Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2018

Double Award Science: Physics

Unit P2

Foundation Tier

ML

[GSD61]

FRIDAY 15 JUNE, MORNING

TIME

1 hour 15 minutes, plus your additional time allowance.

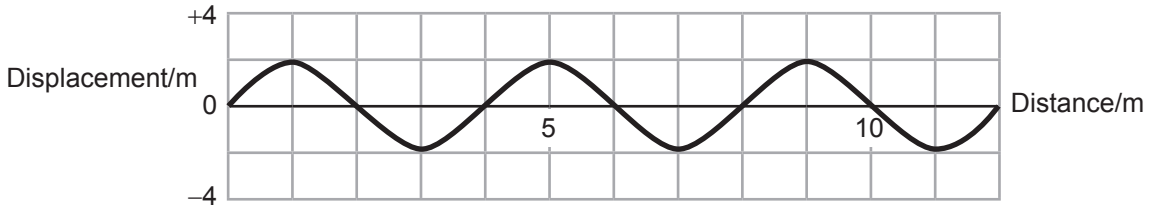
INSTRUCTIONS TO CANDIDATES

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. **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 **8(a)**.

1 Look at the graph below.
It shows a sea wave.



(a) What do waves transfer as they move?

_____ [1]

(b) Use the diagram above to find the amplitude and wavelength of the sea wave.

Amplitude = _____ m [1]

Wavelength = _____ m [1]

(c) In 20 seconds, 50 waves pass a particular point.

(i) Calculate the frequency of the waves.
Remember to include the unit.
Show your working out.

Frequency = _____ [3]

(ii) The wavelength of the waves is 2.0 cm.
Use your answer to (c)(i) to calculate the speed of the waves.
Show your working out.

Speed = _____ cm/s [3]

[Turn over

2 This question is about waves.

Some members of the electromagnetic spectrum are missing from the following list.

gamma rays	X-rays	ultra violet rays		infrared rays		

(a) Complete the list above by filling in the names of missing radiations. [3]

(b) **(i)** What type of wave are all members of the electromagnetic spectrum?

_____ [1]

(ii) Write down another property that **only** electromagnetic waves have.

_____ [1]

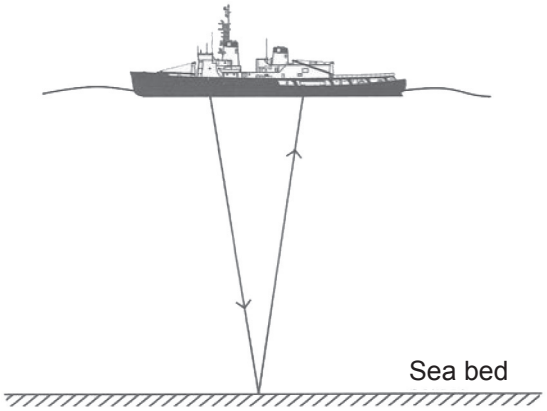
(iii) Which radiation in the list has the shortest wavelength?

_____ [1]

(c) **(i)** Write down a use of X-rays. _____ [1]

(ii) Write down a danger of X-rays. _____ [1]

Sonar waves are used to find the depth of the sea. The sonar waves are reflected from the sea bed. A pulse is sent out from a ship. The pulse takes 5 seconds to return to the ship.

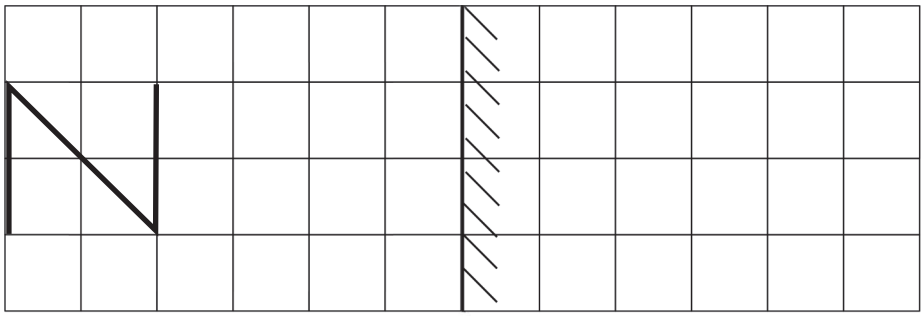


(d) If the speed of sonar waves is 1500 m/s in water, calculate the depth of the sea. **Show your working out.**

