Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **May/June 2019**

1 hour

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

* 5 6 9 6 4 2 0 8 8 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.

© UCLES 2019

1 Which quantities are both vectors?

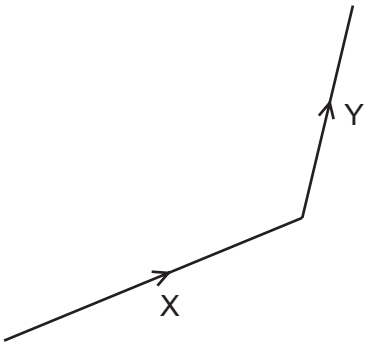
A acceleration and length

B distance and velocity

C length and distance

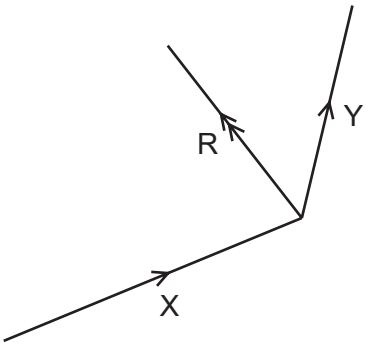
D velocity and acceleration

2 Two forces X and Y act as shown.

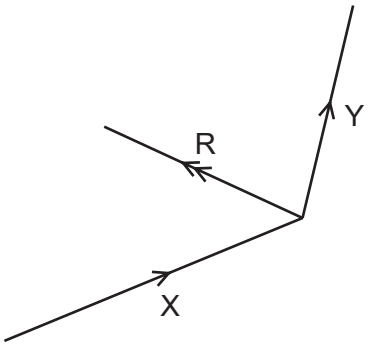


Which diagram shows the resultant force R of X and Y?

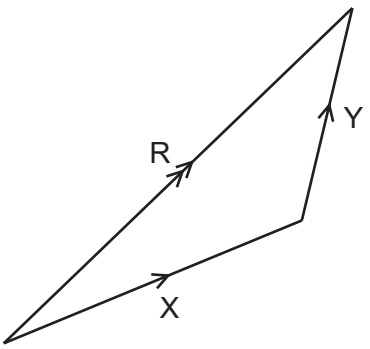
A



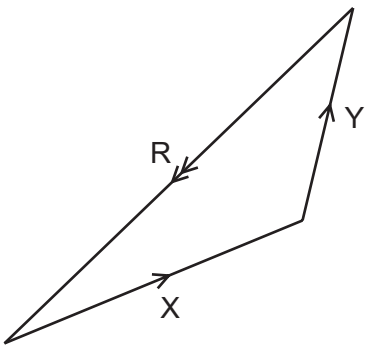
B



C



D



3 Which reading is given to one tenth of a millimetre?

A 3.3 cm **B** 3.31 cm **C** 3.310 cm **D** 3.312 cm

© UCLES 2019

4 The magnitudes of three different electric charges are given below.

What is the correct order of size, from largest to smallest?

A 1 mC → 1 MC → 1 kC

B 1 MC → 1 mC → 1 kC

C 1 MC → 1 kC → 1 mC

D 1 kC → 1 mC → 1 MC

5 Four of the gravitational forces that act between bodies in the Solar System are listed below.

P the force on the Moon due to the Earth

Q the force on the Earth due to the Sun

R the force on the Earth due to the Moon

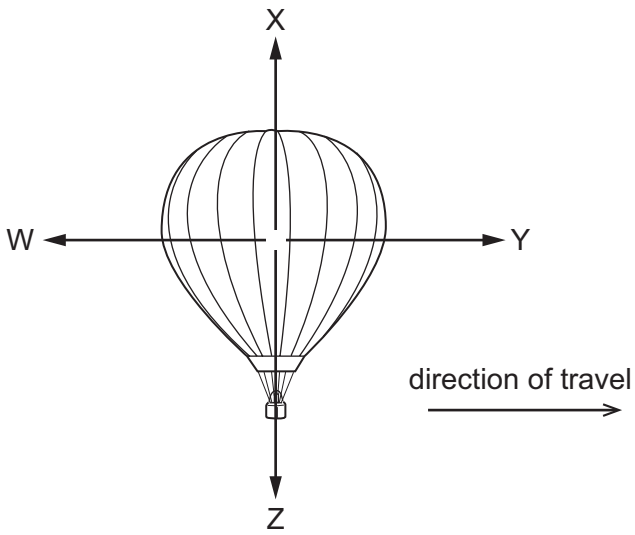
S the force on the Moon due to the Sun

Which two forces are a Newton's third law pair (action and reaction)?

