



Rewarding Learning

General Certificate of Secondary Education
2014

Centre Number

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Candidate Number

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GCSE: Physics

Unit 2

Foundation Tier



[GPH21]

GPH21

MONDAY 23 JUNE, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Complete in blue or black ink only. **Do not write in pencil or with a gel pen.**

Answer **all six** 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 **5(c)**.

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28GPH2101

- 1 (a) Mobile phones involve receiving and transmitting waves which some people think might be harmful to health. All new mobile phones in the UK must be tested and given a SAR (specific absorption rating). The SAR value is a measure of the energy absorbed by the head while a mobile phone is being used.

The table gives the SAR value, **for adults**, for three different mobile phones. To be sold in the UK, a mobile phone must have a SAR value lower than 2.0 W/kg.

Mobile phone	SAR value in W/kg
X	0.15
Y	0.85
Z	1.85

- (i) All organisations use the same test to measure a SAR value. Why is using the same test important?

_____ [1]

- (ii) Give **two** reasons why there might be a significant risk to very young children using mobile phone Z.

1. _____

2. _____

_____ [2]

- (iii) Other than keeping the length of the call as short as possible, what precaution might a user of a mobile phone take to minimise the risk of absorbing too much radiation?

_____ [1]

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Marks	Remark



- (c) Seismic (earthquake) waves travel through the earth to the surface. When they arrive there they cause buildings on the surface to vibrate. One type of seismic wave, called an S-wave, causes buildings on the surface to vibrate parallel to the Earth's surface.

buildings vibrate in this direction



wave direction

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- (i) Seismic waves are either longitudinal or transverse. What type of wave is a seismic S-wave?

_____ [1]

- (ii) Explain the reason for your answer to part (c)(i).

_____ [2]

Examiner Only

Marks Remark



- (iii) This particular S-wave has a wavelength of 2700 m and its frequency is 1.3 Hz. Calculate its speed.

You are advised to show clearly how you get your answer.

Speed = _____ m/s [4]

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Marks	Remark

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(d) The longer you sunbathe, the more solar radiation your skin receives.

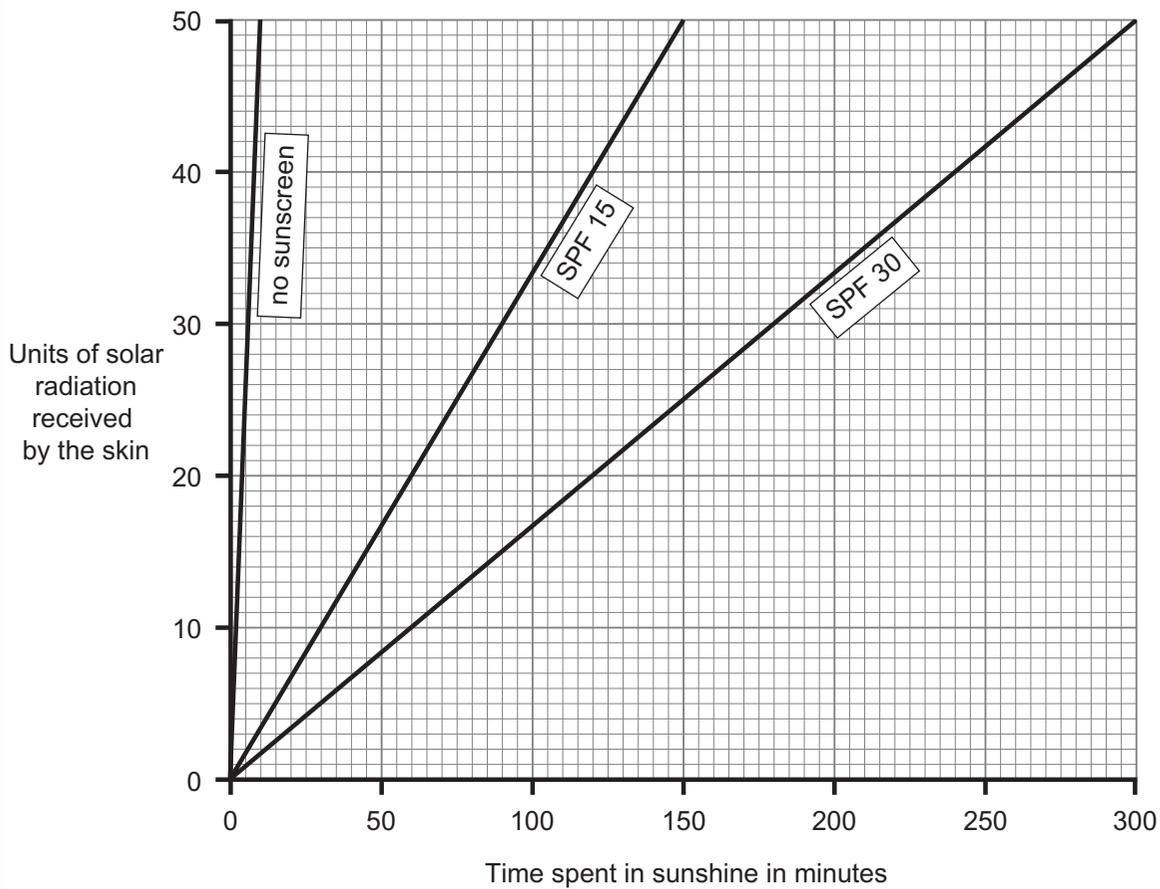
(i) Which part of the electromagnetic spectrum causes sunburn?

