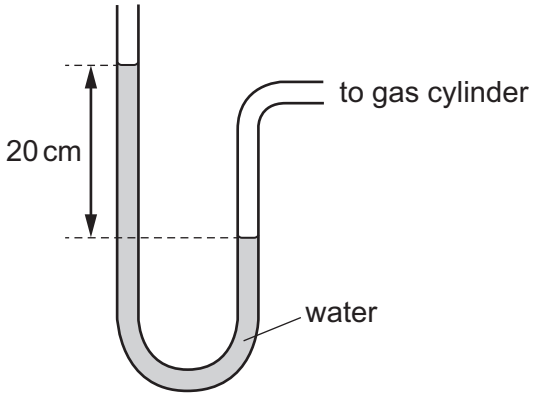
A The atmospheric pressure is different at P.

B The densities of the liquids are different.

C The gravitational field strength is different at P.

D The shapes of the containers are different.

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



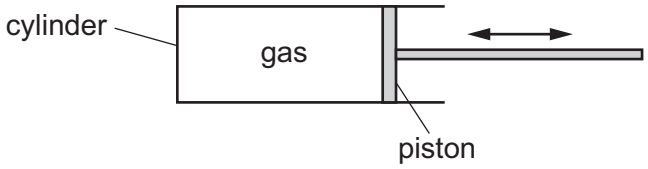
The density of water is 1000 kg / m^3 and the gravitational field strength *g* is 10 N / kg.

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

© UCLES 2017

20 A fixed mass of gas is enclosed in a cylinder with a movable piston.



The gas is initially at pressure p_1 and has a volume V_1.

The temperature is kept constant. The piston is moved so that the pressure becomes p_2 and the volume becomes V_2.

Which equation is correct?

A $\frac{p_1}{V_1} = \frac{p_2}{V_2}$

B $\frac{p_1}{p_2} = \frac{V_1}{V_2}$

C $p_1V_1 = p_2V_2$

D $p_1V_2 = p_2V_1$

21 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

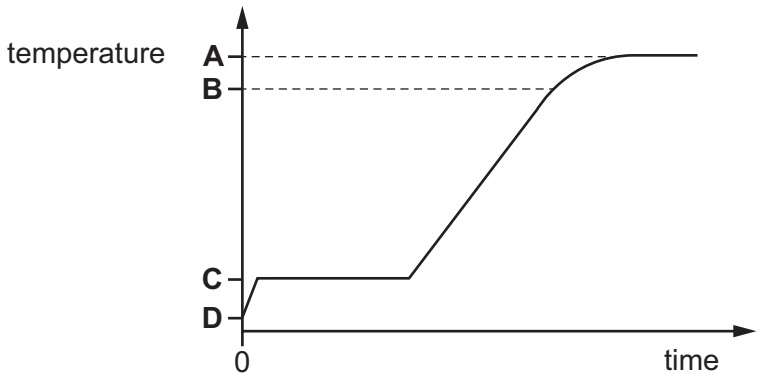
B a liquid being heated

C a liquid undergoing solidification

D a solid being heated

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 A tray for making ice cubes holds 30 g of water. The specific latent heat of fusion of ice is 3.3×10^5 J / kg.

How much thermal energy is removed from the water at 0 °C to change it into ice at 0 °C?

A 9.9×10^3 J **B** 1.1×10^4 J **C** 9.9×10^6 J **D** 1.1×10^7 J

24 The bulbs of the four thermometers shown all contain mercury.

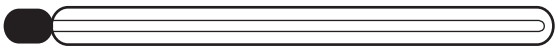
Which thermometer is the most sensitive?

A



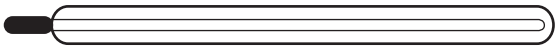
small bulb, narrow tube

B



large bulb, wide tube

C



small bulb, wide tube

D



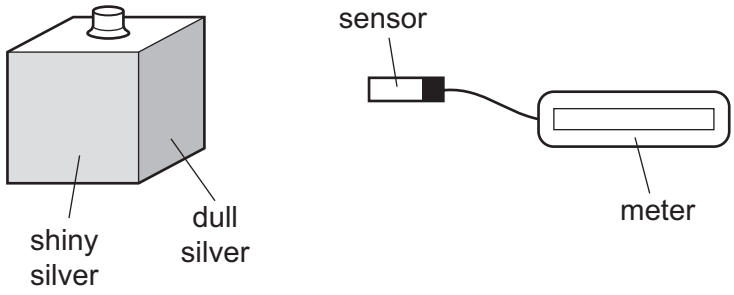
large bulb, narrow tube

© UCLES 2017

25 A metal box has four different surfaces; dull black, shiny black, dull silver and shiny silver.

The box is filled with boiling water so that each surface is at the same temperature.