A P and Q **B** P and R **C** Q and S **D** R and S

6 A hot-air balloon is travelling at constant velocity and is at a constant height above the ground.

The diagram shows the only four forces acting on the balloon.



Which statement is correct?

A W and Y are equal, X and Z are equal.

B W and Y are equal, X is greater than Z.

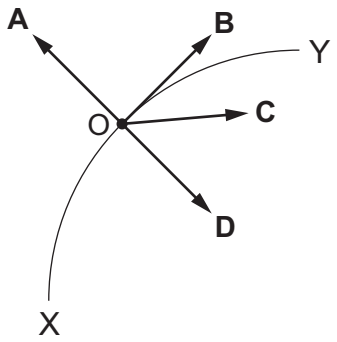
C X and Z are equal, Y is greater than W.

D Y is greater than W, X is greater than Z.

© UCLES 2019

7 The diagram represents an object O moving from X to Y along a circular path at constant speed.

What is the direction of the resultant force on O in the position shown?

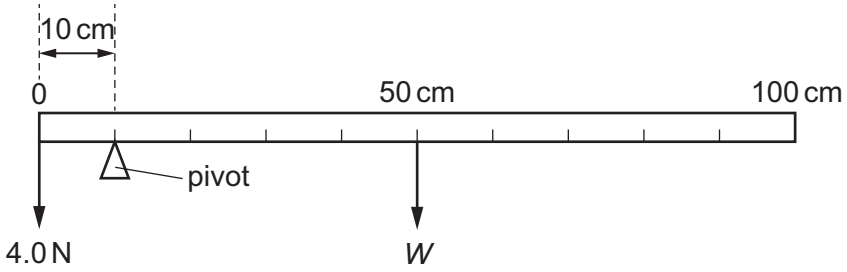


8 Four objects of different masses are situated in places with different gravitational field strengths.

Which object has the greatest weight?

	mass / kg	$\frac{\text{gravitational field strength}}{\text{N/kg}}$
A	3.0	10.4
B	3.5	9.5
C	4.0	10.2
D	4.5	9.0

9 A uniform metre rule is balanced by a 4.0 N weight as shown.



What is the weight *W* of the metre rule?

A 1.0 N **B** 4.0 N **C** 16 N **D** 40 N

10 Which statement about centre of mass is correct?

A Objects with a centre of mass at the same height are less stable when the base is larger.

B Objects with a centre of mass at the same height are more stable when the base is larger.

C Objects with higher centres of mass and smaller bases are more stable.

D Objects with identical bases are more stable when the centre of mass is higher.

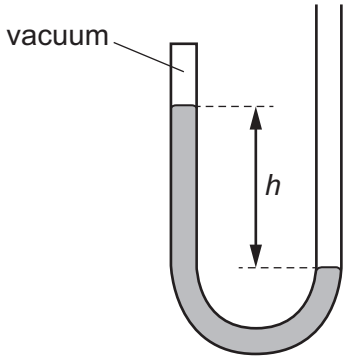
© UCLES 2019

11 A garden table weighs 60 N and has a top surface of area 2.0 m^2. It is raining and the rain produces a pressure of 4.0 N / m^2 on the table.

Ignoring the pressure of the atmosphere, what is the force exerted by the table on the ground?

A 52 N **B** 58 N **C** 62 N **D** 68 N

12 The diagram shows a manometer containing mercury that is sealed at one end.



What happens to the distance *h* when the manometer is taken higher up a mountain?

A It decreases, because atmospheric pressure decreases with height.

