Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017

Double Award Science: Physics

Unit P2

Higher Tier

ML

[GSD62]

MONDAY 19 JUNE, MORNING

TIME

1 hour 15 minutes, plus your additional time allowance.

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.
Answer **all eight** 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 Questions **3(b)** and **7**.

1 Look at the box below. It shows the names of some bodies in our Solar System.

Venus	asteroids	Mars	moon
Saturn	comets	Jupiter	Neptune

(a) (i) **From the box**, give the name of the planet:

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) Give the name of three planets which are **not** shown in the box.

_____ _____ _____ [3]

(b) Artificial satellites have many uses.

(i) What does **artificial** mean in this context?

_____ [1]

(ii) Give two different uses of an artificial satellite.

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]

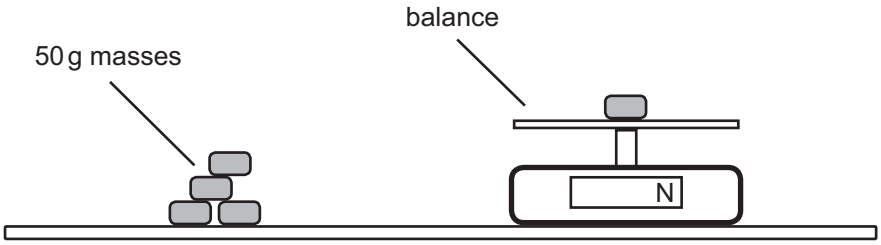
(iii) Name the force involved in the formation of a star.

_____ [1]

[Turn over

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

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



She records her results in a table.

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

(i) One result is missing. Write the missing result in the table. [1]

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

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]

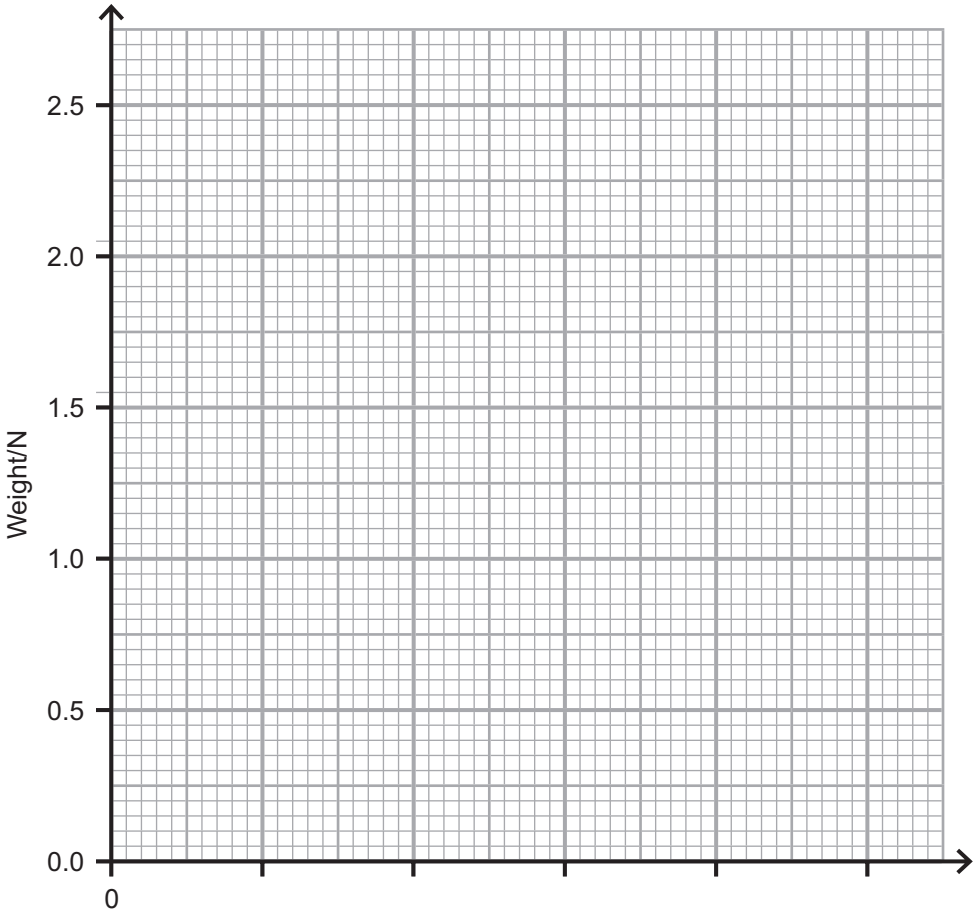
(v) Draw the best fit line. [1]

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

Give two 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 2.1**

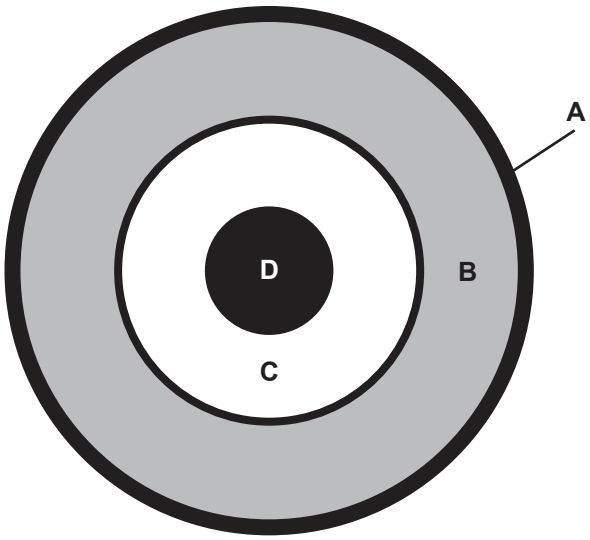
(vii) Use your graph to find the value of the constant k and give its unit.

