Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017

Double Award Science: Physics

Unit P2

Foundation Tier

[GSD61]

MONDAY 19 JUNE, MORNING

GSD61

TIME

1 hour 15 minutes.

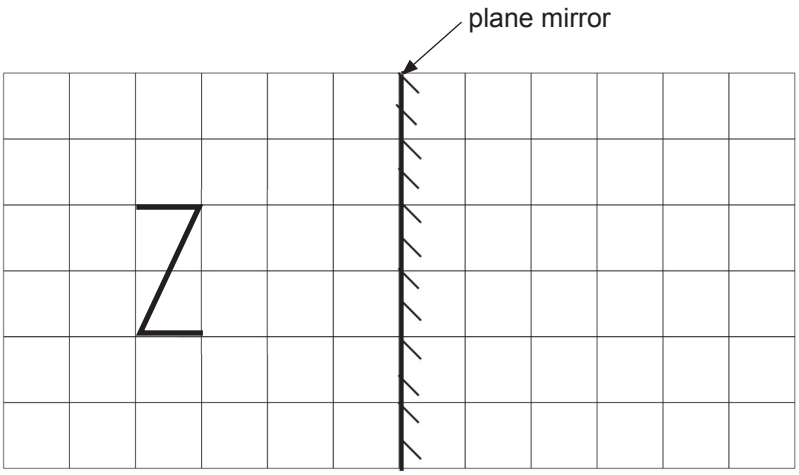
INSTRUCTIONS TO CANDIDATES

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 nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **9(b)**.

1 The letter Z is drawn in front of a plane mirror.



(a) Draw the image of the letter Z in the mirror. [3]

(b) The diagram shows some members of the electromagnetic spectrum in order of increasing wavelength. Some members are missing from the list.

Increasing wavelength →

Gamma Rays		Ultra violet		Infra red		Radio

(i) Fill in the missing radiations. [3]

(ii) State **one** danger of gamma rays.

_____ [1]

(iii) State **one** use of ultraviolet radiation.

_____ [1]

2 When Emily rubs a balloon on her hair it becomes charged with static electricity due to friction.

© Science Photo Library

(a) Explain fully how the balloon becomes **positively** charged.

_____

_____ [2]

Electrostatic charges are used to spray paint a car. The paint droplets are given a **negative** charge as they leave the spray gun.

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(b) (i) Explain why the droplets of paint spread out when they leave the spray gun.

_____

_____ [1]

(ii) What charge should be given to the car to reduce the waste of paint?

_____ [1]

(iii) Explain your answer to **(ii)**.

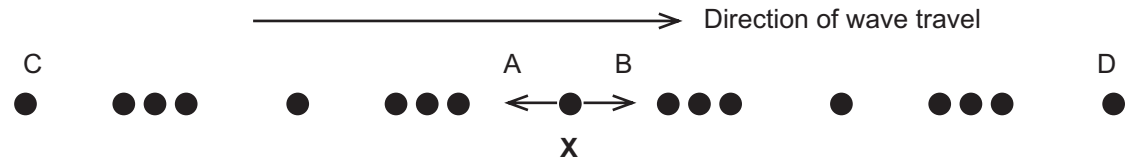
_____ [1]

(c) What is the unit of electrostatic charge?

_____ [1]

[Turn over

3 The particles of a wave vibrate parallel to the direction of travel of the wave as shown below.



Particle **X** vibrates from A to B and back again.

(a) Name this type of wave.

_____ [1]

The distance AB is 10 cm.

(b) What is the amplitude of the wave?

_____ cm [1]

(c) Name an example of this type of wave.

_____ [1]

(d) The frequency of the wave is 9 Hz and its wavelength is 20 cm.

(i) Calculate the speed of the wave in cm/s.

You are advised to show your working out.

Speed of wave = _____ cm/s [3]

(ii) The frequency of the wave is 9 Hz. How many times does the particle labelled **X** move from A to B and back again in 2 seconds?

You are advised to show your working out.

Number of times = _____ [2]

(iii) The wavelength of the wave is 20 cm. Calculate the distance CD.

You are advised to show your working out.