B It decreases, because atmospheric pressure increases with height.

C It increases, because atmospheric pressure decreases with height.

D It increases, because atmospheric pressure increases with height.

13 Some doctors measure blood pressure by using a mercury manometer. Blood pressure varies by 5.6 kPa as a heart beats.

The density of mercury is 14 000 kg / m^3 and the gravitational field strength *g* is 10 N / kg.

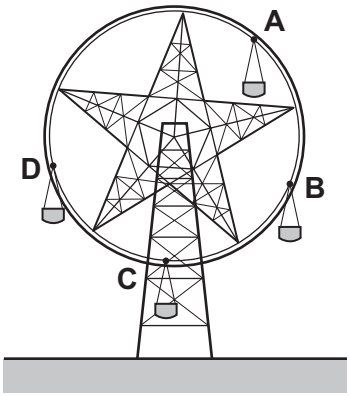
What is the change in the height difference between the levels in the manometer during a heartbeat?

A 40 mm **B** 80 mm **C** 400 mm **D** 800 mm

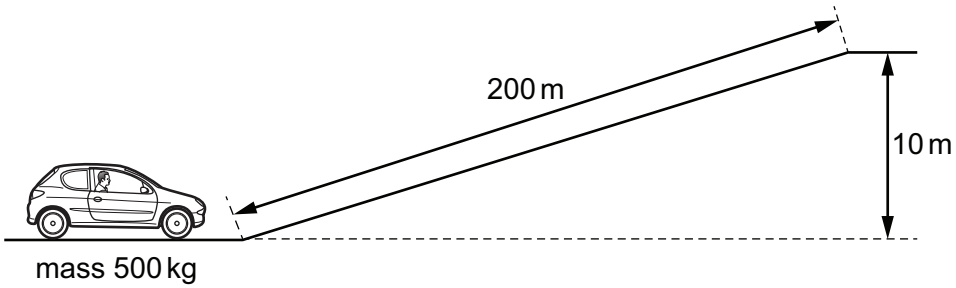
© UCLES 2019

14 The diagram shows a stationary fairground ride with four chairs of equal mass.

Which chair has the most gravitational potential energy?



15 The diagram shows a small car of mass 500 kg approaching a hill. It moves up the hill with constant speed.



The gravitational field strength g is 10 N / kg.

Ignoring friction, how much work is done in moving the car up the hill?

A 5.0×10^3 J **B** 5.0×10^4 J **C** 1.0×10^5 J **D** 1.0×10^6 J

16 Which statement is correct?

A Infrared radiation cannot travel in a vacuum.

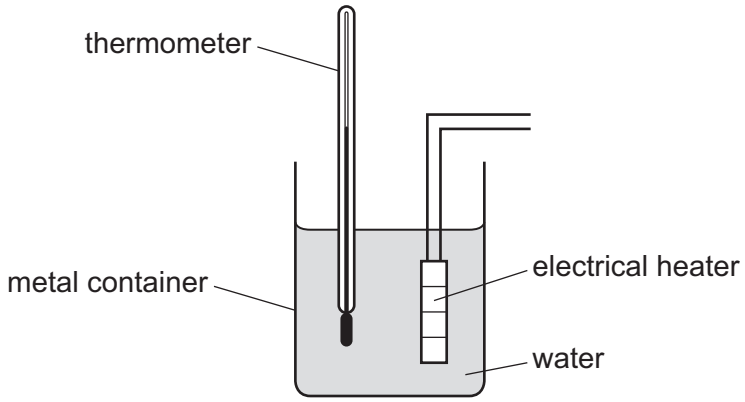
B Infrared radiation cannot travel in solids or in gases.

C Infrared radiation can only travel in a vacuum.

D Infrared radiation can travel in a vacuum and in gases.

© UCLES 2019

17 The diagram shows a set of apparatus used to determine the specific heat capacity of water.



What does **not** affect the rate at which energy is lost to the surroundings?

