Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Double Award Science: Physics

Unit P2

Higher Tier

MV18

[GDW62]

FRIDAY 14 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 on blank pages.
Complete in black ink only.
Answer **all nine** questions.

Information for Candidates

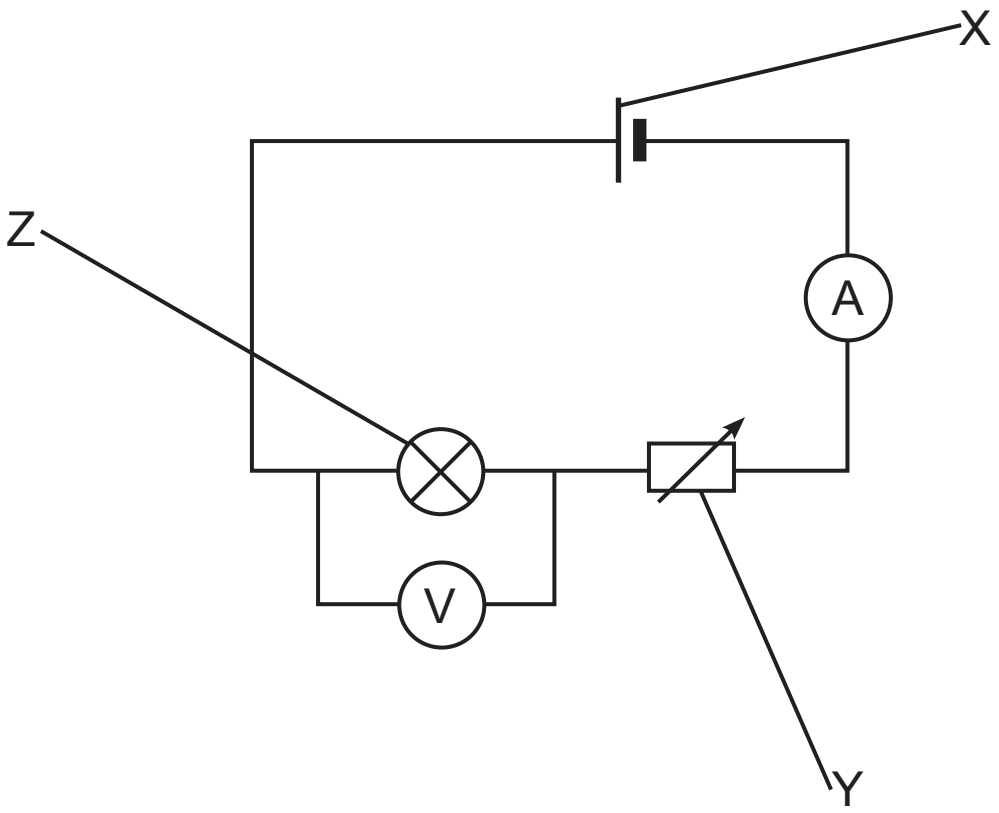
The total mark for this paper is 80.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **3**.

1 (a) (i) What is an electric current? [1 mark]

_____

_____

In the circuit below there are five components.



(ii) Label the components X, Y and Z. [3 marks]

X = _____

Y = _____

Z = _____

(b) Kate spends 30 minutes cutting the grass in her garden with an electric lawnmower which uses a current of 5 A. Calculate the total charge which flows during this time. [5 marks]

Include the unit with your answer.

You are advised to show your working out.

Charge = _____

2 **(a)** When a current travels through a wire, electrical energy is changed into other forms.

Give the main energy form that is produced and describe how it is produced. [3 marks]

Energy form _____

How it is produced _____

_____

_____

(b) **(i)** A 345 W food mixer is connected to a 230 V mains supply.

Calculate the current flowing through it. [3 marks]

You are advised to show your working out.

Current = _____ A

(ii) Choose a suitable fuse for the food mixer from the following: [1 mark]

1 A

3 A

5 A

Circle the correct answer.