CD = _____ cm [2]

[Turn over

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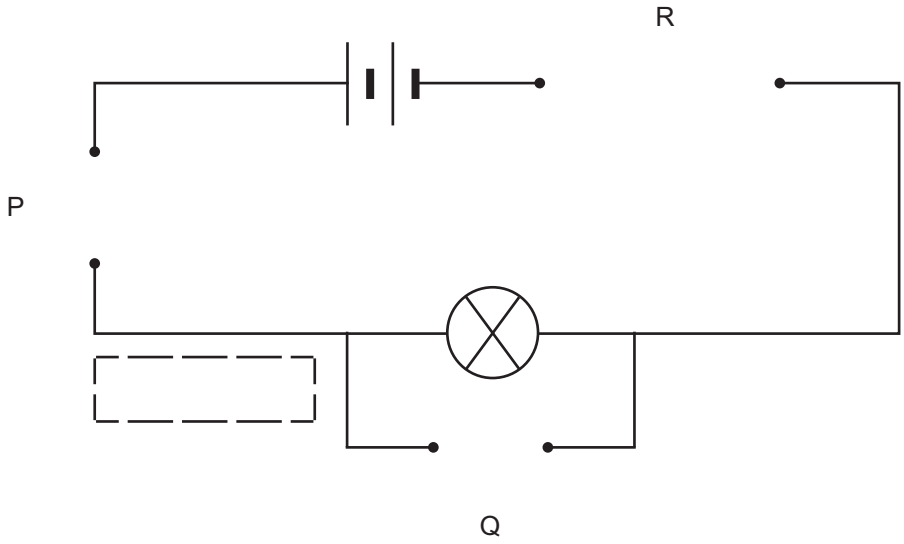
4 A student wants to investigate how the current through a filament lamp affects its resistance.

An incomplete circuit that the student could use is shown below.



(a) (i) Two meters are missing from the circuit at the gaps labelled P and Q.
Add these meters to the circuit using the correct symbols. [3]

(ii) A component is missing at the gap labelled R.

Add the component using the correct symbol and state its name.

Name of component _____ [2]

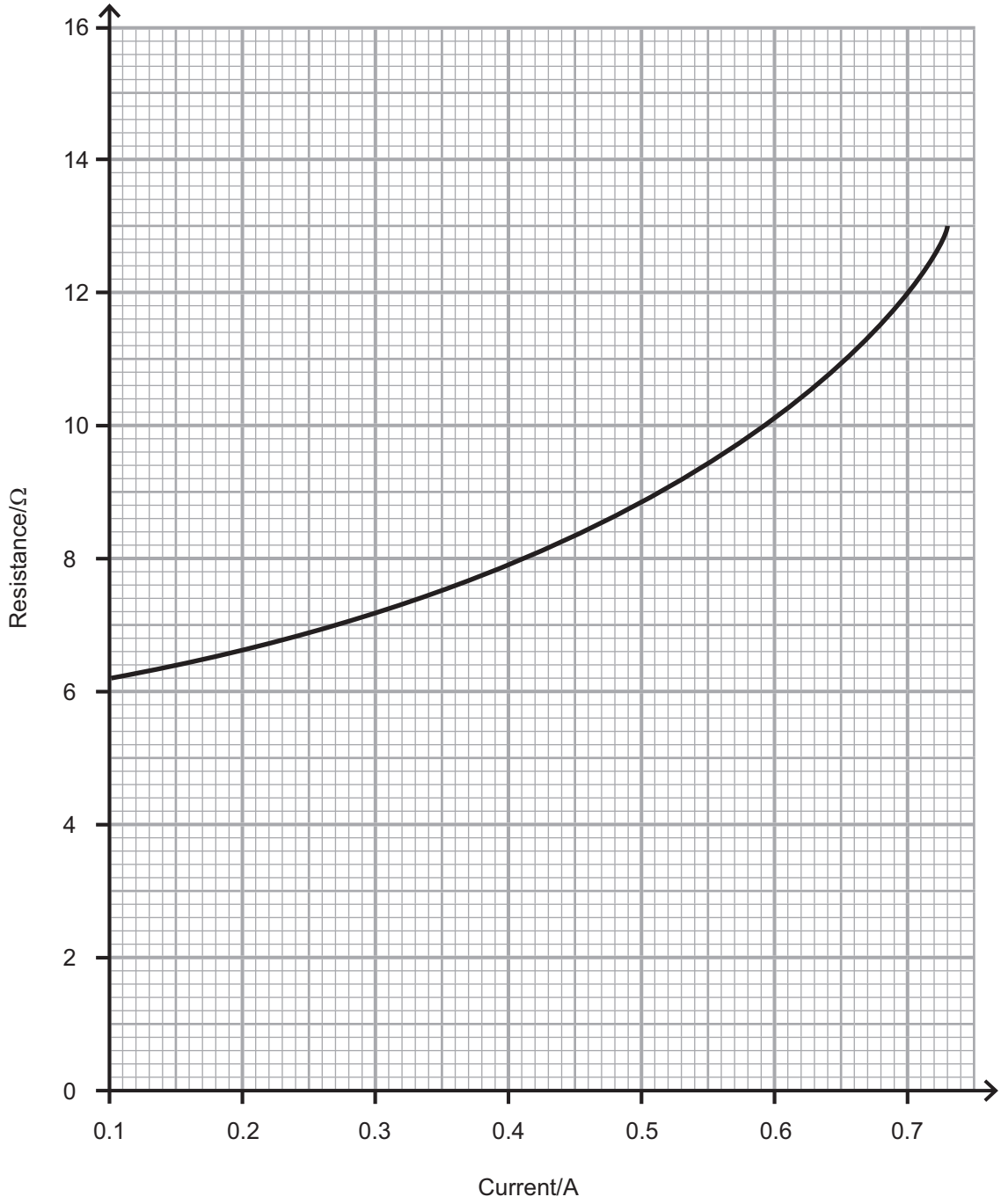
(iii) Why is this component included in the circuit?