A insulating the container

B placing a lid on the container

C polishing the outer surface of the container

D moving the thermometer closer to the heater

18 Two thermometers X and Y contain different liquids but are otherwise identical.

The thermometers are heated through the same temperature rise. The volume of liquid in thermometer X increases by more than the volume of liquid in thermometer Y.

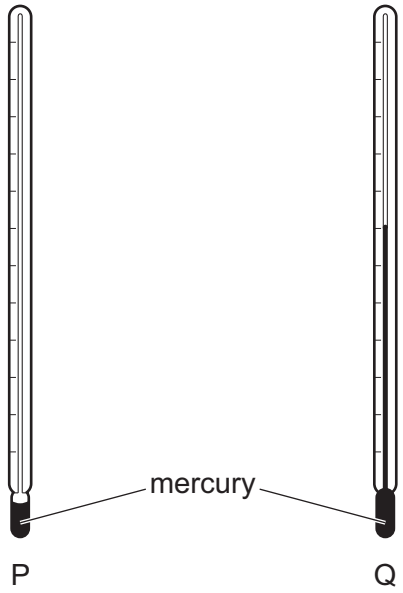
Which is the more sensitive thermometer and which is the thermometer with the larger range?

	more sensitive thermometer	thermometer with the larger range
A	X	X
B	X	Y
C	Y	X
D	Y	Y

© UCLES 2019

[Turn over

19 The diagram shows two thermometers P and Q that are identical except that P contains less mercury.



Which statement is correct?

A The lowest measureable temperature is the same on P and on Q.

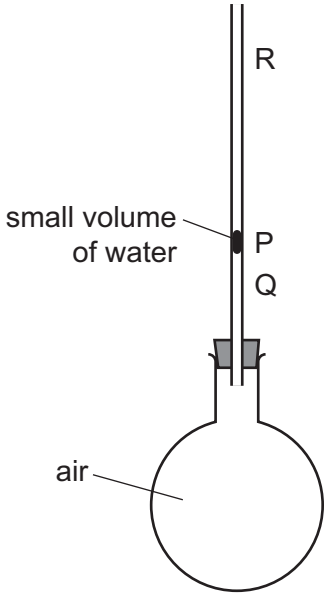
B The range of P is equal to the range of Q.

C The scales on P and Q are both linear.

D The sensitivity of P is equal to the sensitivity of Q.

© UCLES 2019

20 The diagram shows air trapped in a flask by a small volume of water in a thin tube.



When the flask is held in a student's hands, the small volume of water first moves down from P to Q, and then up to R.

Why does the small volume of water move like this?

A The flask contracts and then the air expands.

B The flask expands and then the air contracts.

C The flask expands and then the air expands less than the flask.

D The flask expands and then the air expands more than the flask.

21 Which statement about particles in a liquid is correct?

A They all have the same speed.

B They are stationary.

C They move at random.

D They vibrate about a fixed point.

22 A gas is enclosed in a container of fixed volume.

The gas gains heat energy from an external source.

What happens to the molecules of the gas?

A They expand.

B They move faster inside the container.

C They move further apart.

D They vibrate with greater frequency.

© UCLES 2019

23 Which waves are longitudinal?

A gamma rays

B light waves

C ultrasound waves

D X-rays

24 A ray of light strikes a plane mirror at an angle of incidence of 20°.

The angle of incidence is then increased by 5°.

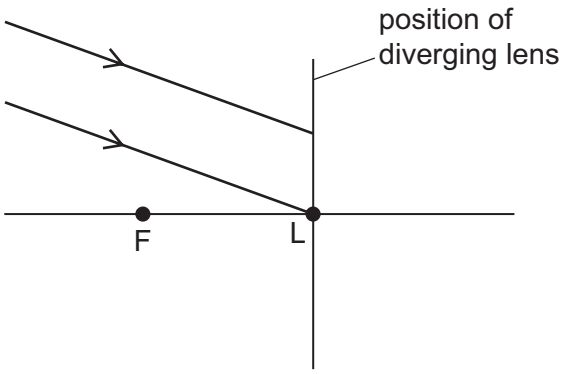
What is the new angle between the incident ray and the reflected ray?

