Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

PHYSICS **0625/21**

Paper 2 Multiple Choice (Extended) **May/June 2016**

45 minutes

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

9170531728

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.

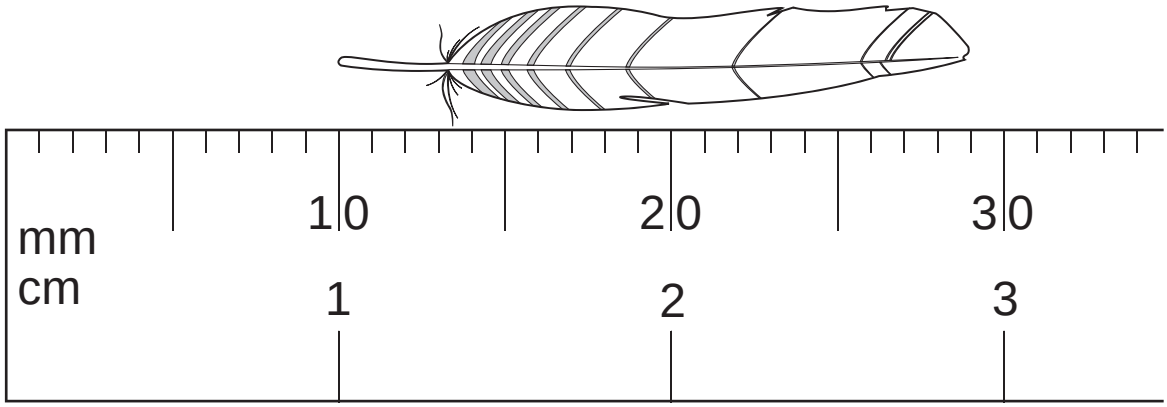
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / s^2).

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **18** printed pages and **2** blank pages.

© UCLES 2016

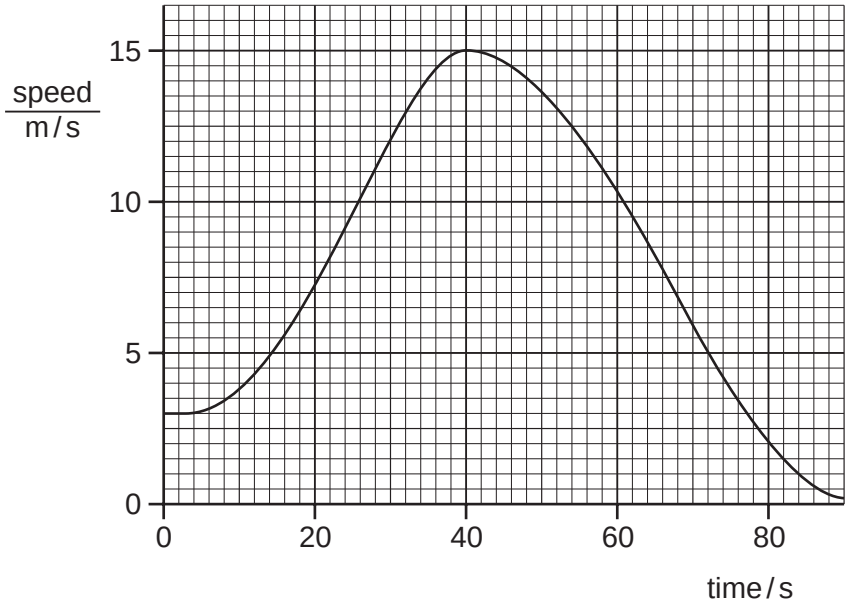
1 The diagram shows an enlarged drawing of the end of a metre rule. It is being used to measure the length of a small feather.



What is the length of the feather?