_____ [1]

(iv) Draw an arrow in the dotted box above to show the direction of conventional current. [1]

[Turn over

The results of the investigation are shown below.



(b) (i) Describe how the resistance of the lamp depends on the current.

_____ [1]

(ii) What is the resistance when the current is 0.1 A?

Resistance = _____ Ω [1]

(iii) Use the graph to find the current when the resistance is 12 Ω. Use this current to calculate the voltage across the lamp when the resistance is 12 Ω.

You are advised to show your working out.

Current = _____ A

Voltage = _____ V [4]

[Turn over

5 The label shown below states that the power of an electric kettle is 1920 W.

© sh22 / iStock / Thinkstock

Voltage = 240 V

Power = 1920 W

(a) (i) Calculate the current which flows when the kettle is switched on.

You are advised to show your working out.

Current = _____ A [3]

(ii) What fuse should be used with the plug lead that is connected to this kettle? Choose from the following: 3A, 5A or 13A, by ticking (✓) the correct box.

3A ☐

5A ☐

13A ☐

[1]

An electric heater is rated at 2.5 kW. It is left switched on for 120 minutes.

(b) (i) Calculate the number of kWh used in this time.

You are advised to show your working out.

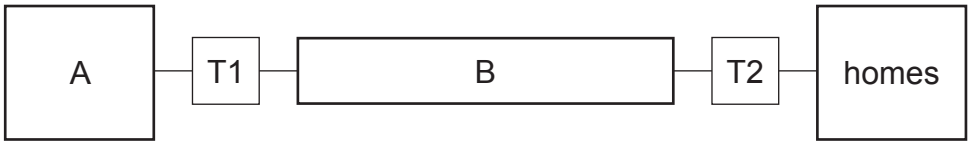
Number of kWh = _____ [4]

(ii) How many units of electricity have been consumed?

Number of units used = _____ [1]

[Turn over

6 Electricity is generated in a power station. Power lines are then used to transmit the electricity to homes. This can be represented by the box diagram below.



(a) (i) Which transformer changes the voltage to a safe level?

_____ [1]

(ii) Which transformer steps the current up (increases the current)?

_____ [1]

(iii) Which box contains a component where coils of wire are rotated between the poles of a magnet?