A 10° **B** 25° **C** 45° **D** 50°

© UCLES 2019

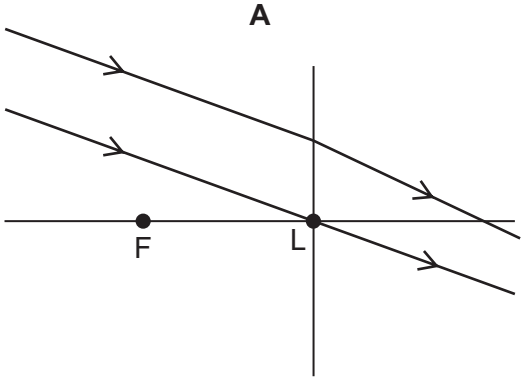
25 A parallel beam of light is incident on a thin diverging lens.

The focal length of the lens is FL, as shown in the diagram.

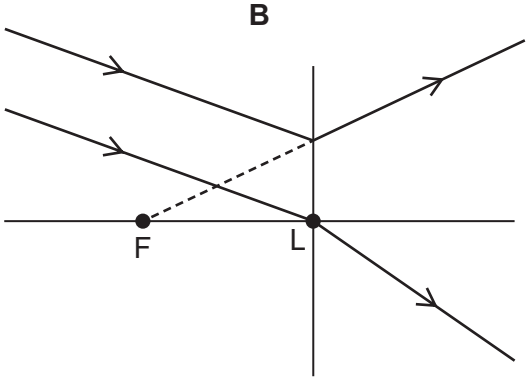


Which ray diagram shows the beam after it has passed through the lens?

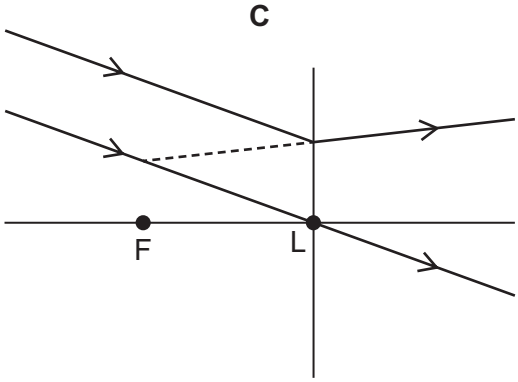
A



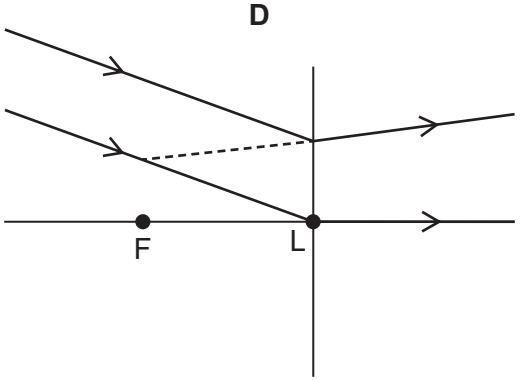
B



C



D



26 The following lists show colours of the spectrum.

Which list shows these colours in order of increasing frequency?

A blue, violet, red, orange, yellow, green

B green, blue, violet, red, orange, yellow

C red, orange, violet, yellow, green, blue

D red, orange, yellow, green, blue, violet

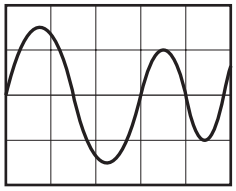
© UCLES 2019

[Turn over

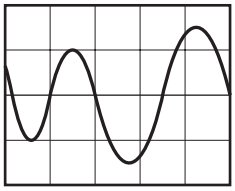
27 Four sound waves are displayed on the screen of a cathode-ray oscilloscope.

Which sound wave gets louder and has a pitch that decreases?

