Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015

Double Award Science: Physics

Unit P2

Higher Tier

ML

[GSD62]

FRIDAY 12 JUNE, AFTERNOON

TIME

1 hour 15 minutes, plus your additional time allowance.

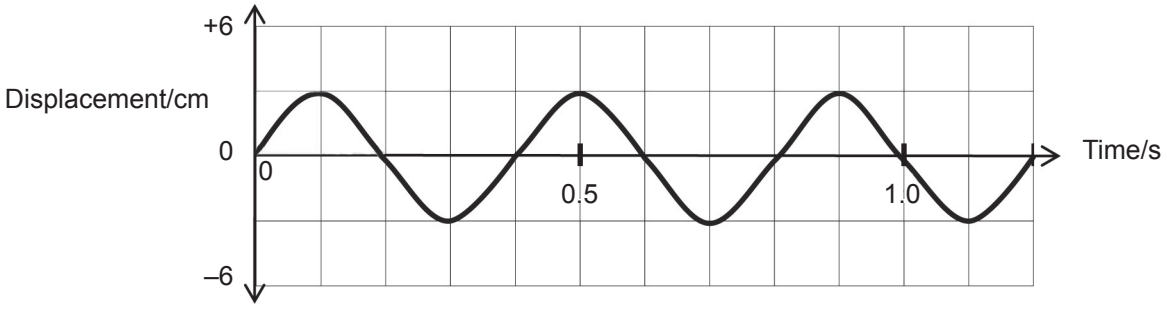
INSTRUCTIONS TO CANDIDATES

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 blue or black ink only.
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 Questions **5** and **9(b)**.

1 The outline of a water wave is shown below.



(a) (i) Use the graph to find the amplitude of the wave.

_____ cm [1]

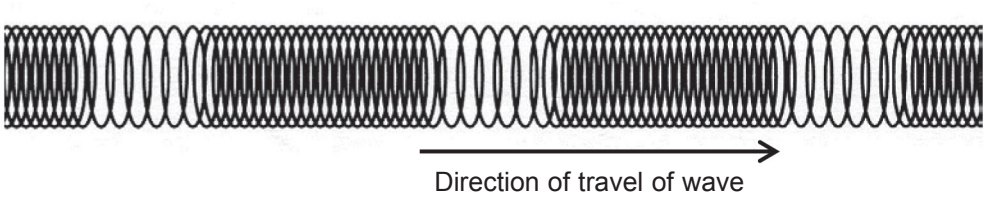
(ii) Use the graph to find the frequency of the wave.

You should show your working out.

Frequency = _____ Hz [3]

(iii) Draw a **single wavelength of a new wave** that has twice the amplitude and twice the frequency of the wave shown above. Do this on the graph at the top of the page. [2]

(b) This diagram shows how waves can be generated on a slinky.



In what direction do particles of the spring vibrate as waves travel?

_____ [1]

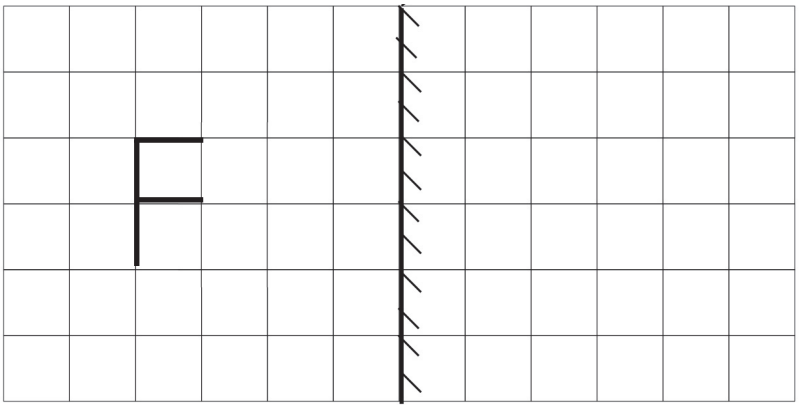
(c) Microwaves travel through space at 3.0×10^8 m/s.
If their frequency is 1.5×10^{10} Hz, what is their wavelength?