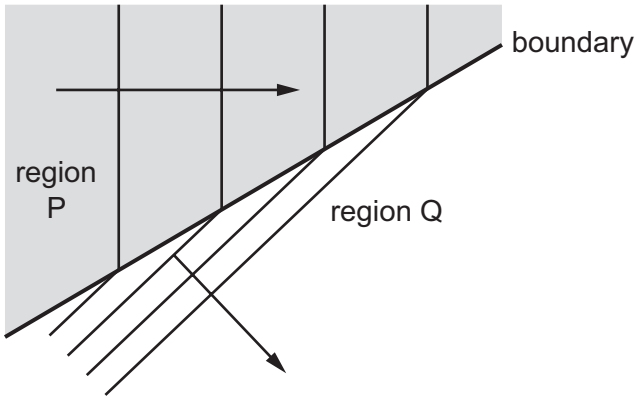
A sensor measures the amount of radiation from each surface.



Which surface emits the least radiation and which surface emits the most radiation?

	least	most
A	dull black	shiny silver
B	dull silver	shiny black
C	shiny black	dull silver
D	shiny silver	dull black

26 The diagram shows a water wave in a ripple tank being refracted at the boundary between region P and region Q.

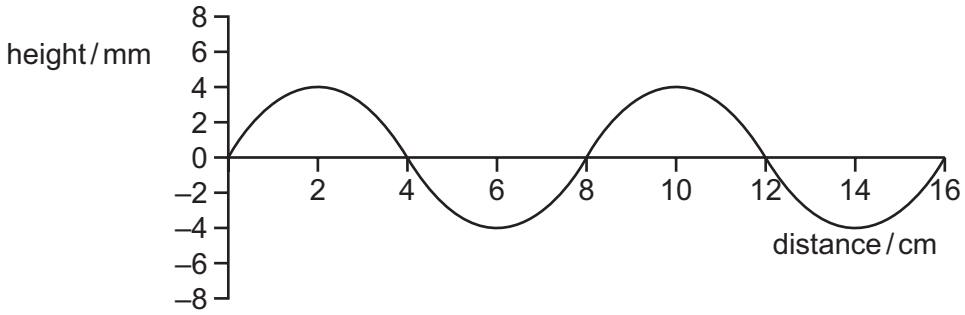


How does the wave in region P compare with the wave in region Q?

	wavelength of wave in region P	speed of wave in region P
A	larger	faster
B	larger	slower
C	smaller	faster
D	smaller	slower

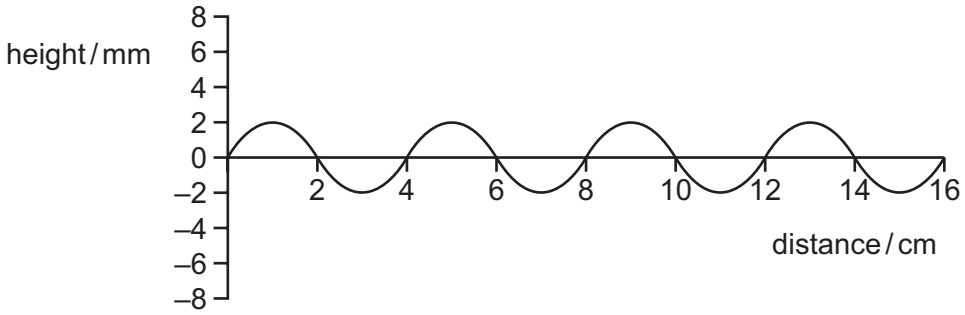
© UCLES 2017

27 The graph shows how the height of a water wave varies with distance along the wave.

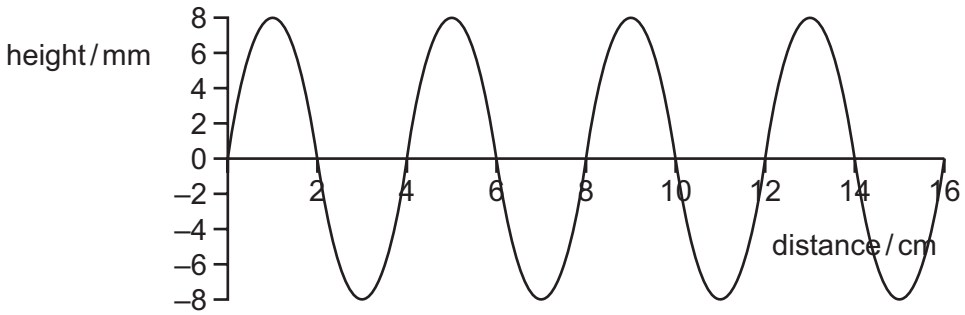


Which graph shows a wave with twice the amplitude, half the frequency, and the same speed?