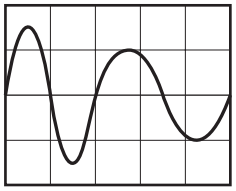
A



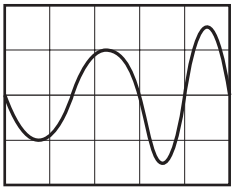
B



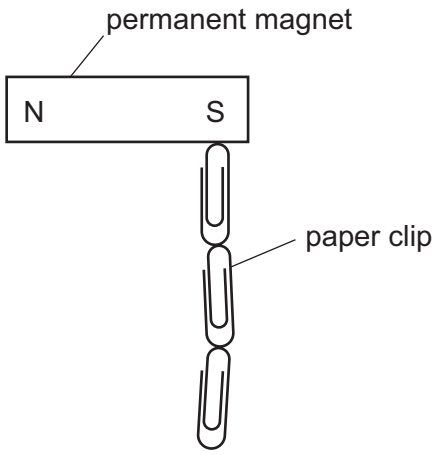
C



D



28 A student investigates a permanent magnet by suspending paper clips from the magnet as shown.



Which statement is correct?

A Each paper clip has a S-pole at the top and a N-pole at the bottom when suspended from the permanent magnet.

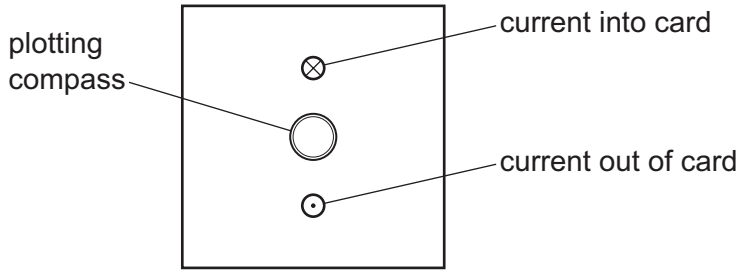
B If the paper clips are made of soft iron they become demagnetised when the permanent magnet is removed.

C If the paper clips are made of steel they become demagnetised when the permanent magnet is removed.

D More paper clips can be suspended from the N-pole.

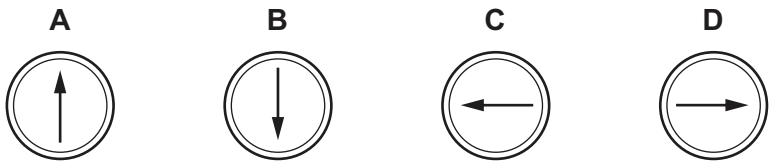
© UCLES 2019

29 Two vertical wires pass at right-angles through a piece of card. There is a large current in each wire in the direction shown.

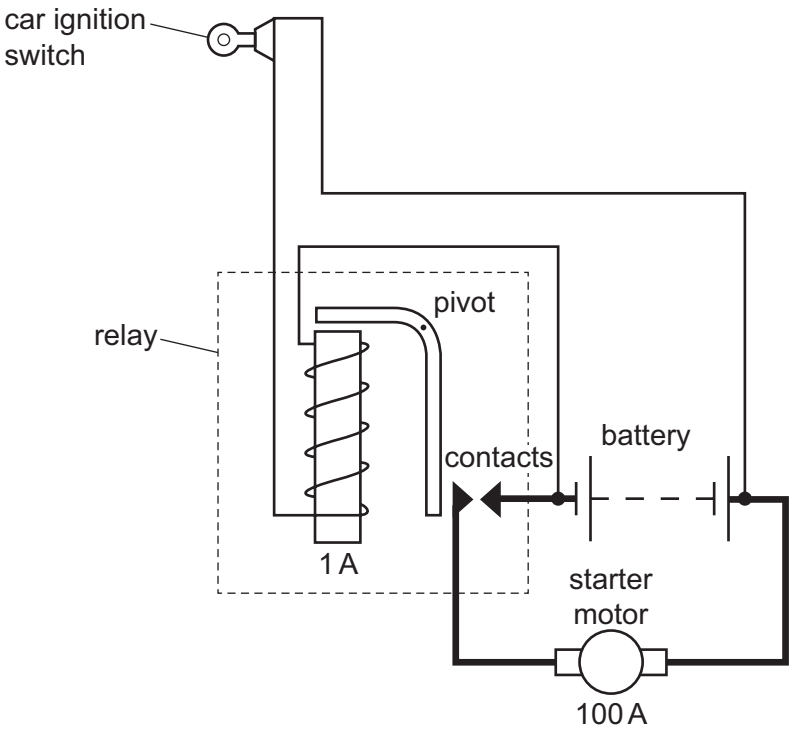


A plotting compass is placed on the card.