(c) Bread is placed in a 1.2 kW toaster for 90 seconds. How much energy does the toaster use? [4 marks]

You are advised to show your working out.

Energy = _____ J

3 The Solar System consists of many objects including planets. Some of these objects orbit the Sun.

Describe the main features of the Solar System.
[6 marks]

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

Your answer should include:

the list of planets in order from the Sun;

_____

_____

_____

the name of one rocky planet;

_____

the name of one gas planet;

_____

the name of a body which orbits a planet other than an artificial satellite;

_____

the name of the force which provides orbital motion in the Solar System.

_____

_____

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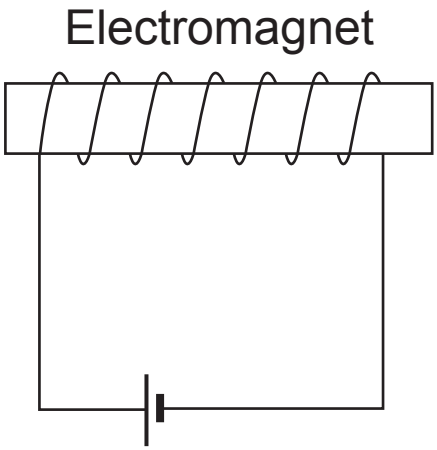
(Questions continue overleaf)

4 An electromagnet can be made using a coil of wire and a power supply.



(a) (i) Describe three ways to increase the strength of the electromagnet. [3 marks]

The direction of current in the coil is reversed.

(ii) Tick (✓) the correct box below to describe what happens. [1 mark]

☐ The north and south poles are reversed.

☐ The magnetic field becomes stronger.

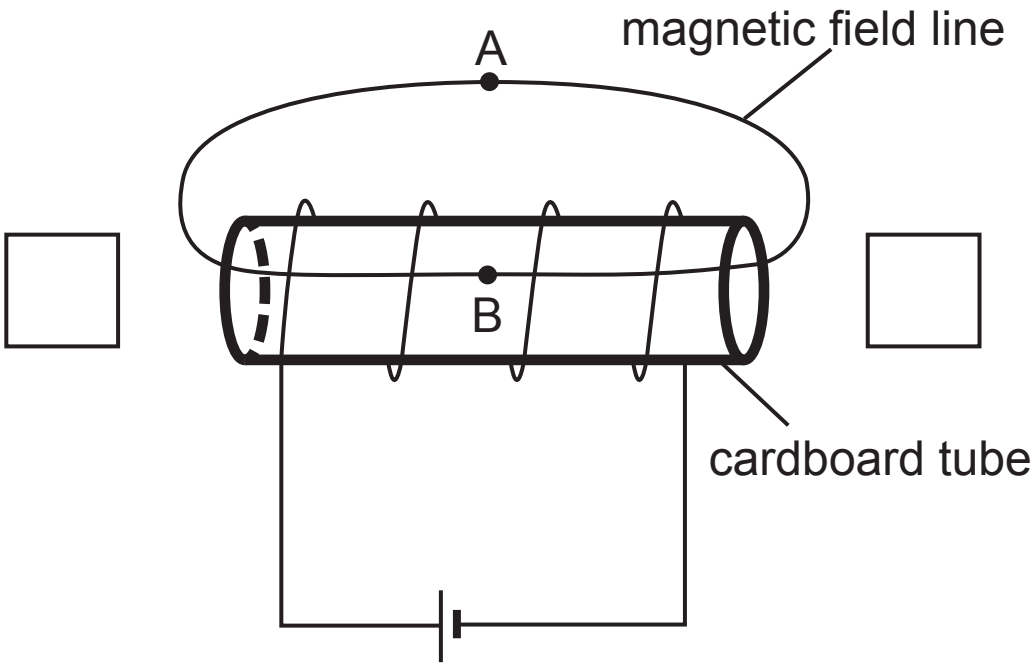
☐ The magnetic field becomes weaker.