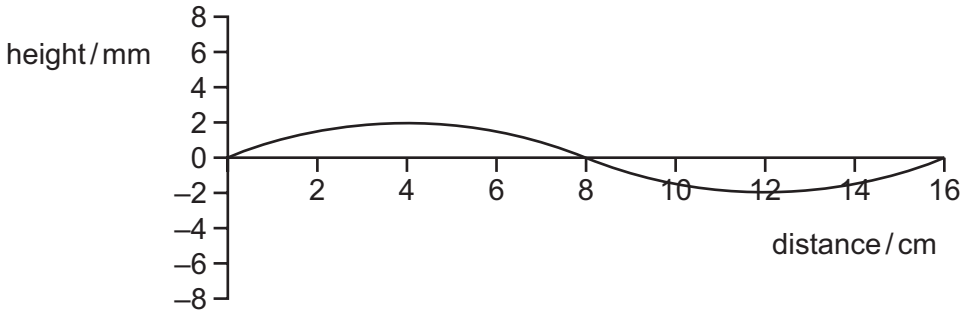
A



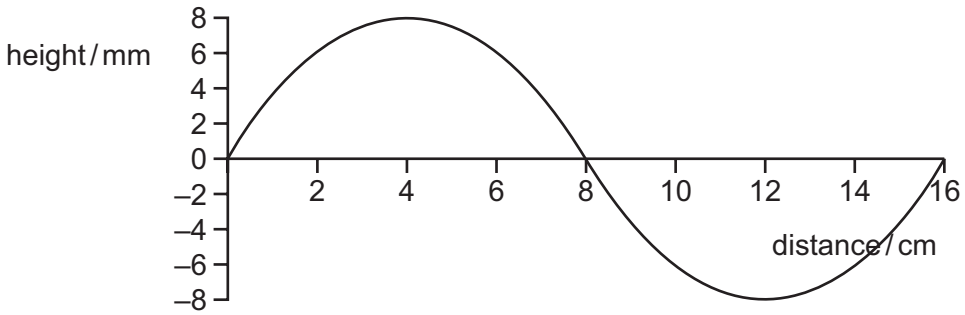
B



C



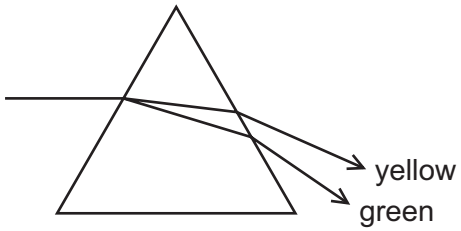
D



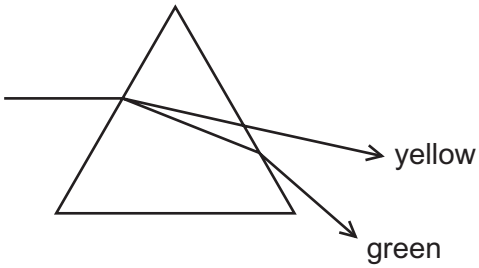
28 A narrow beam of yellow and green light is separated as it passes through a prism.

Which ray diagram is correct?

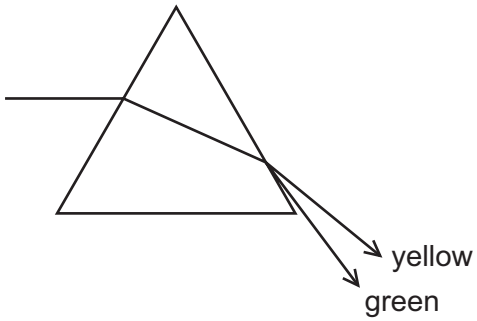
A



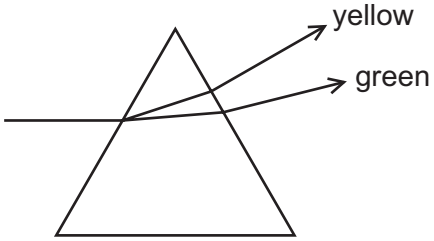
B



C



D



29 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

30 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.

© UCLES 2017

31 Which action demagnetises a bar magnet?

A placing the magnet inside a coil connected to a d.c. supply

B placing the magnet inside a coil connected to an a.c. supply

C withdrawing the magnet from inside a coil connected to a d.c. supply

D withdrawing the magnet from inside a coil connected to an a.c. supply

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

What is the box made from?