A 19 mm **B** 29 mm **C** 19 cm **D** 29 cm

2 The speed-time graph shown is for a car moving in a straight line.



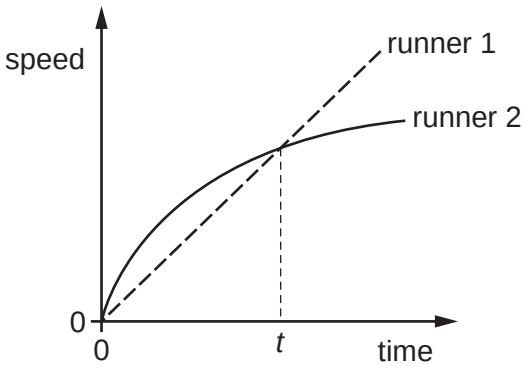
What is the acceleration of the car when the time is 40 s?

A $0\,m/s^2$ **B** $\frac{15-3}{40}\,m/s^2$ **C** $\frac{15}{40}\,m/s^2$ **D** $(15-3)\,m/s^2$

© UCLES 2016

3 Two runners take part in a race.

The graph shows how the speed of each runner changes with time.



What does the graph show about the runners at time *t*?

A Both runners are moving at the same speed.

B Runner 1 has zero acceleration.

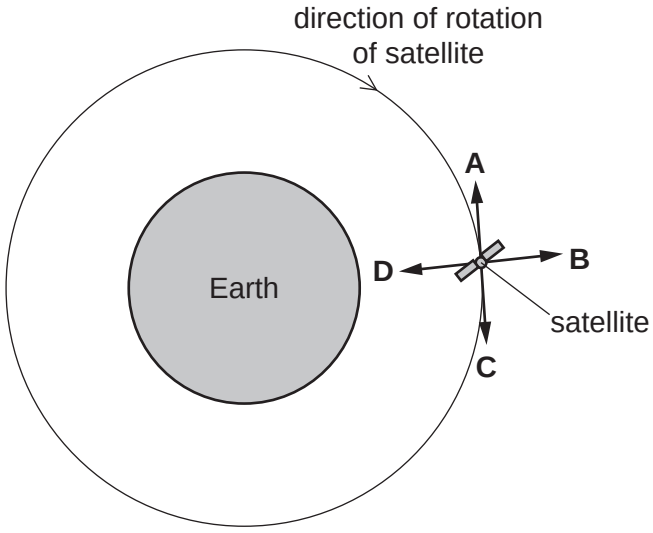
C Runner 1 is overtaking runner 2.

D Runner 2 is slowing down.

4 A satellite orbits the Earth above the atmosphere at a constant speed.

The diagram shows the satellite at one point in its circular orbit around the Earth.

Which labelled arrow shows the direction of the resultant force on the satellite at the position shown?



5 A cup contains hot liquid.

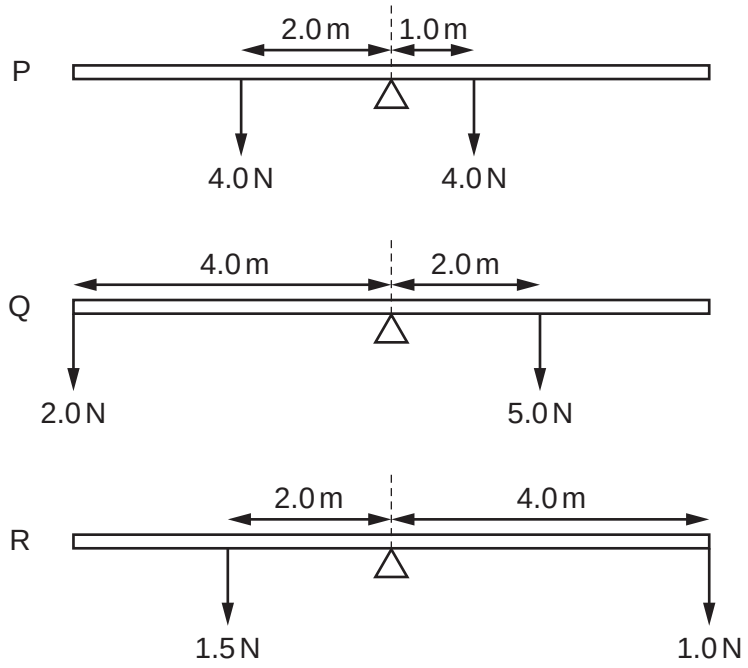
Some of the liquid evaporates.