(b) The diagram shows a current-carrying coil wrapped around a cardboard tube.

One magnetic field line is shown.

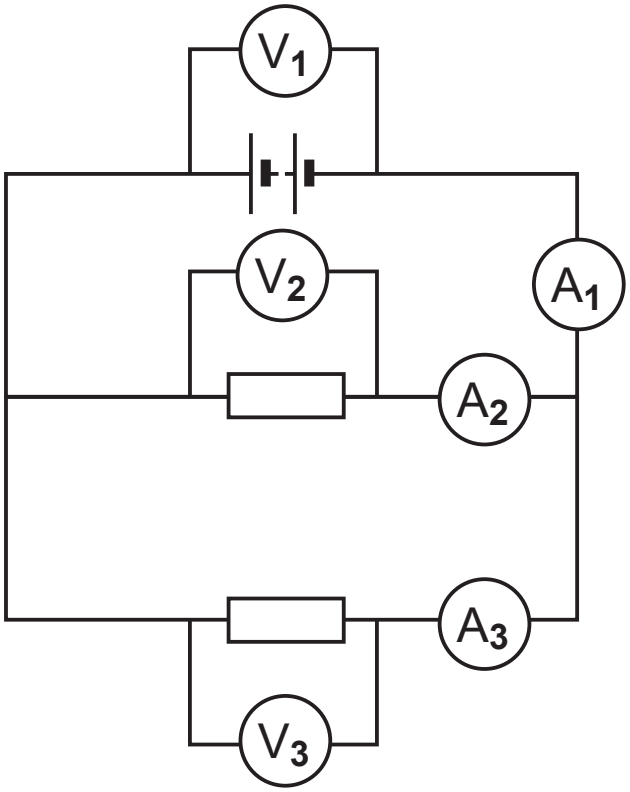
Complete the diagram: [3 marks]

- Show the north and south poles in the boxes provided;
- Indicate with arrows the direction of the magnetic field line at A and B.



5 The circuit below shows a battery connected to two **equal** resistors.

Three ammeters and three voltmeters have been included in the circuit.



Some readings have been recorded below.

(a) Use your knowledge of current and voltages in circuits to complete the missing ammeter and voltmeter readings. [4 marks]

Ammeter 1 = _____ A

Voltmeter 1 = _____ V

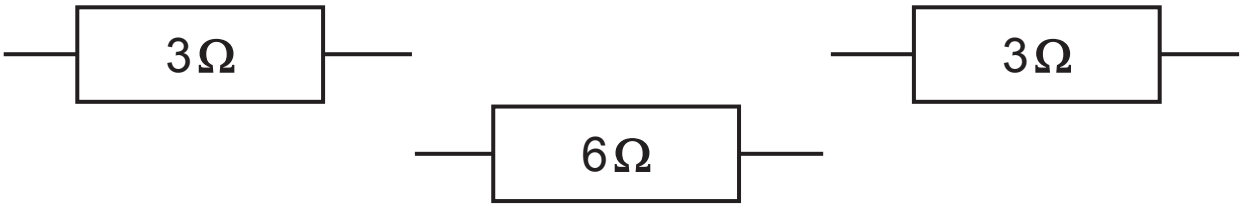
Ammeter 2 = 1.0 A

Voltmeter 2 = 12 V

Ammeter 3 = _____ A

Voltmeter 3 = _____ V

(b) A pupil has been given three resistors.