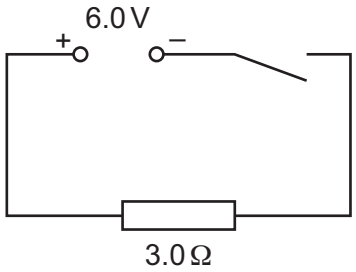
A aluminium

B iron

C rubber

D steel

33 The circuit shown is switched on for 1.0 minute.



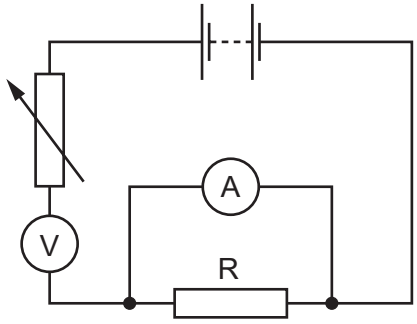
How much charge passes through the 3.0 Ω resistor?

A 2.0 C **B** 12 C **C** 120 C **D** 720 C

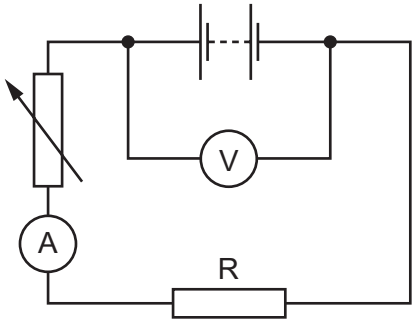
34 The readings of an ammeter and a voltmeter are used to calculate the resistance of resistor R.

Which circuit shows the ammeter and voltmeter in the correct positions?

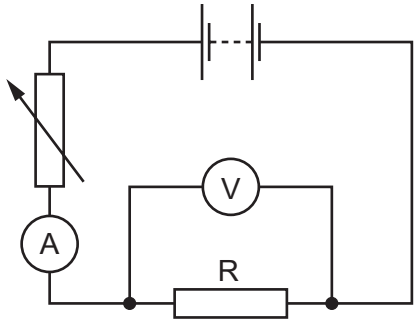
A



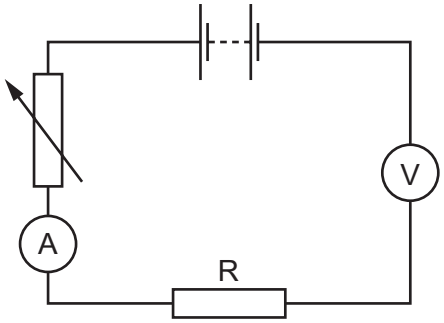
B



C

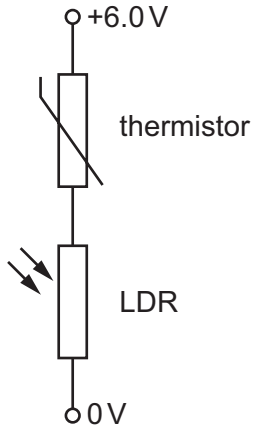


D



© UCLES 2017

35 A thermistor and a light-dependent resistor (LDR) are connected in series. A potential difference (p.d.) of 6.0 V is applied across them as shown.



The thermistor has a resistance of 6000 Ω in a cold room and 1000 Ω in a warm room. The LDR has a resistance of 2000 Ω in dim light and 500 Ω in bright light.

When is the p.d. across the LDR equal to 2.0 V?

A in a cold room with bright light

B in a cold room with dim light

C in a warm room with bright light

D in a warm room with dim light

36 What is the effect of using a split-ring commutator?

A it ensures that the current is the same in all parts of a series circuit

B it generates an alternating electric current

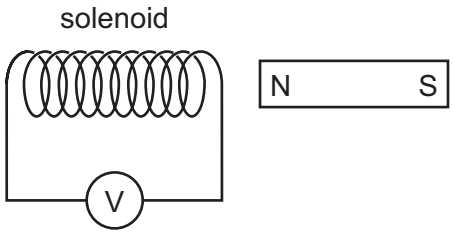
C it produces a force on a current-carrying coil

D it reverses the direction of the current in the coil of a motor

© UCLES 2017

[Turn over

37 The N-pole of a magnet is moved into a solenoid and an e.m.f. is induced.



What causes an increase in the induced e.m.f.?

A moving the magnet more quickly

B moving the magnet more slowly

C pulling the magnet out instead of pushing it in

D using the S-pole of the magnet instead of the N-pole

38 Which material is used for the core of a transformer?

A copper

B iron

C plastic

D steel

39 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

40 What happens to the proton number (atomic number) of a nucleus as it emits an alpha-particle?

A It decreases by one.

B It decreases by two.

C It decreases by four.

D It does not change.

© UCLES 2017

BLANK PAGE

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2017