



Rewarding Learning

General Certificate of Secondary Education
2025

Centre Number

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Candidate Number

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Physics

Unit 2

Foundation Tier



[GPY21]

GPY21

MONDAY 16 JUNE, MORNING

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all five** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

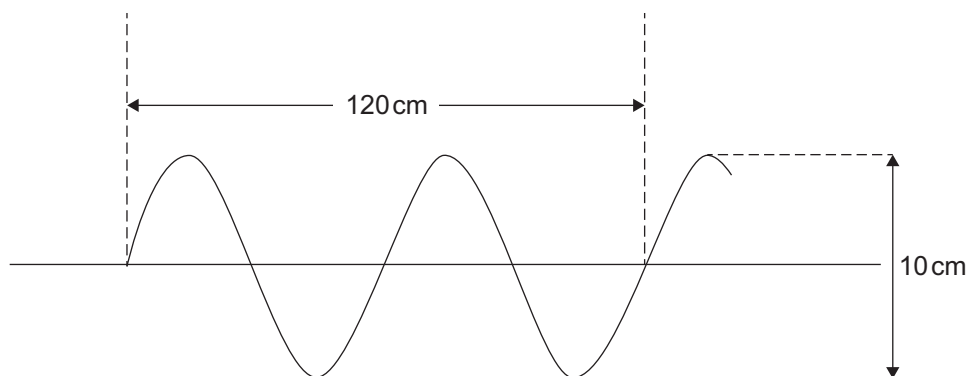
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You may use a scientific calculator.

Quality of written communication will be assessed in question **3(d)**.



- 1 (a) A water wave is shown below.



- (i) Calculate the wavelength of the wave.

Wavelength = _____ cm [2]

- (ii) Calculate the amplitude of the wave.

Amplitude = _____ cm [1]

- (iii) The speed of the wave is 300 cm/s.
Calculate its frequency and state its unit.
Show your working out.

Frequency = _____

Unit for frequency = _____ [4]



- (b) Complete the following sentences about water waves.
Choose words from the box below.

energy

transverse

longitudinal

vibrate

parallel

perpendicular

Like all waves, water waves transfer _____.

In a water wave the particles _____ in a direction which is
_____ to the direction in which the wave is travelling.

A water wave is an example of a _____ wave.

[4]

[Turn over



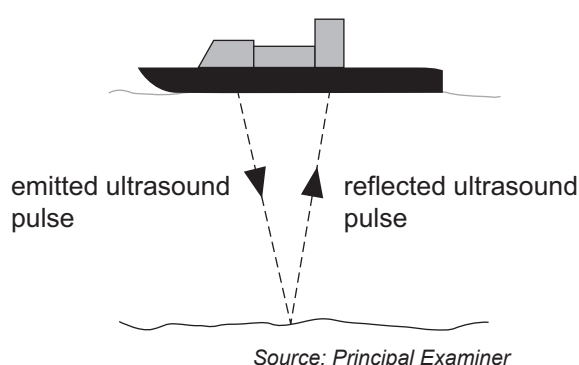
(c) (i) What is the frequency range of human hearing?

From _____ to _____ [1]

(ii) What is ultrasound?

_____ [1]

- (iii) An ultrasound pulse is emitted from the bottom of a ship. The pulse travels 2100 m to the seabed and is reflected back to the ship. The total time which elapses between the transmission of the pulse and receiving the echo from the seabed is 2.8 s.



Calculate the speed of the ultrasound waves in seawater.
Show your working out.

Speed of ultrasound = _____ m/s [4]



- (d) Below are statements about the dangers of electromagnetic waves.
Using lines, match each statement with the correct electromagnetic wave.

Danger

Heating of internal
tissues

Damage to skin cells and
may lead to cancer

Felt as heat and causes
skin burns

Electromagnetic wave

ultraviolet

microwave

infrared

[3]