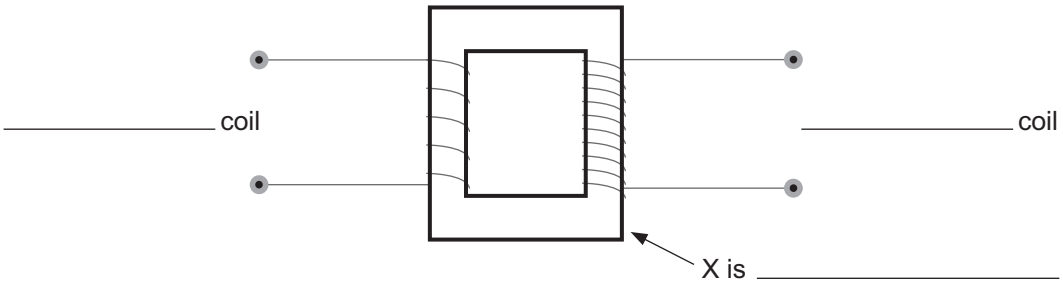
Box _____ [1]

(iv) Which box represents the overhead power cables?

Box _____ [1]

A school power-pack uses a transformer to change the voltage from mains voltage to a **lower**, **safer** voltage.

(b) (i) In the diagram below, label the two coils and name the component X.



[3]

(ii) From what material is component X made? Choose from the list below.

iron plastic copper

X is made from _____ [1]

(iii) Transformers make use of a particular scientific process.
What is the name of this process?

Circle the correct answer. [1]

electromagnetic production electromagnetic induction

electrical induction

[Turn over

7 The box below contains the names of some bodies in our Solar System.

Venus	asteroids	Mars	moon
Saturn	comets	Jupiter	Neptune

(a) (i) Give the name of the planet **in the box** which is:

farthest from the Sun _____

closest to the Sun _____ [2]

(ii) **From the box**, give the name of a body which orbits a planet.

_____ [1]

(iii) Name three planets which are **not** mentioned in the box.

_____ _____ _____ [3]

(b) Artificial satellites have many uses.

(i) What do you understand by the word *artificial* in this context?

_____ [1]

(ii) Give two different uses of artificial satellites.

Use 1: _____

Use 2: _____ [2]

(c) The nebular model is used to describe how a star is formed.

(i) What is a nebula?

_____ [1]

(ii) What is the main chemical element found in a nebula?

_____ [1]

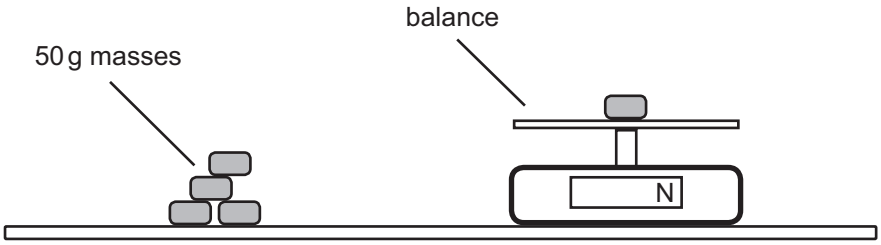
(iii) Name the force involved in the formation of a star.

_____ [1]

[Turn over

8 A student wants to find how the weight of an object in newtons depends on its mass in grams.

He uses 50 gram masses and places them on a balance marked in newtons.



The results are recorded in a table.

Mass/g	50	100	150	200	250
Weight/N		1	1.5	2.0	2.5

(i) Fill in the missing entry in the table. [1]

(ii) Circle the entry which has been inaccurately recorded in the table. [1]

You are asked to plot a graph of weight against mass.

(iii) Choose a suitable scale for the horizontal axis and label it. [2]

(iv) Plot the points on the grid opposite. [2]