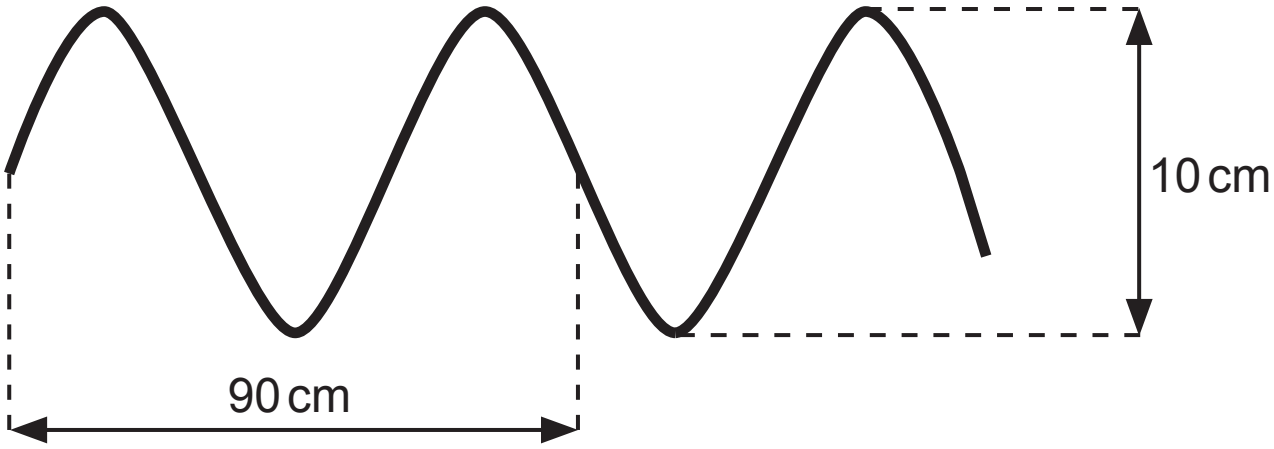
Using some or all of the resistors above, **draw arrangements** to provide the total resistance for each box. [4 marks]

Do not include any components other than the resistors and connecting wires.

Total resistance = 9 Ω	Total resistance = 1.5 Ω

Total resistance = 2 Ω	Total resistance = 5 Ω

6 A water wave is shown.



Use the diagram to find:

(a) (i) the wavelength of the wave; [1 mark]

_____ cm

(ii) the amplitude of the wave. [1 mark]

_____ cm

(b) Microwaves are used in microwave ovens.

(i) If the velocity of the wave is 3×10^{8} m/s and its frequency is 1×10^{10} Hz, calculate the wavelength of the microwave. [3 marks]

You are advised to show your working out.

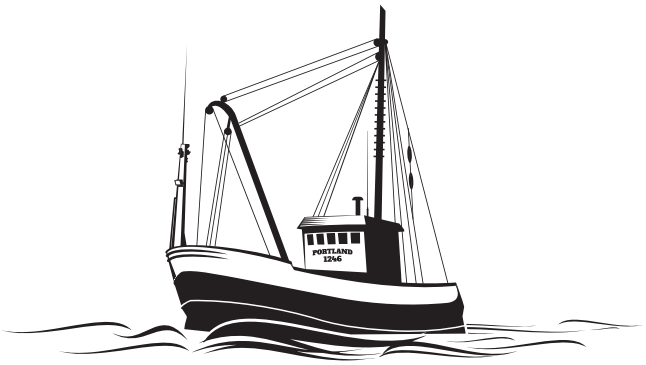
Wavelength = _____ m

(ii) State the wavelength in **(b)(i)** in cm. [1 mark]

Wavelength in cm = _____ cm

A boat uses sonar to detect a whale.

It takes 0.5 seconds for the signal to travel from the boat to the whale and back again.



(c) If sound travels at 1500 m/s in seawater, find how far the whale is beneath the boat. [4 marks]

You are advised to show your working out.