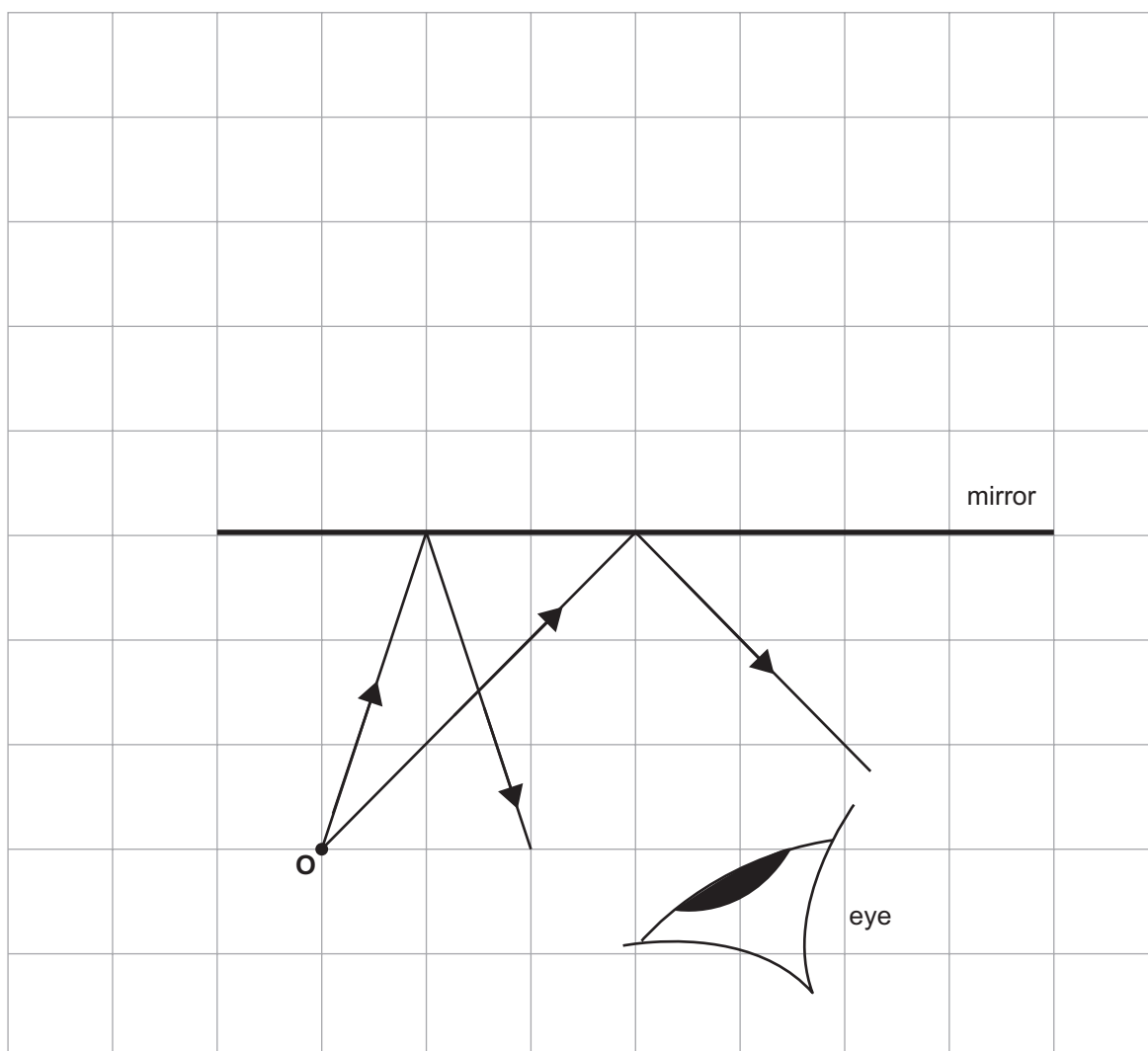
- 2 (a) The diagram below shows an object (O) placed in front of a plane mirror. Two rays from O are shown being reflected by the mirror into the eye.

- (i) Using the two reflected rays, show clearly and accurately on the diagram how the mirror image of O is located.

You must show clearly any construction lines you use.

Label the image clearly with the letter I.

[3]



- (ii) Complete the table below using ticks (✓) to show the properties of an image in a plane mirror.

Property of an image	Property of an image in a plane mirror
real	
virtual	
larger than the object	
smaller than the object	
same size as the object	
double the distance from the mirror as the object	
same distance from the mirror as the object	

[3]

- (iii) The image in a plane mirror is laterally inverted.