Show your working out.

k = _____ [4]

[Turn over

3 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: _____

_____

_____

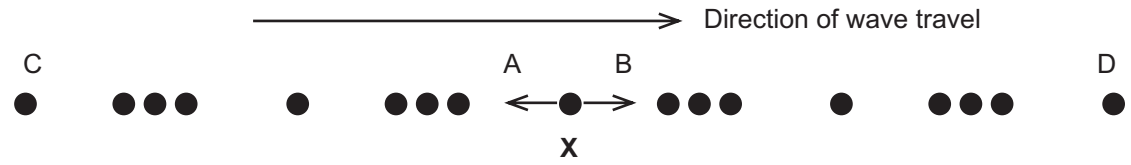
_____

_____

_____ [6]

[Turn over

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

Show your working out.

Number of times = _____ [2]

(ii) The distance CD is 80 cm. What is the wavelength of the wave?

Show your working out.

_____ cm [2]

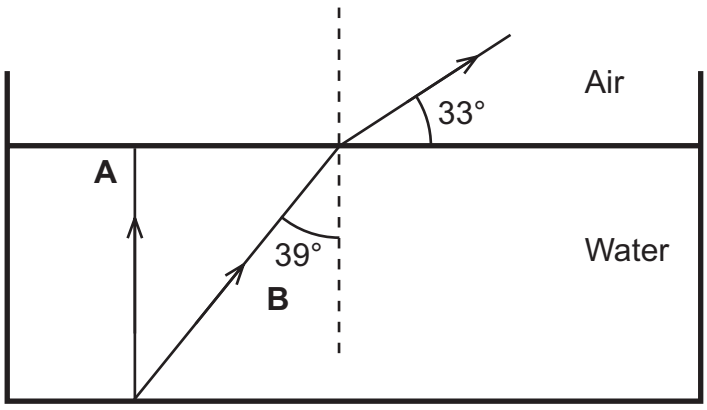
(e) A radio station broadcasts on 200 kHz. What is their wavelength if the speed of radio waves is 3.0×10^8 m/s?

Show your working out.

Wavelength = _____ m [4]

[Turn over

5 Look at the diagram below. It shows two rays of light, A and B, travelling in water. The diagram is not to scale.



(a) (i) Continue ray **A** into air. Draw this on the diagram. [1]

(ii) What is the value of the angle of incidence of ray **B** in water?

_____ [1]

(iii) What is the value of the angle of refraction of ray **B** in air?

_____ [1]

(iv) Describe how the speed of ray **B** changes when it passes from water to air.

_____ [1]

(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) Give one property which is unique to all electromagnetic waves.

_____ [1]

(iii) Give one danger of gamma rays.

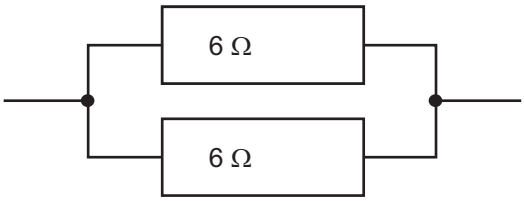
_____ [1]

(iv) Give one use of ultraviolet radiation.

_____ [1]

[Turn over

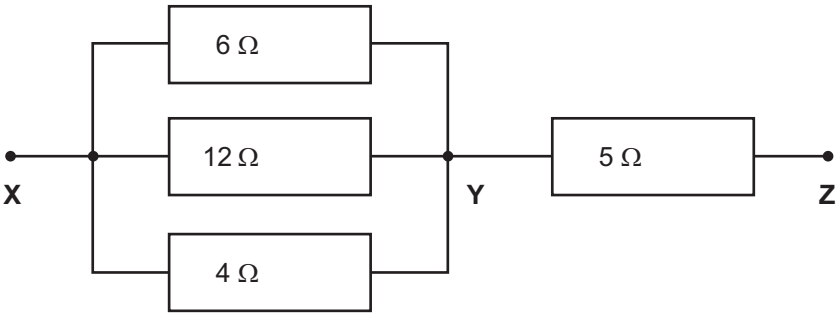
6 Two equal resistors are connected in parallel as shown in the diagram below.



(a) Calculate the total resistance.

Resistance = _____ Ω [1]

Four resistors are connected between the points **X** and **Z**.



(b) (i) Find the resistance between **X** and **Y**, then calculate the total resistance between **X** and **Z**.

Show your working out.