Depth = _____ m

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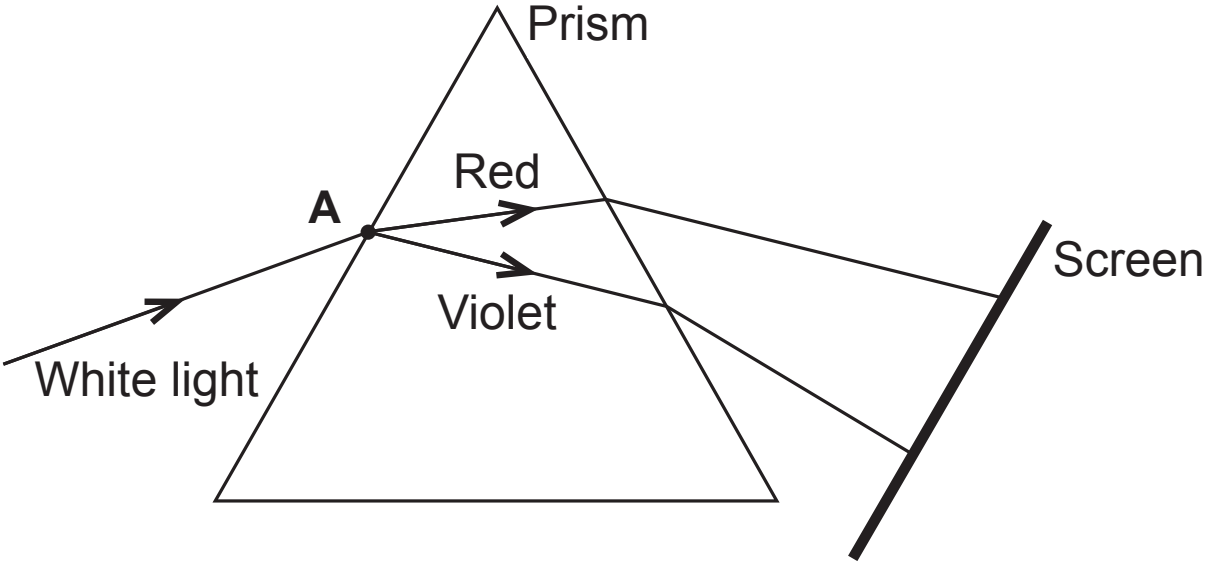
7 (a)



The diagram shows what happens when white light enters a glass prism.

(i) What name is given to the process which causes white light at **A** to separate into a spectrum of different colours? [1 mark]

_____

(ii) Explain why the colours separate when the light enters the glass prism. [1 mark]

_____

_____

(iii) Why is the red light refracted less than the violet light? [1 mark]

_____

_____

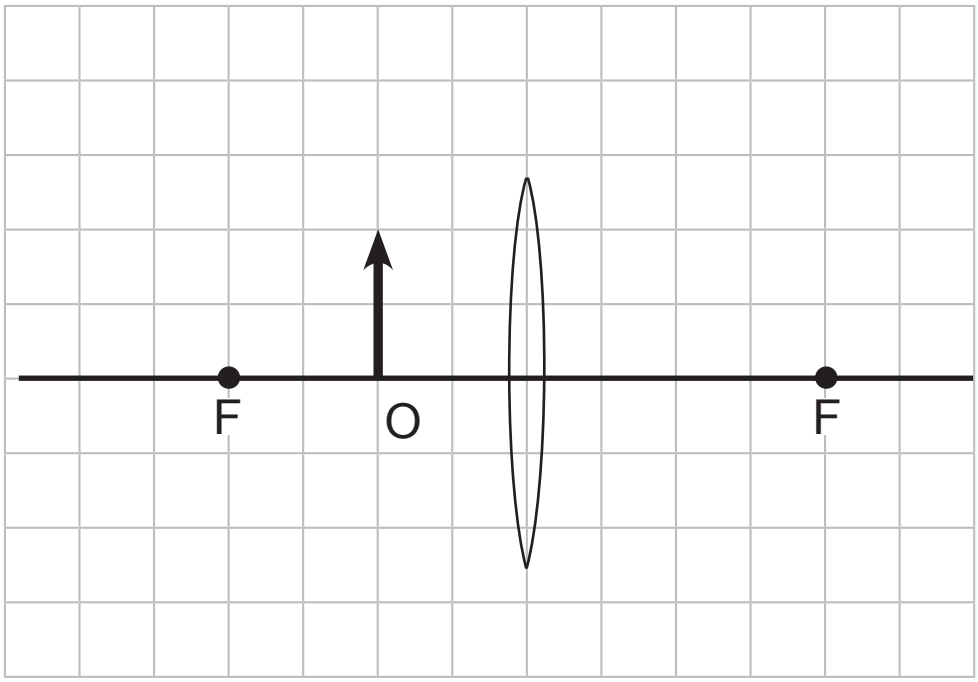
(b) (i) An object O is placed inside the focal point, F, of a converging lens.