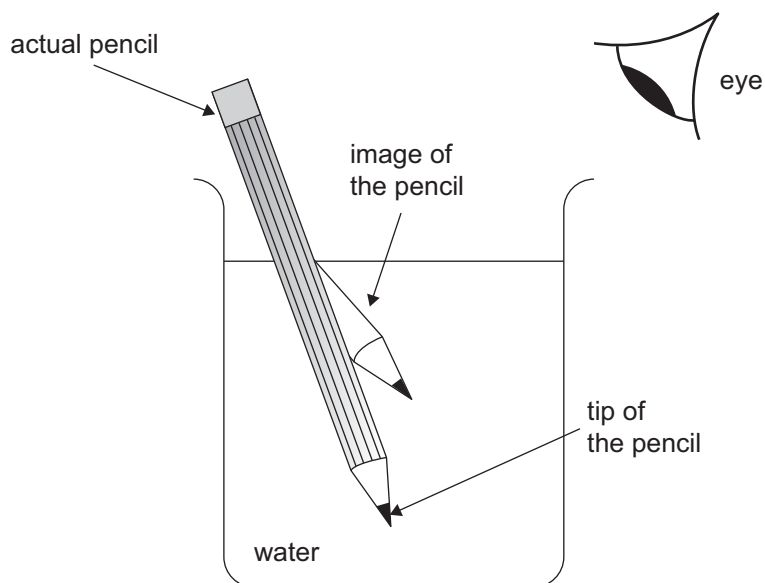
Explain what this means.

[1]

[Turn over



- (b)** A pencil in a beaker of water appears to be bent.
This is shown in the diagram below.



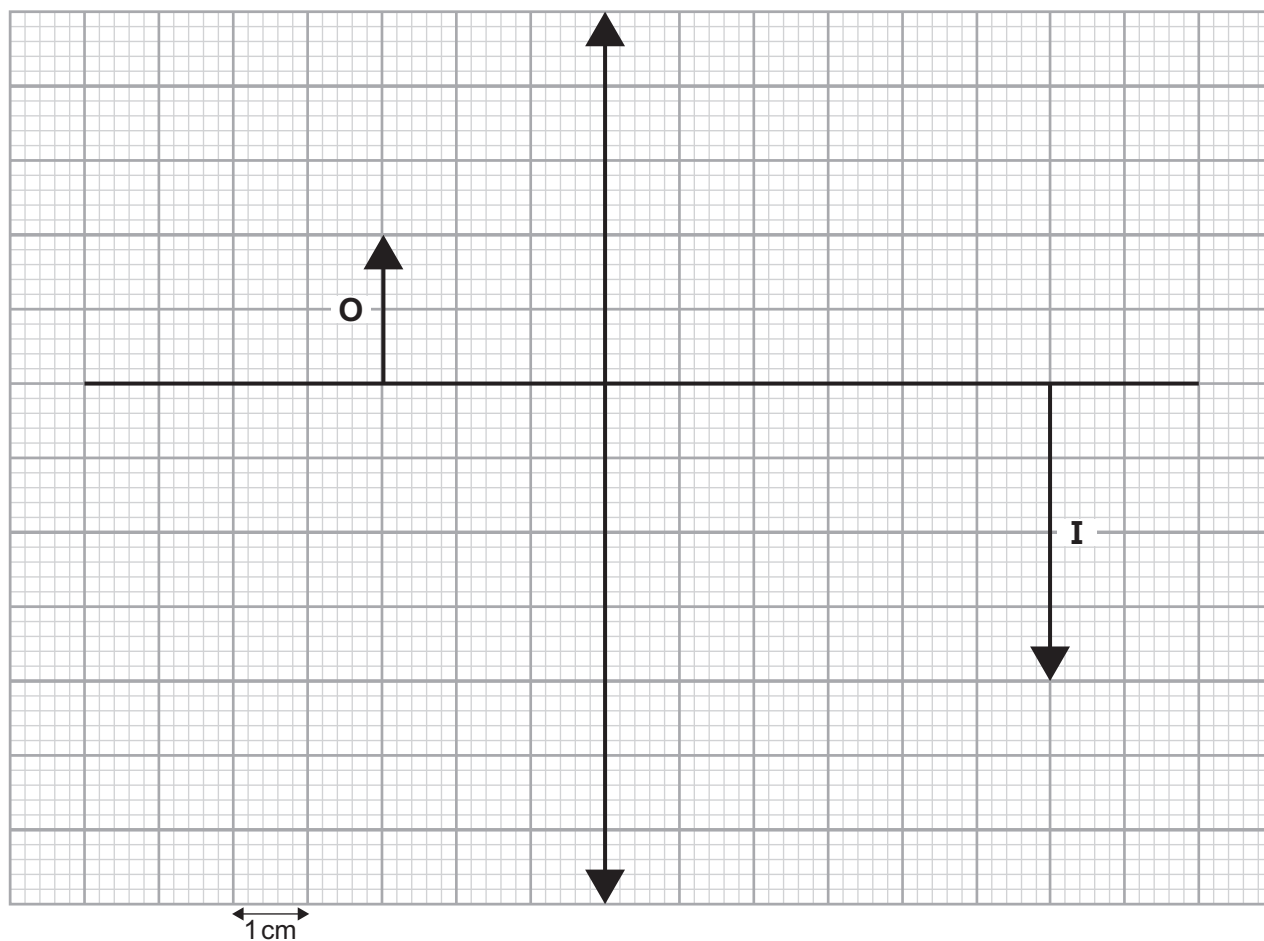
- (i)** Draw a ray of light from the tip of the actual pencil to show how it reaches the eye. [2]