You should show your working out.

Wavelength = _____ m [3]

[Turn over

2 The letter, F, is placed in front of a plane mirror.



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

The letter F is 0.4 m from the mirror. The mirror is moved 0.1 m to the right.

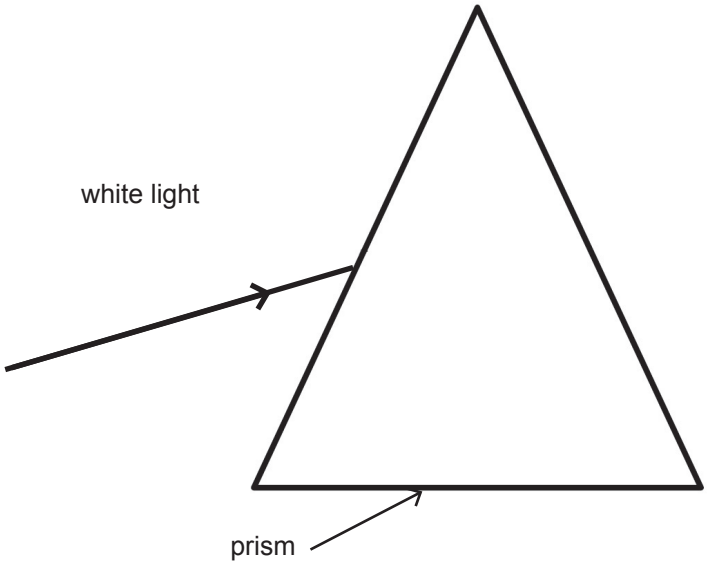
(ii) How far is the letter F from its image?

You should show your working out.

Distance = _____ m [2]

White light can be dispersed into its different colours.

(b) (i) Complete the diagram below to show how white light can be dispersed to produce red and violet light. Label the red and violet rays.



[3]

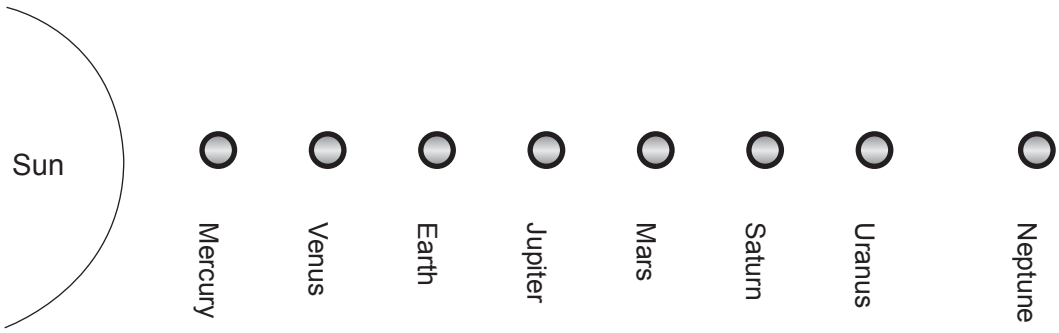
(ii) Explain why different colours travel in different directions in the prism.

_____

_____ [1]

[Turn over

3 This diagram shows a view of the Sun and planets. The view is not correct and the diagram is not to scale.



(a) (i) Two planets are in the wrong positions.

Name these two planets.

_____ and _____ [2]

(ii) Some planets are known as rocky planets and some are known as gas planets.

Write down two examples of each.

Two rocky planets: _____ and _____

Two gas planets: _____ and _____ [4]

(iii) Write down the names of two bodies that orbit the Sun.
Do not write the names of planets in your answer.

_____ and _____ [2]

(iv) What force keeps the planets orbiting the Sun?

_____ [1]

There are two models of the Solar System.