Which diagram shows the direction in which the needle of the plotting compass points?



30 The diagram shows a car ignition switch and starter motor.



The ignition switch is in a circuit with long, thin wires. The starter motor is in a circuit with short, thick wires.

What is the explanation for the choice of wires?

A Each circuit needs to contain the same total mass of wire.

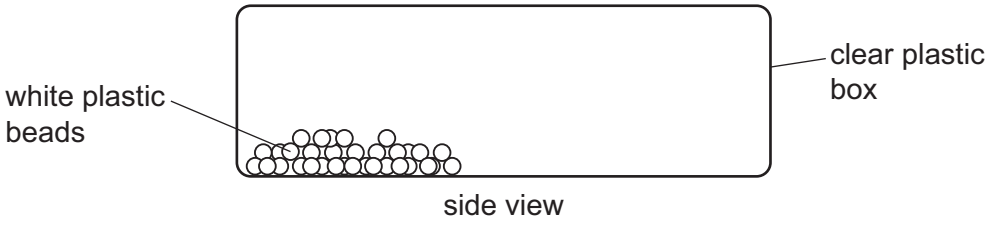
B Thicker wires heat up more quickly when the relay is switched on.

C Thin wires have lower resistances.

D The ignition switch circuit carries a smaller current than the starter motor circuit.

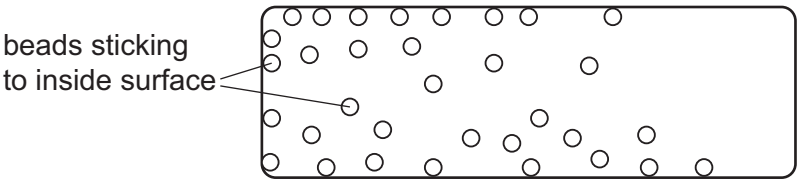
© UCLES 2019

31 The diagram shows some white plastic beads in a clear plastic box.



side view

The box is shaken and the beads rub against the box. The beads stick to the inside surface of the box.



side view

Which row is a possible explanation for this?

	box	beads
A	gains electrons	no change of electrons
B	loses electrons	gain electrons
C	no change of electrons	lose electrons
D	no change of electrons	gain electrons

32 Which unit is the same as a volt?

A ampere / ohm

B ampere / watt

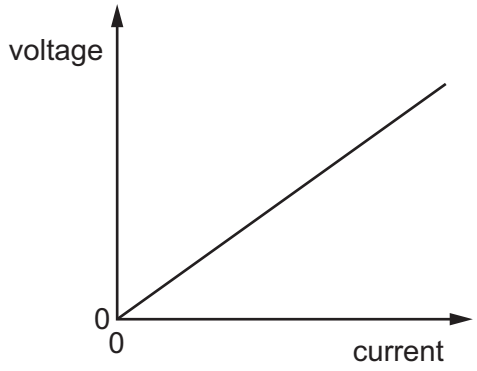
C ohm / ampere

D watt / ampere

© UCLES 2019

[Turn over

33 The voltage / current graph for a metal wire is shown.



What does the gradient of this graph represent?

A the charge passing through the wire

B the e.m.f. of the battery connected to the wire

C the energy produced in the wire

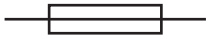
D the resistance of the wire

34 What is the symbol for a device that measures current?

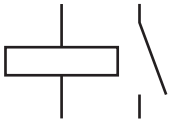
A



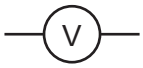
B



C



D



35 The cable to an electric cooker contains a live wire, a neutral wire and an earth wire.

When the cooker is working correctly, in which wires are the currents equal?