- (ii)** What causes the ray to take the path you have drawn?

[1]



- (c) The diagram below shows the position of an object (**O**) placed in front of a converging (convex) lens and the image (**I**) formed by the lens.



- (i) Draw **two rays** from the top of **O**, passing through the lens, to show clearly how the lens forms the image **I**. [3]

- (ii) Using your completed ray diagram, clearly label the **principal focus** with the letter **F**. [1]

- (iii) What is the focal length of the lens?

Focal length = _____ cm [1]

- (iv) Name an optical instrument which uses a converging lens in this manner.

Optical instrument _____ [1]

[Turn over]



(d) The ray diagrams below show the two possible actions of an eye on rays of light.

Diagram 1

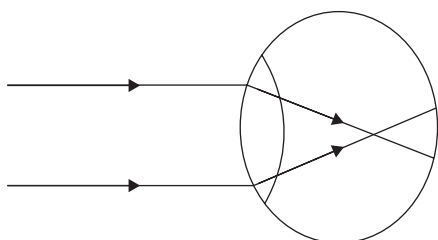
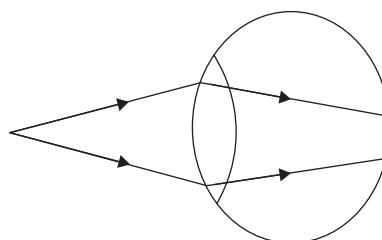


Diagram 2



(i) Which diagram, 1 or 2, shows what happens in a long-sighted eye?

Diagram _____ [1]

(ii) What type of lens would be required to correct the vision of a long-sighted person?

Type of lens _____ [1]





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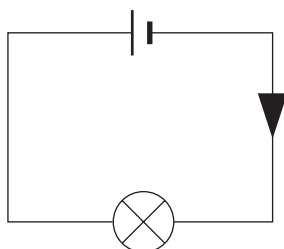


24GPY2111

- 3 (a) (i) Plastic is an insulator and copper is a conductor of electricity. In terms of particles, explain the difference between the two materials.

_____ [1]

- (ii) The circuit diagram below is of a cell connected to a lamp. What does the arrow on the circuit diagram represent?



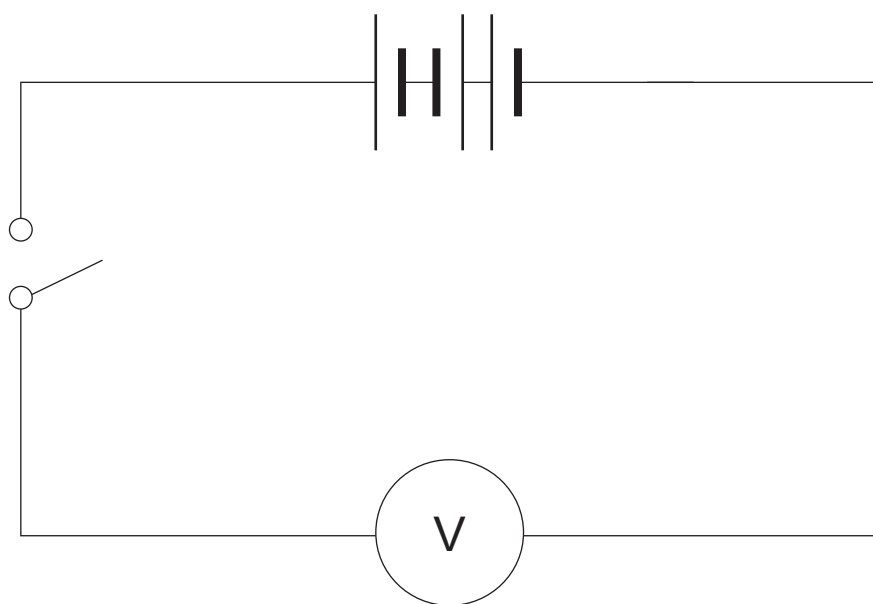
_____ [1]