(b) (i) What is the name of the first model?

_____ [1]

(ii) What is at the centre of the Solar System in this first model?

_____ [1]

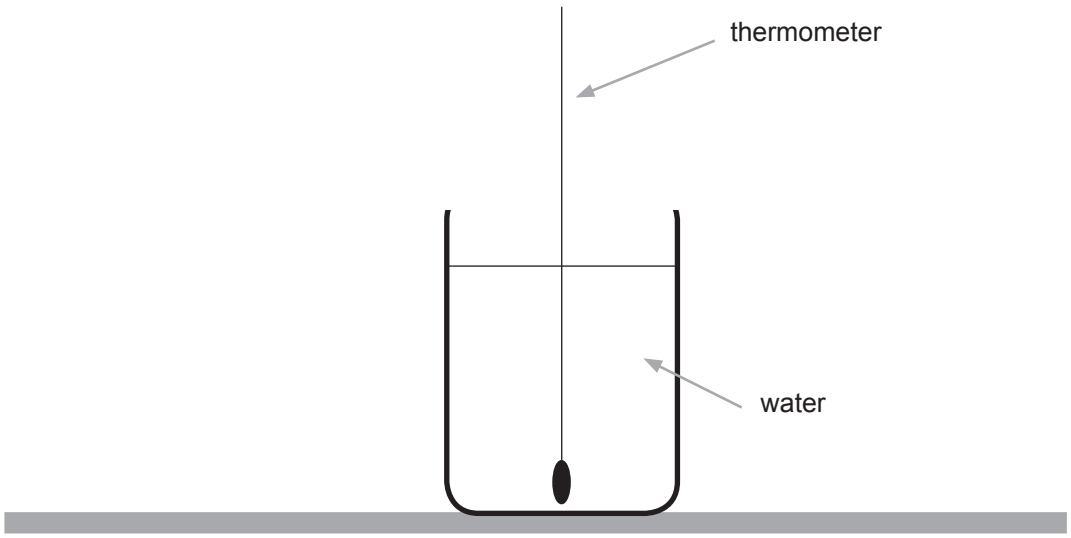
(iii) What is the name of the model with the Sun at the centre?

_____ [1]

[Turn over

4 Water is heated to 100 °C and then allowed to cool.

A thermometer records the temperature of the water every 5 minutes.



The table below shows the results of the experiment.