Complete the diagram below to show how the image of O is formed. [5 marks]

Each square measures 1 cm × 1 cm.

Include the following:

- two rays from the top of the object;
- arrows to show the direction of the rays;
- the image produced.



(ii) Use your diagram to find the height of the image. [1 mark]

Height = _____ cm

(iii) The image produced can be described using one of the words below. Place a tick (✓) in the correct box. [1 mark]

☐ Real

☐ Inverted

☐ Virtual

☐ Diminished

(iv) Which use of a converging lens is illustrated in your ray diagram? Place a tick (✓) in the correct box. [1 mark]

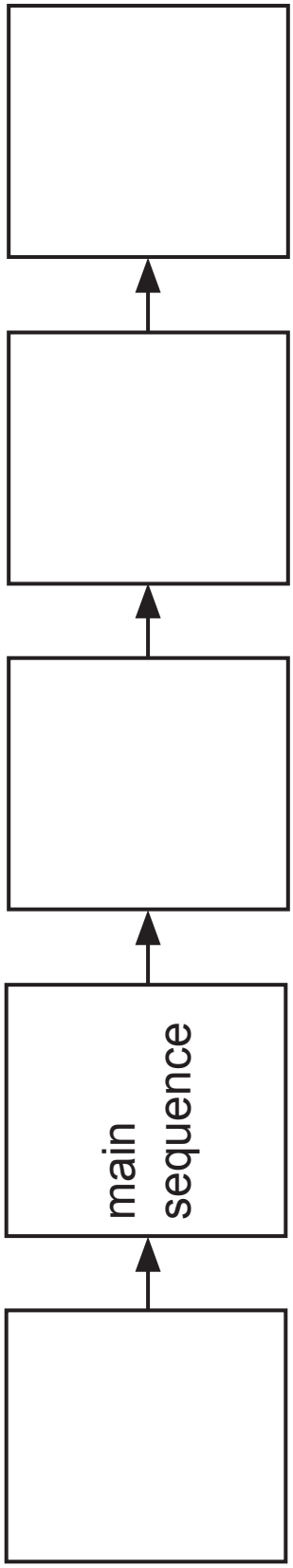
☐ Magnifying glass

☐ Projector

☐ Camera

8 **(a)** Our Sun is currently in the main sequence period of its life cycle.

Name the other stages of its life cycle by completing the diagram below. [4 marks]



(b) (i) The Sun is our nearest star.

Name the two main elements in our Sun.
[2 marks]

_____

and

_____

(ii) Explain why the Sun is stable during its main sequence period.

Remember to include the direction of any forces you mention in your answer. [5 marks]

_____

_____

_____

_____

_____

9 **(i)** Massive stars have a different life cycle after the main sequence period.

Complete the sentence below to describe how a massive star can become a supernova. [3 marks]

A massive star becomes a red _____

followed by an _____ where the

outer layers of the star are _____ .

(ii) When a star becomes a supernova it shines very brightly. How many times greater than our Sun is this brightness? [1 mark]

_____

(iii) After a supernova, a massive star may collapse. This causes the massive star to turn into something different. List two things the massive star could turn into. [2 marks]

1. _____

2. _____

(iv) What force prevents light escaping from the final stage of the life cycle of a very massive star? [1 mark]

_____

This is the end of the question paper

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For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

Examiner Number