A the live, the neutral and the earth

B the live and the earth only

C the neutral and the earth only

D the neutral and the live only

36 The coil of a simple motor lies between the poles of a permanent magnet. The coil rotates about its axis when there is a current in it.

What decreases the frequency of rotation of the coil?

A increasing the number of turns in the coil

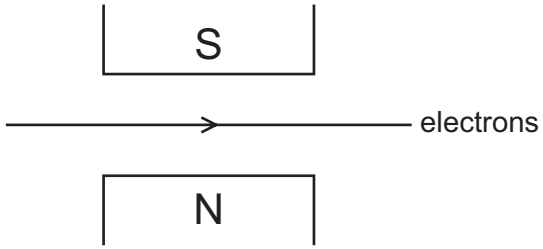
B reversing the current

C using a lower voltage supply

D using a stronger magnet

© UCLES 2019

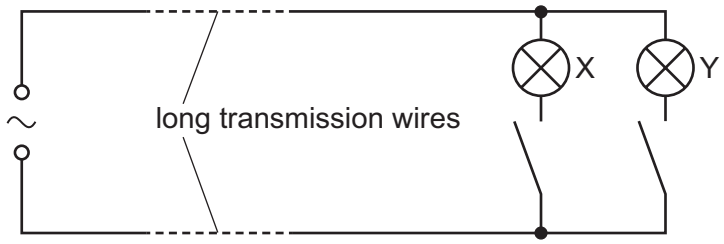
37 A beam of electrons travels through a vacuum. The beam passes between the poles of a magnet as shown.



What is the direction of the conventional current and what is the direction of the magnetic field?

	direction of the conventional current	direction of the magnetic field
A	→	↓
B	→	↑
C	←	↓
D	←	↑

38 A teacher uses the circuit shown.



The identical lamps X and Y are connected to a low voltage a.c. power supply by high resistance transmission wires. Both lamps are switched on.

Lamp X is then switched off. Lamp Y stays switched on.

What happens to the voltage and the power supplied to lamp Y?

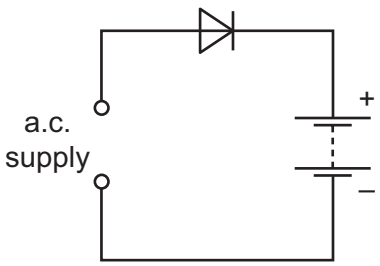
	the voltage supplied to lamp Y	the power supplied to lamp Y
A	decreases	decreases
B	decreases	stays the same
C	increases	increases
D	increases	stays the same

© UCLES 2019

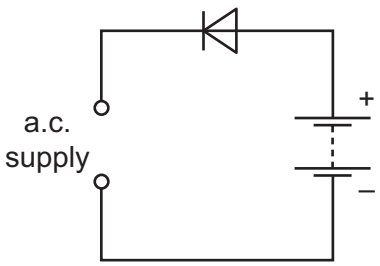
39 A car battery supplies a current in one direction. A current in the opposite direction recharges the battery.

Which circuit recharges the battery, using an alternating current (a.c.) supply and a diode?

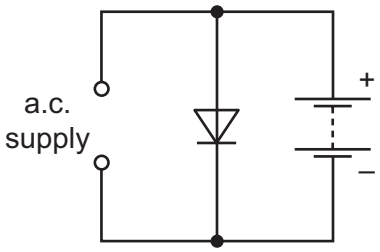
A



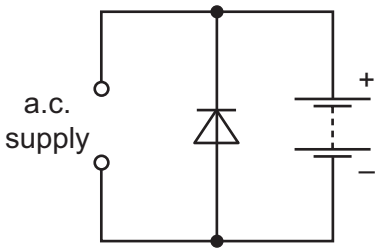
B



C



D



40 A neutral atom of boron contains 5 electrons and 5 protons.

The nucleon number (mass number) of the atom is 11.

How many neutrons are there in the atom?

A 1 **B** 5 **C** 6 **D** 11

© UCLES 2019

BLANK PAGE

© UCLES 2019

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 Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

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

© UCLES 2019