What happens to the mass and what happens to the weight of the liquid in the cup?

	mass	weight
A	decreases	decreases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	stays the same

6 The diagrams show three uniform beams P, Q and R, each pivoted at its centre.

The two forces acting on each beam are also shown.



Which beams rotate clockwise?

A P and Q only

B P and R only

C Q and R only

D P, Q and R

© UCLES 2016

7 An object of mass 50 kg accelerates from a velocity of 2.0 m / s to a velocity of 10 m / s in the same direction.

What is the impulse provided to cause this acceleration?

A 250 N s **B** 400 N s **C** 850 N s **D** 2500 N s

8 A scalar quantity has

A magnitude and direction.

B no magnitude and no direction.

C magnitude but no direction.

D direction but no magnitude.

9 Energy is released in some nuclear reactions.

Which nuclear reaction takes place in a nuclear power station, and which nuclear reaction takes place in the Sun?

	nuclear power station	the Sun
A	fission	fission
B	fission	fusion
C	fusion	fission
D	fusion	fusion

10 A lorry of mass 4000 kg is travelling at a speed of 4.0 m / s.

A car has a mass of 1000 kg. The kinetic energy of the car is equal to the kinetic energy of the lorry.

What is the speed of the car?

A 2.0 m / s **B** 4.0 m / s **C** 8.0 m / s **D** 16.0 m / s

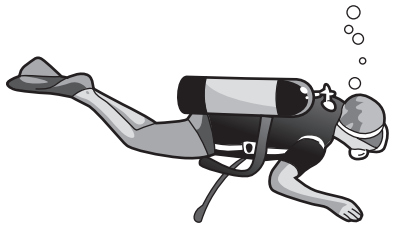
© UCLES 2016

11 A force acts on an object and causes the object to move a certain distance, in the same direction as the force.

Which row represents a situation in which the largest amount of work is done on the object by the force?

	force / N	distance moved / m
A	2.0	40.0
B	10.0	2.0
C	20.0	6.0
D	100.0	1.0

12 A diver under water uses breathing apparatus at a depth where the pressure is 1.25×10^5 Pa.



A bubble of gas breathed out by the diver has a volume of 20 cm^3 when it is released. The bubble moves upwards to the surface of the water.

At the surface of the water, the atmospheric pressure is 1.00×10^5 Pa.

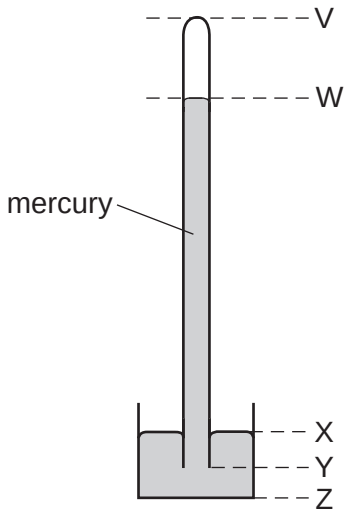
The temperature of the water is the same at all depths.

What is the volume of this bubble when it reaches the surface?

A 15 cm^3 **B** 16 cm^3 **C** 20 cm^3 **D** 25 cm^3

© UCLES 2016

13 The diagram shows a simple mercury barometer.



The atmospheric pressure increases.

Which distance increases?

A VW **B** WY **C** XY **D** XZ

14 Which statement about evaporation is correct?

A Evaporation causes the temperature of the remaining liquid to decrease.

B Evaporation does not occur from a cold liquid near its freezing point.

C Evaporation does not occur from a dense liquid, such as mercury.

D Evaporation occurs from all parts of a liquid.

15 A beaker contains 0.500 kg of water at a temperature of 3.0 °C. The beaker is heated, and the internal energy of the water increases by 21.0 kJ.

The specific heat capacity of water is 4200 J / (kg °C).