- (iii) In the circuit above, a current of 0.5A passes through the lamp for 20s. Calculate the amount of electric charge that has passed through the lamp. **Show your working out.**

Electric charge = _____ C [3]



(iv) Three 1.5 V cells are connected as shown in the circuit diagram below.

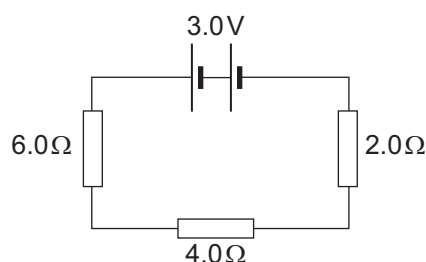


What reading is shown on the voltmeter when the switch is closed?

Reading on voltmeter = _____ V [1]



- (b) (i) Calculate the total resistance of the circuit shown below.

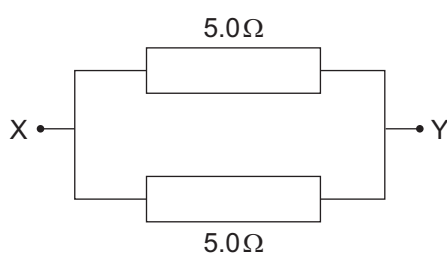


Total resistance = _____ Ω [1]

- (ii) Calculate the current through the 4.0Ω resistor.
Show your working out.

Current = _____ A [3]

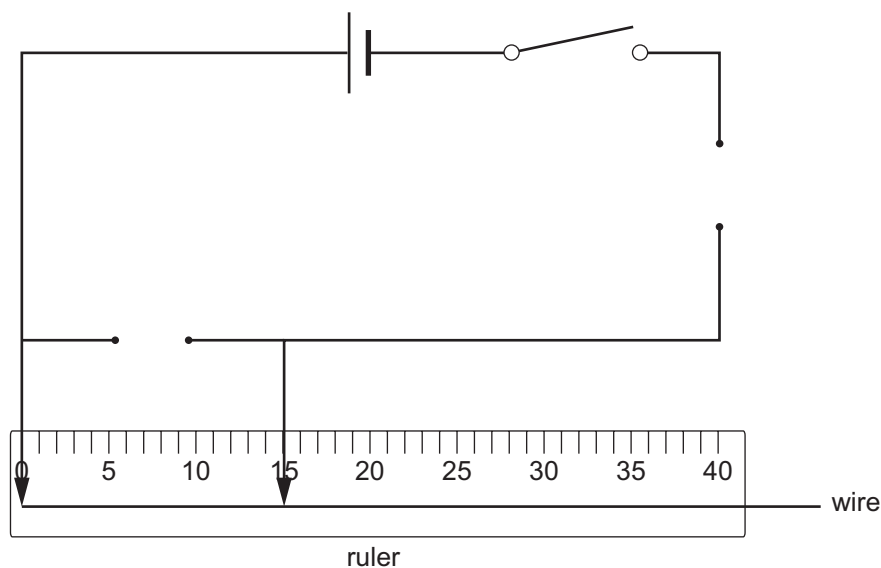
- (iii) Calculate the total resistance between the points X and Y of the two resistors shown in the diagram below.
Show your working out.



Total resistance = _____ Ω [2]



- (c) To investigate how the resistance of a wire depends on its length, the circuit shown below was used.

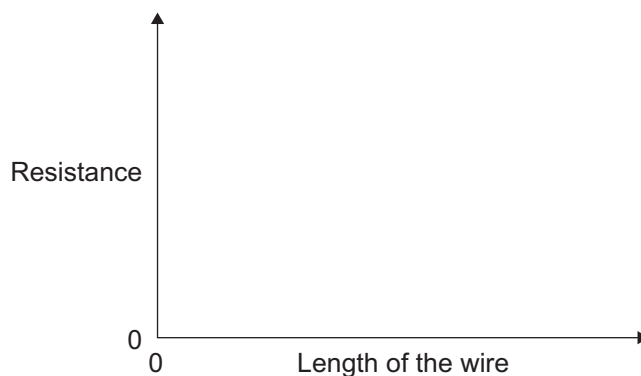


- (i) Complete the circuit diagram above by adding an ammeter and a voltmeter to show how the resistance of the length of wire can be obtained. Use the correct symbols for the two meters. [2]

- (ii) Describe how the switch is used to ensure that the wire does not heat up.