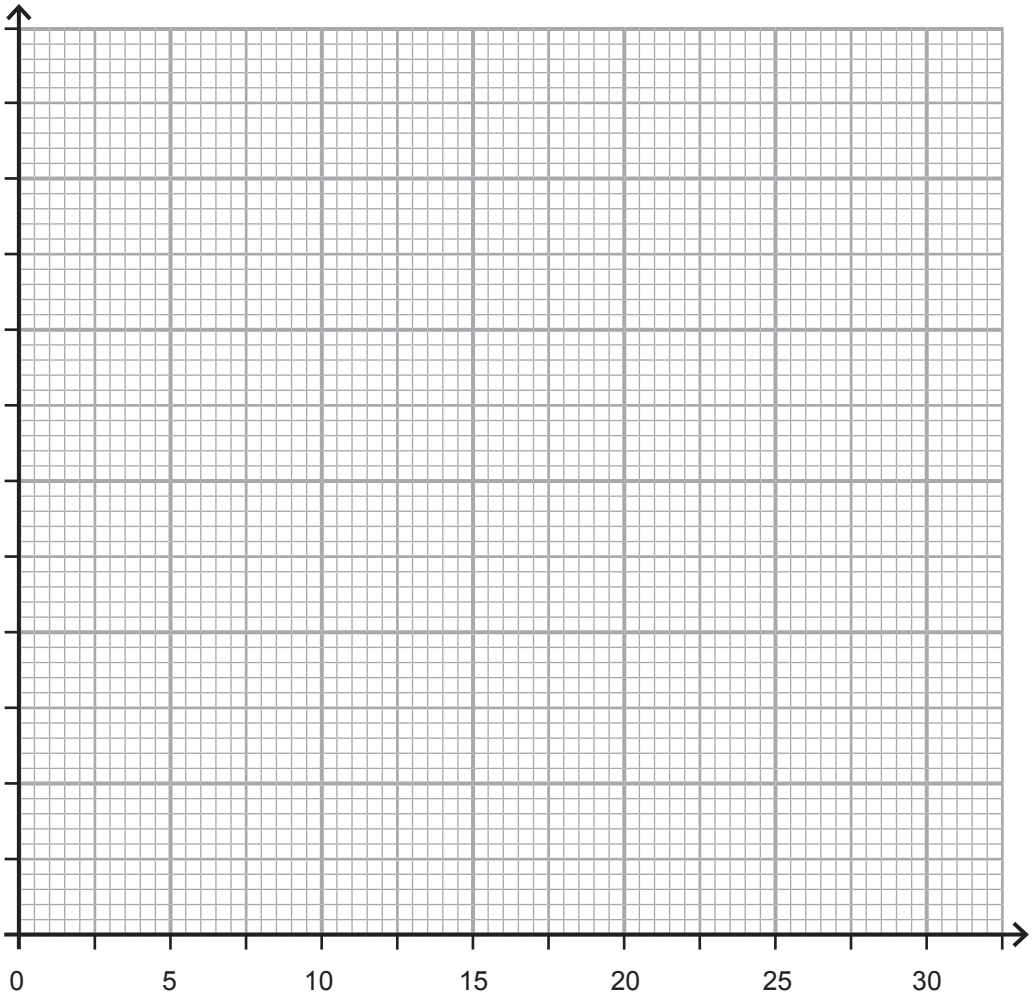
Temperature/°C	100	66	45	30	22	18	18
Time/min	0	5	10	15	20	25	30

Draw a graph of temperature against time for the cooling water.

(i) Choose a suitable scale for the temperature and label it. [2]

(ii) Plot the points on the grid. [2]

(iii) Draw the best fit curve. [1]



(iv) Why do you think the last two readings of temperature are the same?

_____ [1]

(v) Describe fully how the temperature of the water changes with time.

_____

_____ [2]

(vi) Use the graph to find the temperature of the water at 12 minutes.

_____ °C [1]

[Turn over

5 Many scientists believe that the Universe began a long time ago.

State and describe the modern scientific theory for the formation of the Universe.

Your description should include:

- the name of the theory and what happened at the beginning;
- when the Universe began;
- the evidence and explanation for this theory.

You will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

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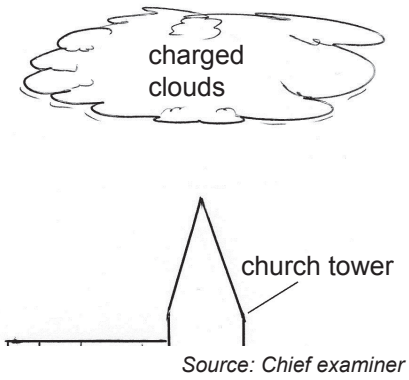
(Questions continue overleaf)

6 Charged thunderclouds can cause damage to tall buildings.



Source: Chief examiner

(a) (i) How do the clouds become charged?

_____ [1]

(ii) What phenomenon could happen next because of the charge on the clouds?

_____ [1]

(iii) What can be done to reduce this damage to tall buildings?

_____

_____ [1]

(b) A current of 20 mA flows through a resistor. How much charge passes in 5 minutes? Remember 1 mA = 0.001 A.

You should show your working out.

Charge = _____ C [4]

Samuel wants to find the relationship between the resistance and the area of cross section of a piece of resistance wire.

He measures the resistance of different thicknesses of a metal wire and obtains the following results.