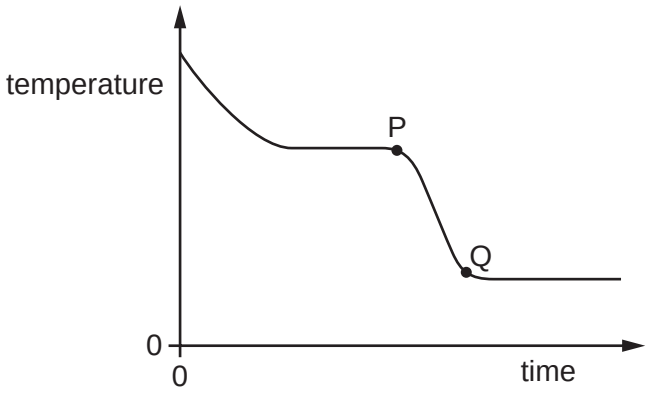
What is the temperature of the water after it has been heated?

A 5.5 °C **B** 10.0 °C **C** 13.0 °C **D** 31.5 °C

© UCLES 2016

16 A substance loses thermal energy (heat) to the surroundings at a steady rate.

The graph shows how the temperature of the substance changes with time.



What could the portion PQ of the graph represent?

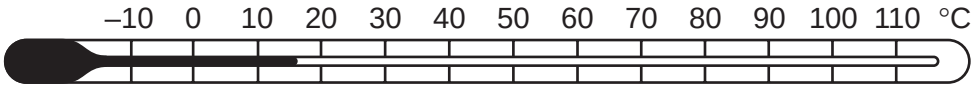
A gas condensing

B gas cooling

C liquid cooling

D liquid solidifying

17 A student wishes to check the upper and the lower fixed points on a Celsius scale thermometer.



She has four beakers P, Q, R and S.

Beaker P contains a mixture of ice and salt.

Beaker Q contains a mixture of ice and water.

Beaker R contains boiling salt solution.

Beaker S contains boiling water.

Which two beakers should she use to check the fixed points?

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

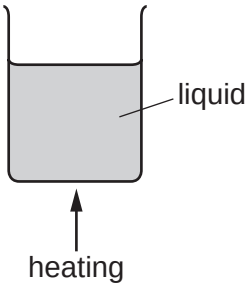
© UCLES 2016

18 Two otherwise identical cars, one black and one white, are at the same initial temperature. The cars are left in bright sunshine and their temperatures increase. During the night their temperatures decrease.

Which car shows the greater rate of temperature increase and which car shows the greater rate of temperature decrease?

	greater rate of temperature increase	greater rate of temperature decrease
A	black	black
B	black	white
C	white	black
D	white	white

19 A liquid is heated in a beaker.



The density of the liquid changes as its temperature increases. This causes energy to be transferred throughout the liquid.

How does the density change and what is this energy transfer process?

	density	energy transfer process
A	decreases	conduction
B	decreases	convection
C	increases	conduction
D	increases	convection

20 Sound waves of frequency 2.0 kHz travel through a substance at a speed of 800 m / s.

What is the wavelength of the waves?

A 0.40 m **B** 2.5 m **C** 400 m **D** 1600 m

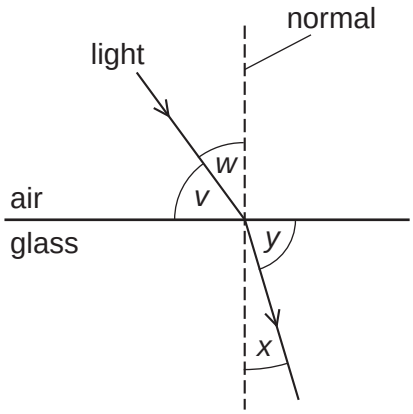
© UCLES 2016

21 Which row shows the natures of light waves, sound waves and X-rays?

	light waves	sound waves	X-rays
A	longitudinal	longitudinal	transverse
B	longitudinal	transverse	longitudinal
C	transverse	longitudinal	transverse
D	transverse	transverse	longitudinal