Depth of sea = _____ m [4]

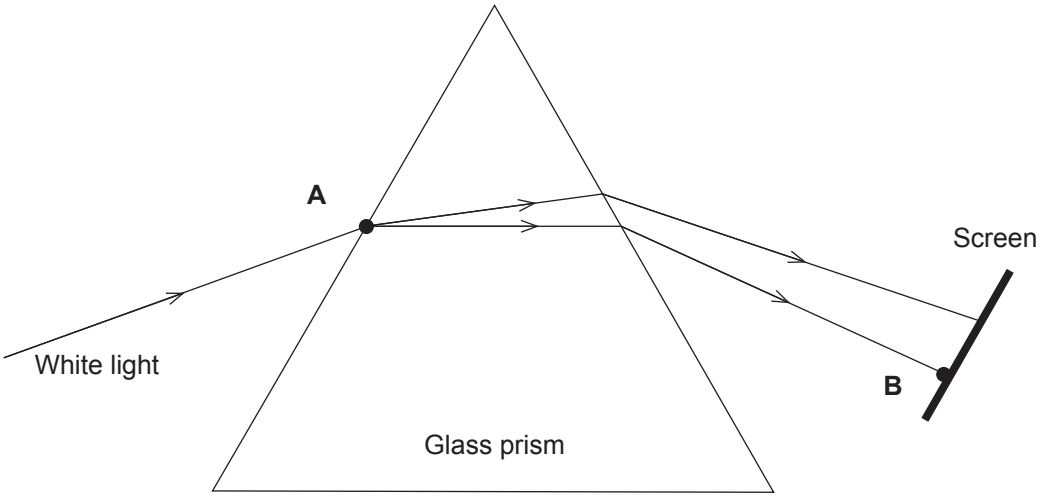
[Turn over

3 The letter N is placed in front of a plane mirror as shown below.



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

(b) The following diagram shows a beam of white light passing through a glass prism.



(i) What happens to the speed of light as it enters the glass at point **A**?

_____ [1]

(ii) The white light spreads out into different colours inside the prism. Name this process.

_____ [1]

(iii) What is the term used to describe the full list of colours displayed on the screen?

_____ [1]

(iv) Which colour appears on the screen at point **B**?

_____ [1]

[Turn over

4 A girl combs her hair with a plastic comb.

© Mint Images / Science Photo Library

(a) (i) What is the name of the force which causes the comb to become charged?

_____ [1]

(ii) Name the particle which moves. Describe how the comb has become **positively** charged.

Particle _____

Description _____ [2]

(b) The girl notices that after she combed her hair some strands remained separated.

Explain fully why the strands of hair remained separated.

_____

_____ [2]

Before a racing car is refuelled, a conducting metal strip is connected between the car and the ground. This is called earthing.

© gsermek / iStock / Thinkstock

(c) Explain fully what might happen if the racing car is not earthed while refuelling.

_____

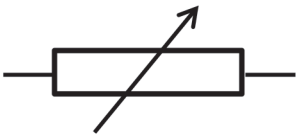
_____ [2]

(d) A charge of 750 C flows through a resistor for 5 **minutes**. Calculate the current which flows during this time.
Show your working out.

Current = _____ A [4]

[Turn over

5 **(a)** Identify the electrical symbols below.



_____ _____ _____ [3]

A single cell produces 1.5 V. The cells below are all identical and are combined in different ways.

A

B

C

D

(b) Answer **A**, **B**, **C**, or **D** for each of the following.

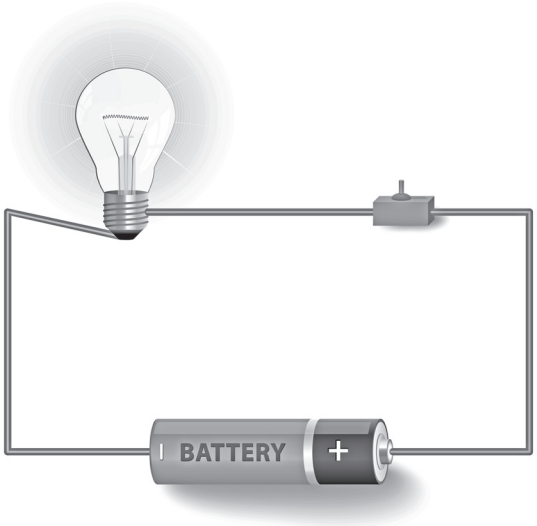
Which arrangement produces 0 volts? _____

Which arrangement produces 1.5 volts? _____

Which arrangement produces 3.0 volts? _____

Which arrangement produces 4.5 volts? _____ [4]

A battery of unknown voltage sends a current of 0.5A through a bulb of resistance 6Ω.