Area of cross section of wire, A/mm^2	0.5	1.0	2.0	3.0	4.0
Resistance of wire, R/Ω	24.0	12.0	6.0	4.0	3.0
Product of resistance and area of cross section/Ω mm^2			12.0		

(c) (i) How would Samuel make this a fair test, assuming he keeps the temperature of the wire constant?

_____ [1]

(ii) Complete the third row of the table above. One box has been completed for you.

[1]

(iii) Use the results to state the **general** relationship between area of cross section and resistance.

_____

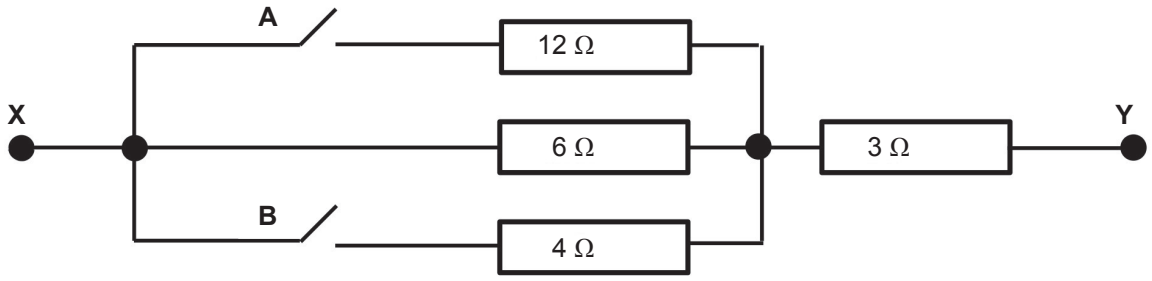
_____ [1]

(iv) Calculate the resistance of this wire if its area of cross section is 1.5 mm^2.

Resistance = _____ Ω [1]

[Turn over

7 Four resistors are connected between **X** and **Y** as shown below.



(a) (i) Complete the following table to show the effective resistance between **X** and **Y** for the different switch settings.

SWITCH		**Resistance between X and Y /Ω**
A	**B**	
Open	Open	
Closed	Open	
Open	Closed	

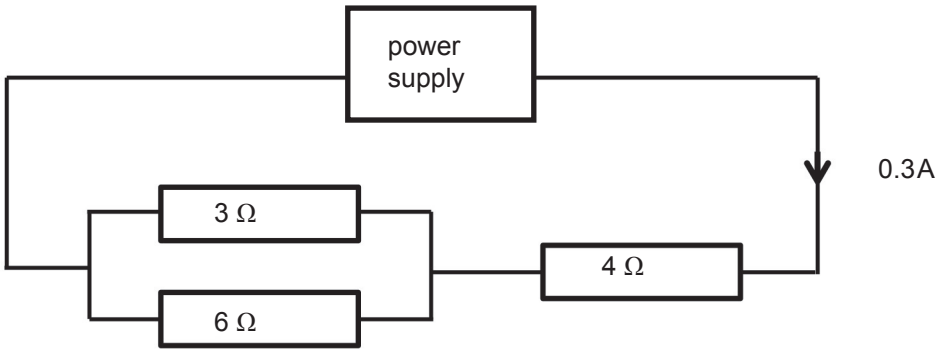
[3]

(ii) Calculate the total resistance between **X** and **Y** when both switches are closed.

You should show your working out.

Total resistance = _____ Ω [4]

In the circuit below a current of 0.3A flows through the 4 Ω resistor.



(b) (i) What currents flow through the other two resistors?

Current through 3 Ω resistor = _____ A

Current through 6 Ω resistor = _____ A [2]

(ii) Calculate the voltage across the 4 Ω resistor.

You should show your working out.