22 The diagram shows light travelling from air into glass.

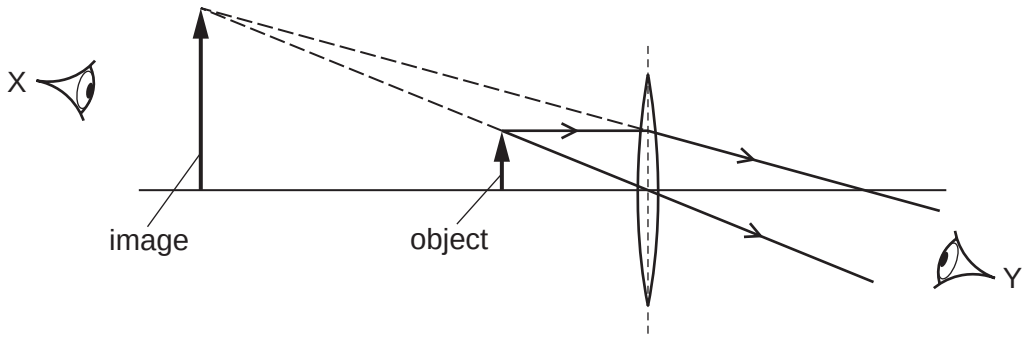
Four angles *v*, *w*, *x* and *y* are shown.



Which formula is used to calculate the refractive index *n* of the glass?

A $n = \frac{\sin v}{\sin y}$ **B** $n = \frac{\sin v}{\sin x}$ **C** $n = \frac{\sin w}{\sin y}$ **D** $n = \frac{\sin w}{\sin x}$

23 The diagram shows a converging lens forming an image of an object.



Which statement about the image is correct?

A It is real and can be seen by an eye at X.

B It is real and can be seen by an eye at Y.

C It is virtual and can be seen by an eye at X.

D It is virtual and can be seen by an eye at Y.

© UCLES 2016

24 A sound wave travels through air as a series of compressions and rarefactions.

Which row correctly compares the air pressure in a compression and the air pressure in a rarefaction to the air pressure nearby where there is no sound wave?

	air pressure in a compression	air pressure in a rarefaction
A	higher	higher
B	higher	lower
C	lower	higher
D	lower	lower

25 A sound wave has a certain amplitude and a certain frequency.

A second sound wave is quieter and lower in pitch than the first sound wave.

The second wave has

A a larger amplitude and a greater frequency.

B a larger amplitude and a smaller frequency.

C a smaller amplitude and a greater frequency.

D a smaller amplitude and a smaller frequency.

26 What is an electric field?

A a region around a wire carrying an electric current in which a compass needle experiences a force

B a region in which an electric charge experiences a force

C a region in which an electric charge is attracted by the Earth's gravity

D a region through which electromagnetic radiation is passing

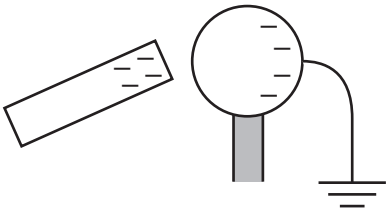
© UCLES 2016

[Turn over

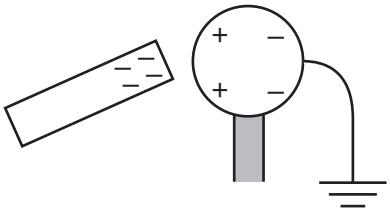
27 A negatively charged rod is held close to one side of a metal sphere. The other side of the sphere is earthed.

Which diagram shows the distribution of charge on the metal sphere?

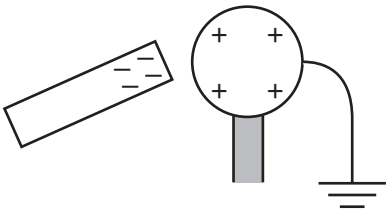
A



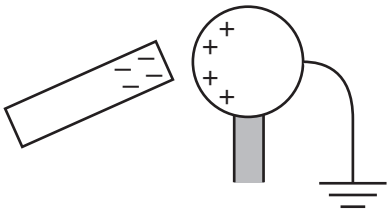
B



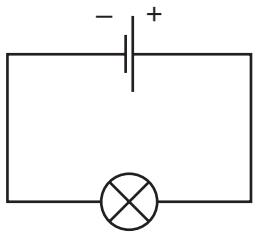
C



D



28 A cell is connected to a lamp, as shown.



A charge of 4.0 C flows through the lamp in 2.0 s.