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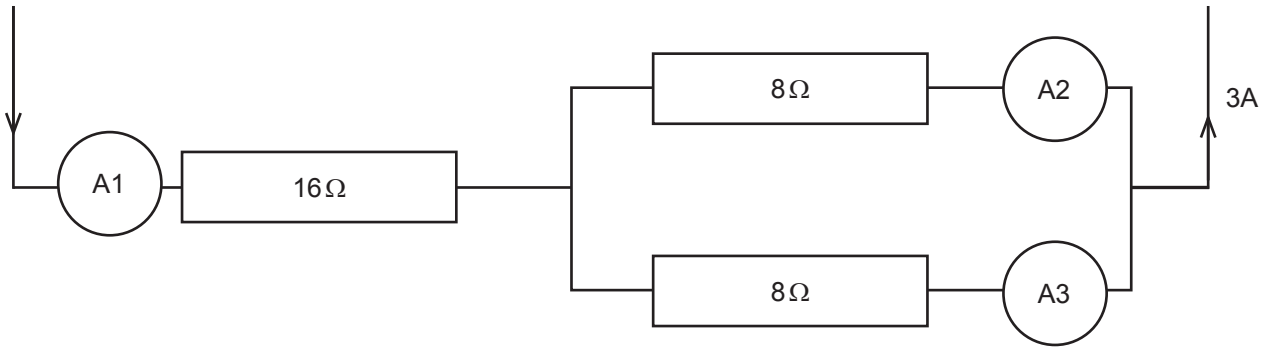
(c) Calculate the unknown battery voltage.
Show your working out.

Voltage = _____ V [3]

[Turn over

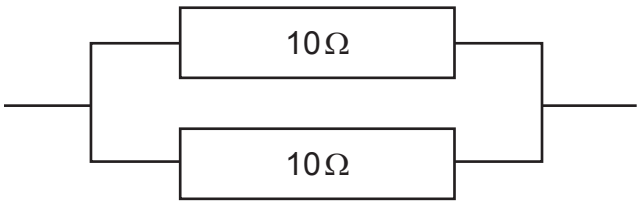
6 The diagram shows part of an electrical circuit.



(a) Give the readings on the ammeters A1, A2, and A3.

Reading on A1 = _____ A Reading on A2 = _____ A Reading on A3 = _____ A [3]

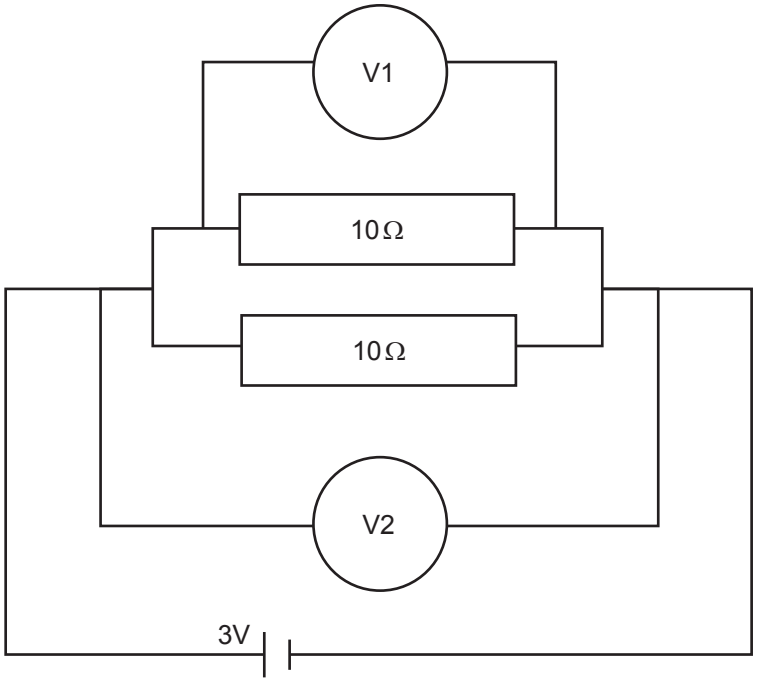
Two resistors of equal resistance are connected in parallel.