_____ [1]

- (iii) On the axes below, sketch the graph that would be obtained from this investigation.

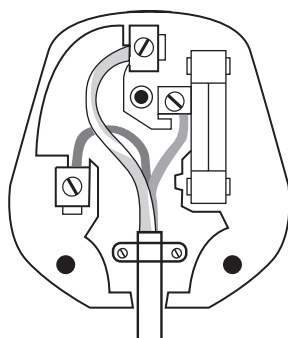


[2]

[Turn over]



- (d) Electrical appliances in the home are connected to the mains supply using a three-pin plug.



The three-pin plug is designed to prevent the user from suffering an electric shock.

Describe the main features of the three-pin plug and how the user is kept safe.

In your description you should state:

- the names of the three wires of the plug;
- the wire that protects the user from receiving an electric shock;
- how this wire and the fuse protect the user from receiving an electric shock.

In this question, you will be assessed on your written communication skills including the use of specialist scientific terms.

Write your answers in the appropriate space on the page opposite.





[6]

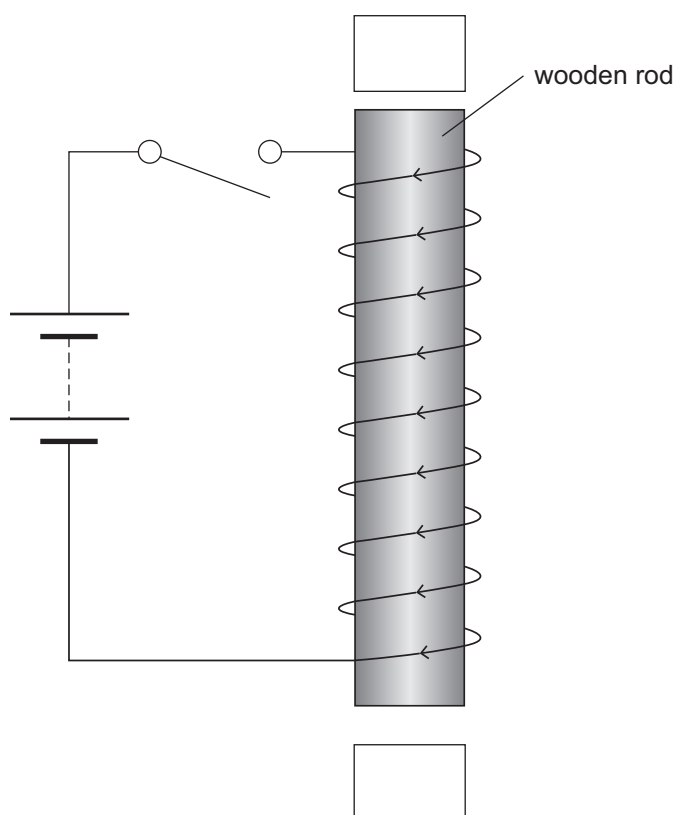
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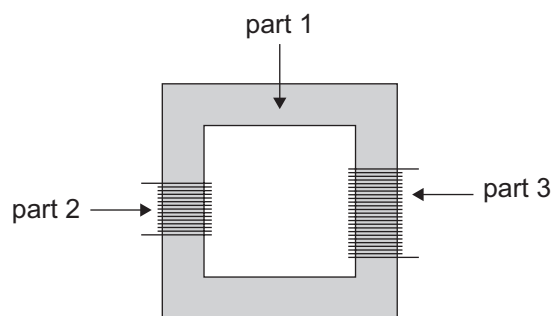
- 4 (a) A simple electromagnet is shown in the diagram below.
The coil is wound around a wooden rod.
When the switch is closed, a current flows from a battery causing one end of the coil to become a north pole and the other end to become a south pole.



- (i) Mark the north pole of the electromagnet with an N and the south pole of the electromagnet with an S in the boxes above. [1]
- (ii) State three changes that could be made to increase the strength of the electromagnet.
1. _____
 2. _____
 3. _____ [3]



- (b) A **step-up** transformer is shown in the diagram below.
It consists of three main parts.