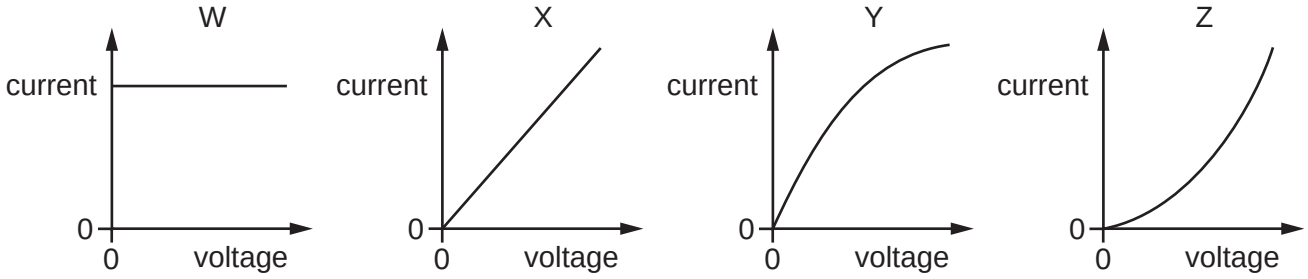
What is the direction of the electron flow in the lamp and what is the current in the lamp?

	direction of electron flow in lamp	current / A
A	from left to right	2.0
B	from left to right	8.0
C	from right to left	2.0
D	from right to left	8.0

© UCLES 2016

29 The diagrams show four current-voltage graphs.

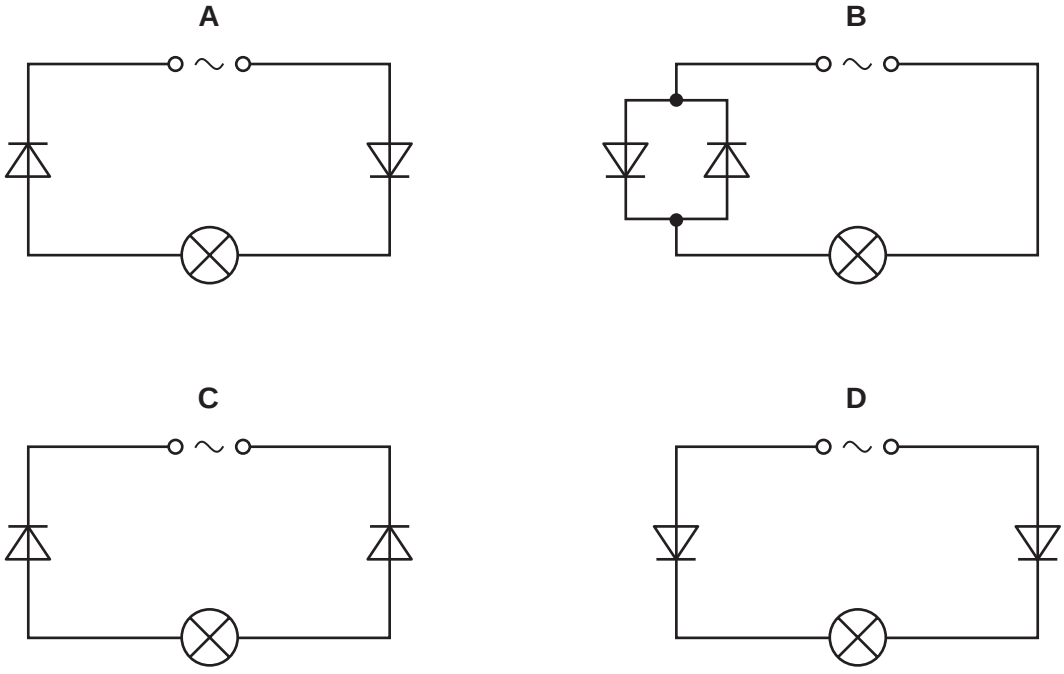
Which two graphs show the characteristics of an ohmic resistor and of a filament lamp?