(b) What single resistor would have the same resistance as the two resistors in parallel?
Show your working out.

Resistance = _____ Ω [2]

The resistors are now connected into a circuit across a 3 V battery.

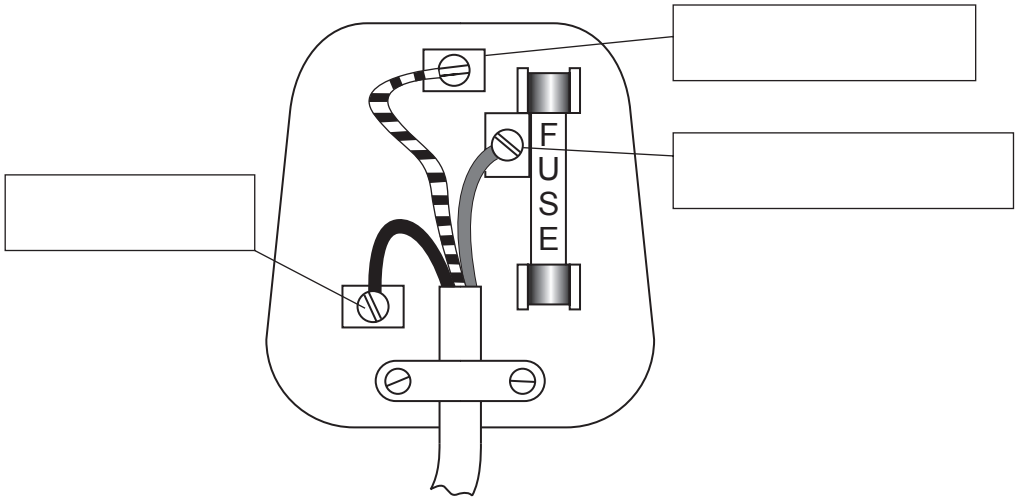


(c) What are the readings on voltmeters V1 and V2?

Reading on V1 = _____ V Reading on V2 = _____ V [2]

[Turn over

(d) **(i)** The diagram shows an electrical three pin plug.
Name the three terminals in the boxes.



[3]

When the plug is attached to an appliance, wires are connected to each of the terminals.

(ii) Which wire protects the user from electric shock?

_____ wire [1]

(iii) What is the colour of the neutral wire?

_____ [1]

(iv) The plug is connected to an electric lamp and a current of 3.0 A flows through the live wire. What current flows in the earth wire?

Current = _____ A [1]

7 Generators are used to produce electricity.

(a) (i) Give the names of two major components found inside a simple a.c. generator.

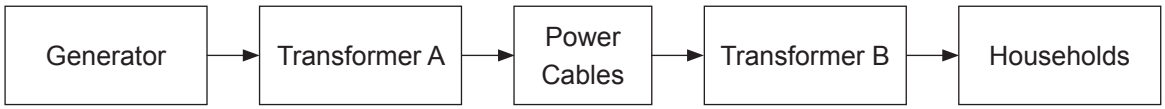
_____ and _____ [2]

(ii) A generator produces alternating current. What do you understand by 'alternating current'?

_____

_____ [2]

The block diagram below represents the generation and transmission of electricity.



(b) (i) What change is made by Transformer A to the alternating voltage from the generator?

_____ [1]

(ii) Give a reason why this change is made.

_____ [1]

(c) (i) What change is made by Transformer B to the alternating voltage from the power cables?

_____ [1]

(ii) Give a reason why this change is made.

_____ [1]

[Turn over

8 **(a)** You are asked to describe the two theories that were put forward for the structure of our Solar System.

Your description should include:

- the names of the two theories;
- what is at the centre of the system in each theory;
- the name of the theory we accept today;
- the name of the main force common to both theories.

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

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

(b) Give the names of two bodies, other than planets, which orbit the Sun.

_____ and _____ [2]

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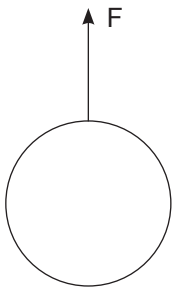
(Questions continue overleaf)

9 When an object falls through the air a frictional drag force, F, acts on the object.



The size of the drag force, F, depends on the speed, v, of the falling object.