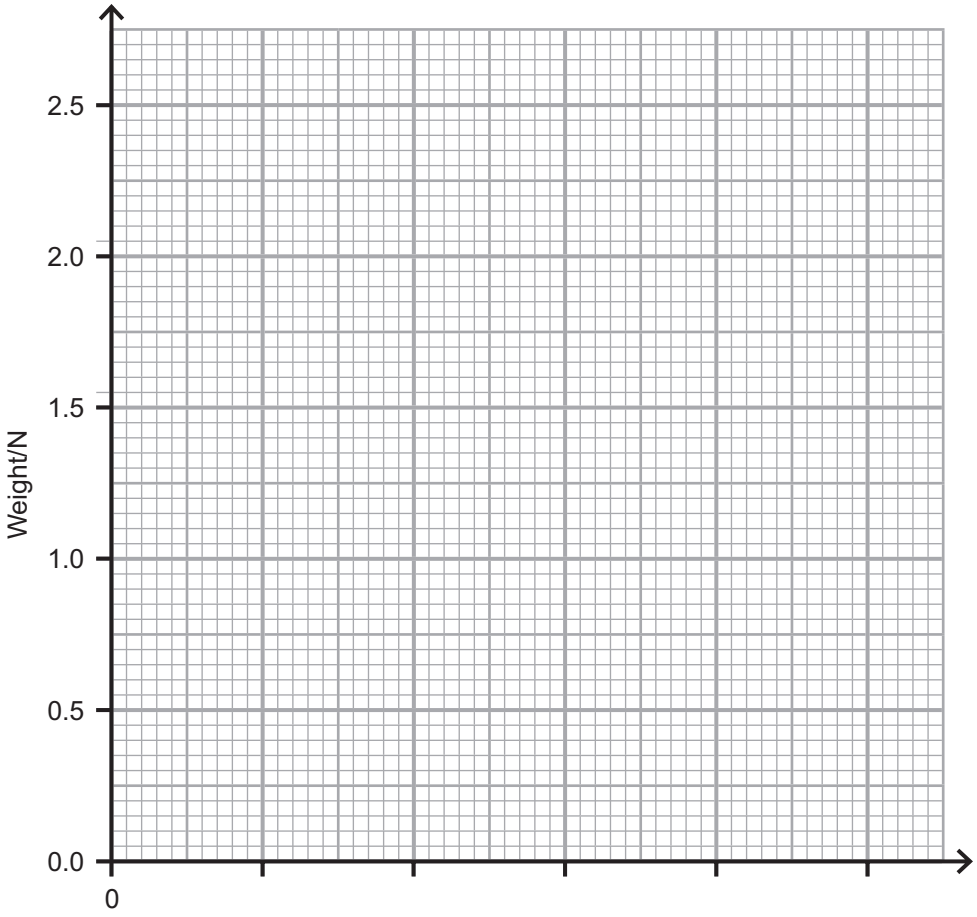
(v) Draw the best fit line. [1]

(vi) Is the weight directly proportional to the mass? _____

Give the reasons for your answer.

1. _____

2. _____ [2]



The weight, W, and mass, M, are connected by the equation:

W = k M where k is a constant **Equation 8.1**

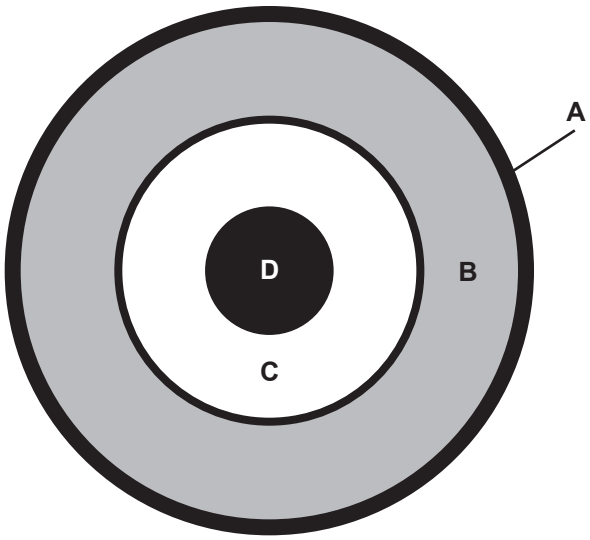
(vii) Use your graph to find the value of the constant k and give its unit.

You are advised to show your working out.

k = _____ [4]

[Turn over

9 The structure of the Earth is drawn below.



(a) Name parts **A**, **B**, **C** and **D**.

A _____

B _____

C _____

D _____ [4]

(b) Describe **(i)** how volcanoes are formed and **(ii)** how earthquakes occur.

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

(i) Volcanoes: _____

_____

_____

_____

_____

_____

(ii) Earthquakes: _____

_____

_____

_____

_____

_____ [6]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
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Total Marks	

Examiner Number