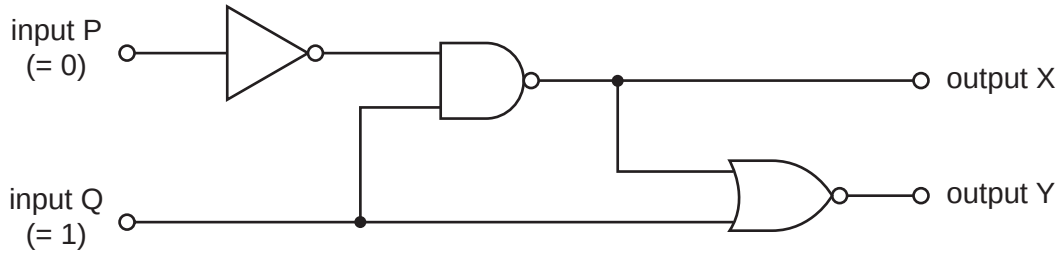
	ohmic resistor	filament lamp
A	W	Y
B	X	Y
C	W	Z
D	X	Z

30 The four circuits shown all include an a.c. power supply, two diodes and a lamp.

In which circuit is there a rectified current in the lamp?



31 The diagram shows a combination of logic gates.

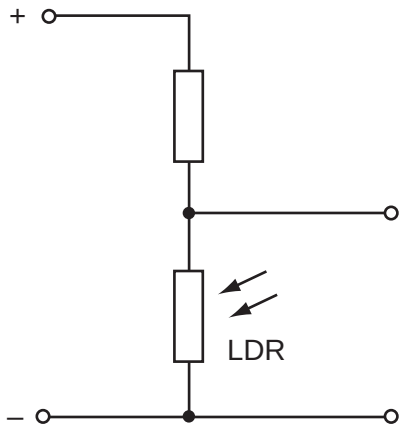


Input P is at a logic state 0 (low) and input Q is at a logic state 1 (high).

What are the logic states at output X and at output Y?

	output X	output Y
A	0	0
B	0	1
C	1	0
D	1	1

32 The diagram shows part of a circuit used to switch street lamps on and off automatically.



In the evening it gets dark.

Which row shows the effect on the resistance of the light-dependent resistor (LDR) and on the potential difference (p.d.) across it?

	resistance of LDR	p.d. across LDR
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

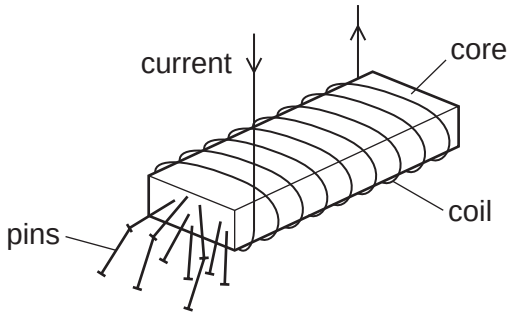
© UCLES 2016

33 A domestic circuit includes a 30 A fuse. This protects the wiring if there is too much current in the circuit.

In which wire is the 30 A fuse positioned, and what does it do when it operates?

	position	operation
A	live wire	disconnects the circuit
B	live wire	reduces the current to 30 A
C	neutral wire	disconnects the circuit
D	neutral wire	reduces the current to 30 A

34 A strong electromagnet is used to attract pins.



What happens when the current in the coil is halved?

A No pins are attracted.

B Some pins are attracted, but not as many.

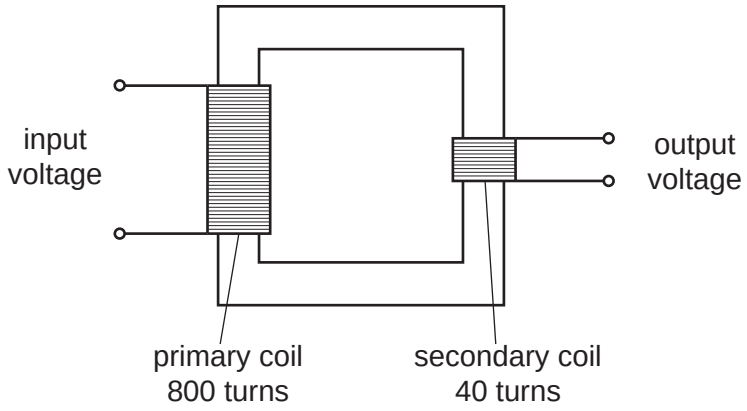
C The same number of pins is attracted.