Voltage across 4 Ω resistor = _____ V [3]

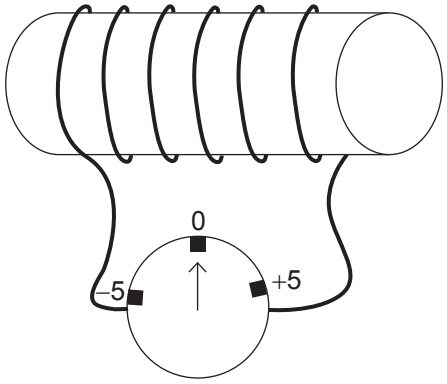
(iii) Calculate the power developed in the 4 Ω resistor.

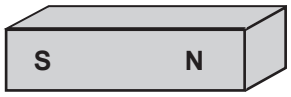
You should show your working out.

Power in the 4 Ω resistor = _____ W [3]

[Turn over

8 A sensitive zero centred ammeter is connected to a coil of wire as shown.





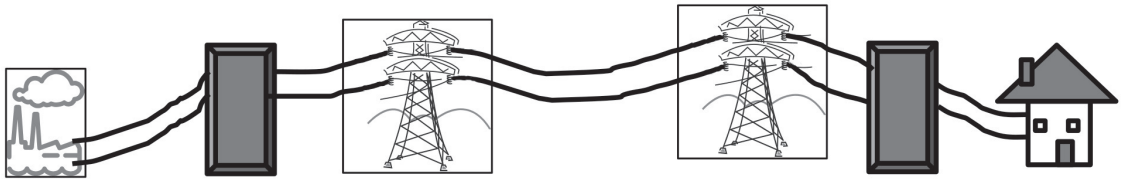
A magnet is moved towards the coil and the ammeter gives a momentary deflection to the left, as shown in the table below.

(a) Complete the table.

PROCEDURE	OBSERVATION
S Pole of magnet enters the coil	Momentary deflection to the left
S Pole of magnet now leaves the coil	Momentary deflection to the _____
N Pole of magnet enters the coil	Momentary deflection to the _____
N Pole of magnet now leaves the coil	Momentary deflection to the _____

[3]

(b) The diagram below shows the main stages in the generation and transmission of electricity.



generator in power station | transformer **A** | transformer **B** | home

(i) How does transformer **A** change the current?

_____ [1]

(ii) What is the function of transformer **B**?

_____ [1]

(iii) When cables carry an electric current they generate heat. Explain how this happens.

_____ [1]

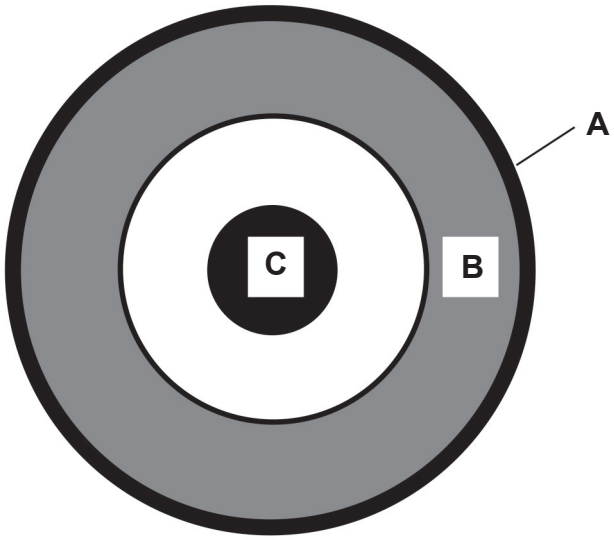
(c) A transformer for a printer reduces the voltage from 240 V to 36 V. If the primary coil has 1800 turns, how many turns are on the secondary coil?

You should show your working out.

Number of turns = _____ [3]

[Turn over

9 The structure of the Earth is shown in the diagram below.



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

A _____

B _____

C _____ [3]

(b) Describe and explain the causes of earthquakes and volcanoes.

You will be assessed on your written communication skills including the use of specialist scientific terms.

Earthquakes

Volcanoes

[6]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
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8	
9	
Total Marks	

Examiner Number