It is suggested that the drag force is proportional to the square of the velocity.

This relationship may be written:

$$F = kv^2 \qquad \textbf{Equation 9.1}$$

where k is a constant.

Results are obtained and these are shown in the table below.

F/N	0.5	2.0	4.5	8.0	12.5
v/ m/s	1	2	3	4	5
v^2/ m^2/s^2		4			

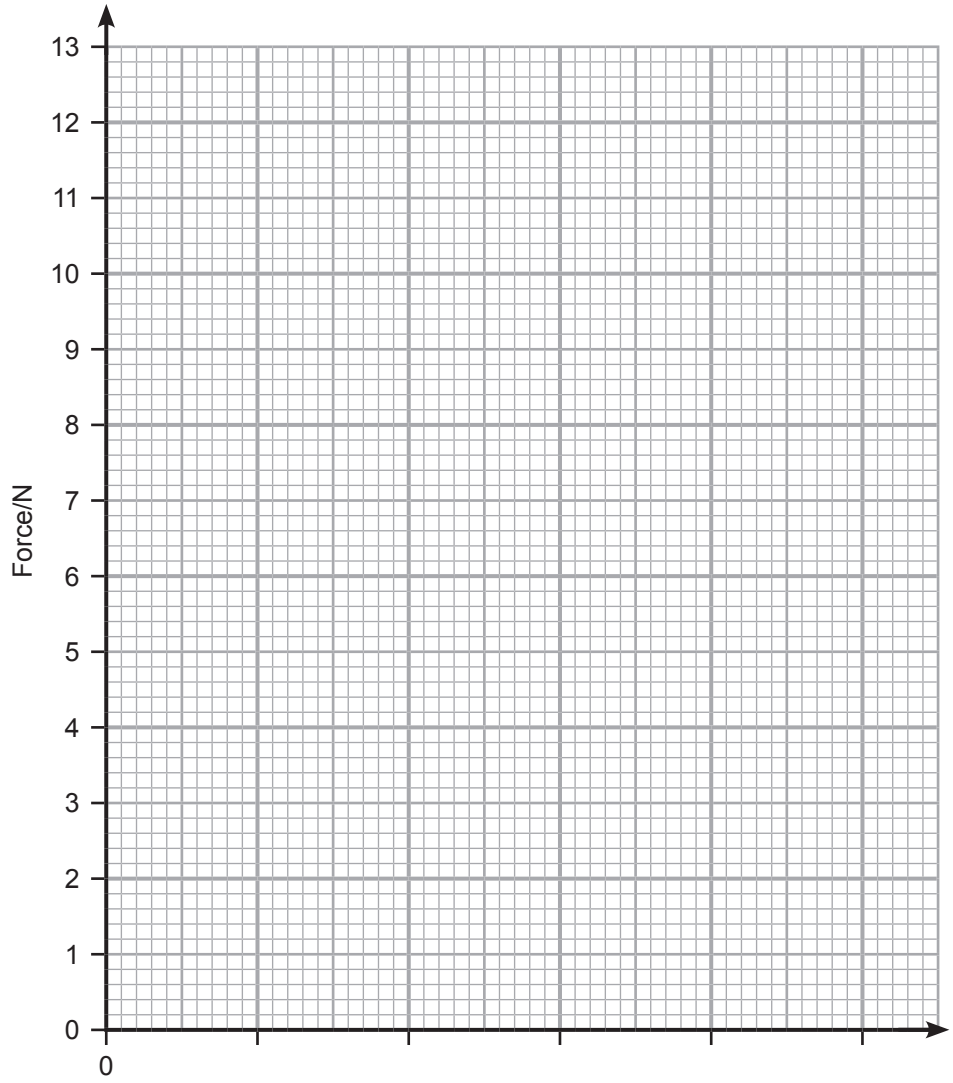
(i) Complete the table by entering the values of v^2. One value has been entered for you. [2]

You are asked to plot a graph of F against v^2.

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

(iii) Plot a graph of F against v^2. [2]

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



(v) Is the drag force directly proportional to v^2?

Tick (✔) the correct box.

Yes ☐ No ☐

Give **two** reasons for your answer.

1. _____

2. _____ [2]

[Turn over

(vi) Use your graph to find the velocity of the falling body when the drag force acting on it is 10 N. Give your answer correct to one decimal place.

Show your working out.

Velocity = _____ m/s [3]

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