D More pins are attracted.

© UCLES 2016

[Turn over

35 The diagram shows a transformer.



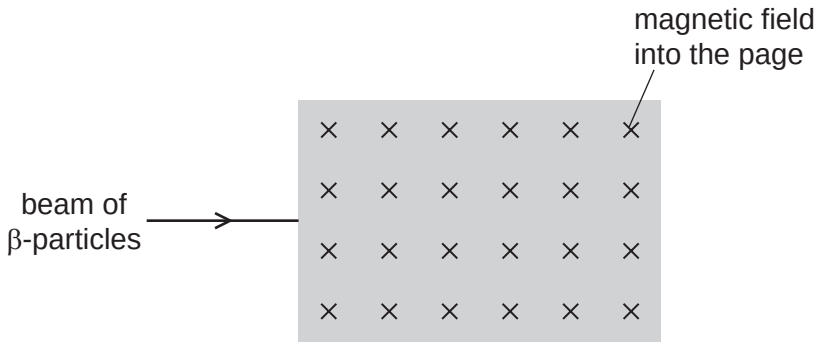
The input voltage is 240 V.

What is the output voltage?

A 6.0 V **B** 12 V **C** 20 V **D** 40 V

36 The diagram shows a shaded area where the direction of a magnetic field is into the page.

A beam of β-particles enters the field as shown.



In which direction is the beam of β-particles deflected as they enter the magnetic field?

A into the page

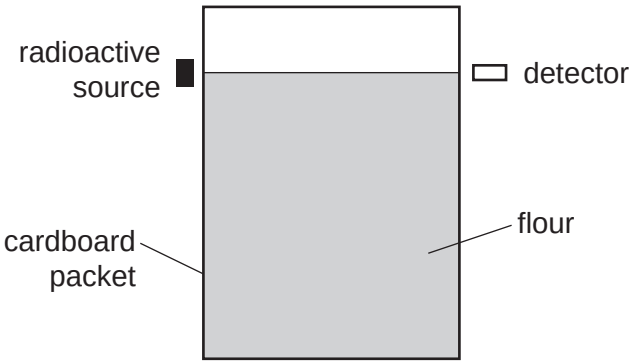
B out of the page

C down the page

D up the page

© UCLES 2016

37 The arrangement shown is used to check whether the flour inside a cardboard packet is above a certain level. If it is above this level, the flour absorbs the radiation from the source so that it doesn't reach the detector.



Which type of radiation is suitable to use?

A α-particles only

B β-particles only

C either α-particles or β-particles

D γ-rays only

38 A nucleus of americium $^{243}_{95}\text{Am}$ emits an α-particle to form a nucleus of neptunium (Np).

Which equation represents this decay?

A $^{243}_{95}\text{Am} \rightarrow {}^{247}_{97}\text{Np} + {}^{4}_{2}\alpha$

B $^{243}_{95}\text{Am} \rightarrow {}^{243}_{96}\text{Np} + {}^{0}_{-1}\alpha$

C $^{243}_{95}\text{Am} \rightarrow {}^{243}_{94}\text{Np} + {}^{0}_{-1}\alpha$

D $^{243}_{95}\text{Am} \rightarrow {}^{239}_{93}\text{Np} + {}^{4}_{2}\alpha$

39 A certain element has several isotopes.

Which statement about these isotopes is correct?

A They must have different numbers of electrons orbiting their nuclei.

B They must have the same number of neutrons in their nuclei.

C They must have the same number of nucleons in their nuclei.

D They must have the same number of protons in their nuclei.

© UCLES 2016

40 A reading is taken every 10 minutes of the number of emissions per second from a radioactive source. The table shows the readings.

time / min	number of emissions per second
0	800
10	560
20	400
30	280
40	200
50	140
60	100

What is the half-life of the source?

A 10 min **B** 20 min **C** 40 min **D** 60 min

© UCLES 2016

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.