- (i) What is the function of part 1?

_____ [1]

- (ii) Explain why part 2 is the input coil and part 3 the output coil.

_____ [1]

- (iii) What type of voltage, a.c. or d.c., is connected to part 2? _____

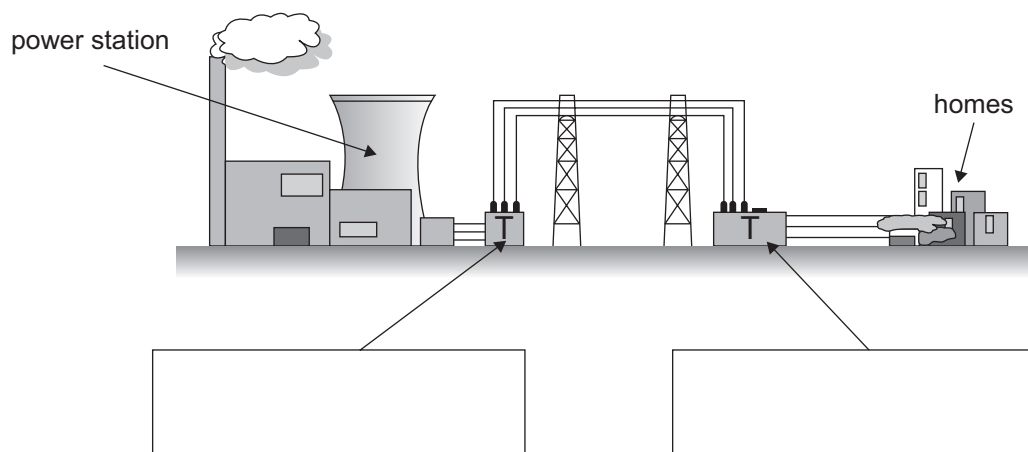
What type of voltage, a.c. or d.c., is obtained from part 3? _____ [2]

[Turn over



(iv) In Northern Ireland, power stations generate electricity at 25 000 V.
The overhead cables carry the electricity at 275 000 V.
This is reduced to 230 V before it is connected to homes.

Name the type of transformer indicated by the arrows.
Write the name in the boxes provided.



[2]





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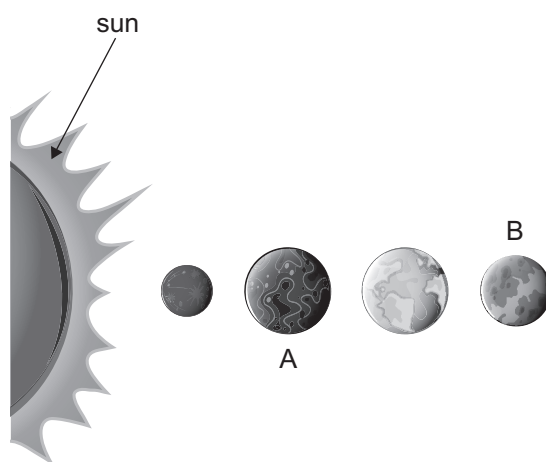


5 (a) Below is a diagram of the **rocky** planets in our Solar System.

(i) Name the planets labelled A and B

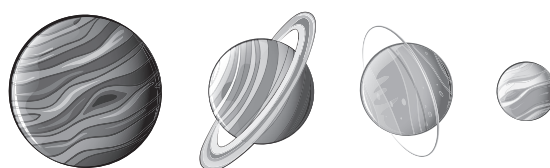
A = _____ B = _____

[2]



Source: Shutterstock <https://www.shutterstock.com/image-vector/solar-system-infographics-vector-hand-drawn-1013866546> (edited)

(ii) The diagram below shows the four planets that are most distant from the Sun.



How is their composition different from the rocky planets?

_____ [1]

(iii) Name the force keeping the planets in orbit around the Sun.

_____ [1]



(b) Complete the following statements about stars.

Stars are composed mainly of _____ and _____.

The energy of a star is supplied by nuclear _____. [3]

(c) (i) State what observation provides evidence for the Big Bang.

_____ [1]

(ii) How is this observation explained?

_____ [1]

THIS IS THE END OF THE QUESTION PAPER



Sources

Q3d.....CCEA
Q5a.....Adapted from © Getty Images

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Question Number	Marks
1	
2	
3	
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Total Marks	
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Examiner Number

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