Total resistance between **X** and **Y** = _____ Ω

Total resistance between **X** and **Z** = _____ Ω [5]

A current of 0.3A flows through the 4Ω resistor.

(ii) What current flows through the 12Ω resistor?

Show your working out.

Current through the 12Ω resistor = _____ A [4]

(c) (i) Calculate the voltage across a resistor when 0.9A flows through it and the power developed in the resistor is 4.05W.

Show your working out.

Voltage = _____ V [3]

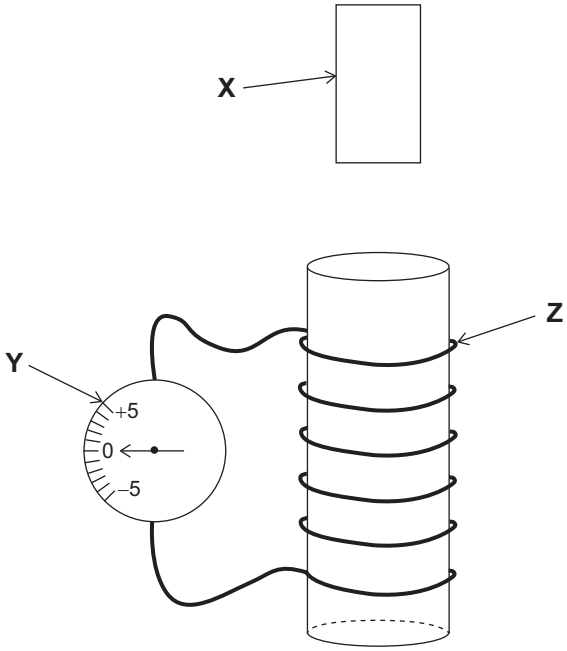
(ii) Calculate the charge which flows through the resistor in 5 minutes. Include the unit with your answer. Remember the current is 0.9A.

Show your working out.

Charge = _____ [5]

[Turn over

7 Look at the diagram below. It shows the apparatus which can be used to illustrate the generation of electricity in a school laboratory.



Describe how the apparatus on the opposite page can be used to illustrate the generation of electricity, in a school laboratory.

Your answer should include:

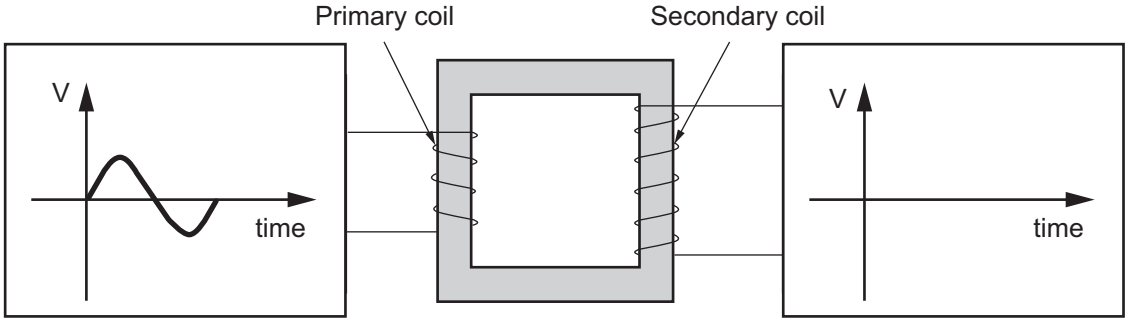
- the name of the process;
- the names of the components labelled **X**, **Y** and **Z** in the diagram opposite;
- how you would use the apparatus and what is observed.

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

[6]

[Turn over

8 **(a)** **(i)** An a.c. voltage is applied to the primary coil of a transformer. The graph on the left hand side shows how this voltage changes with time.

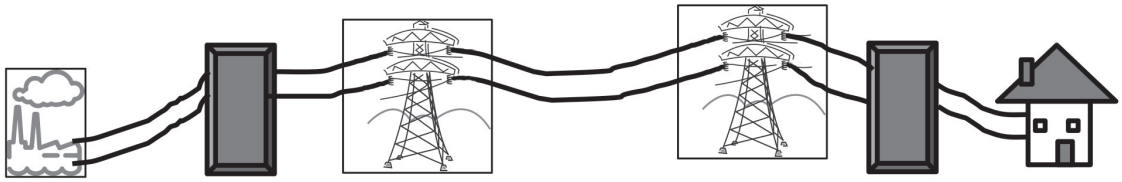


In the box on the right sketch the graph of voltage against time you would expect to obtain from the secondary coil. [2]

(ii) Name the laboratory apparatus used to display a.c. voltage.

_____ [1]

Transformers are used in the transmission of electricity from power stations to our homes.



(b) In the following table state how the current and voltage are changed in transformers **A** and **B**.

	Current	Voltage
Transformer **A**		
Transformer **B**		

[4]

(c) A transformer is used to supply 6 V to a piece of electrical apparatus. The transformer has 800 turns in the primary coil and 20 turns in the secondary coil. What is the input voltage of the transformer?

Show your working out.

Input voltage = _____ V [3]

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For Examiner's use only	
Question Number	Marks
1	
2	
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Total Marks	

Examiner Number