_____ [1]

Sunscreen lotions absorb some of this radiation. The lotions are given a skin protection factor (SPF) number.

The graph shows how the amount of radiation received by a person's skin is related to how long they are outside on a sunny day.

The skin gets sunburn if it receives 50 units of solar radiation.



(ii) If no sunscreen is applied, how long can you stay in the sun before you get sunburn?

_____ minutes [1]

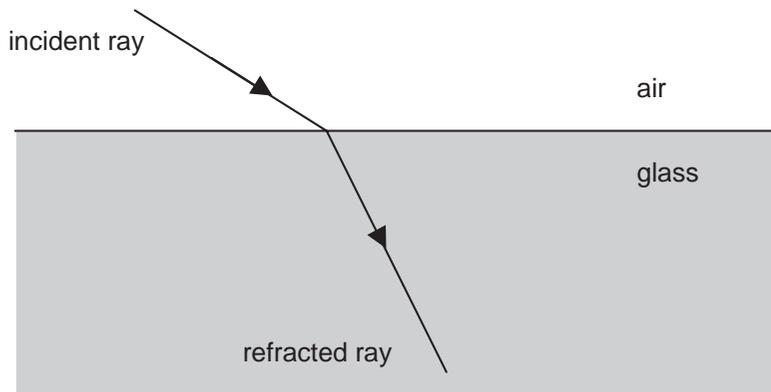
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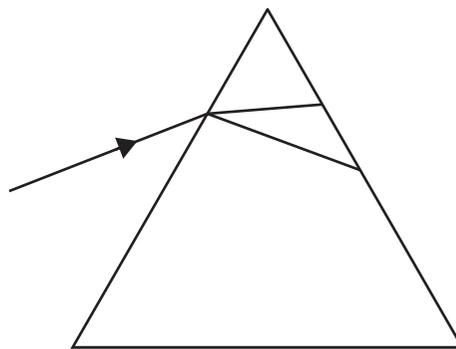


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- (b) When a ray of light is passed through a glass block it is refracted. The diagram below shows a ray of light incident on a glass block. The refracted ray is also shown.



- (i) On the diagram mark clearly with the letter *i* the angle of incidence. [1]
- (ii) On the diagram mark clearly with the letter *r* the angle of refraction. [1]
- (iii) The diagram shows the dispersion of white light by a glass prism. Complete the diagram to show the path of red and violet rays as they leave the prism. Label each ray with its colour.



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Marks Remark

[1]

[1]

[1]

[Turn over

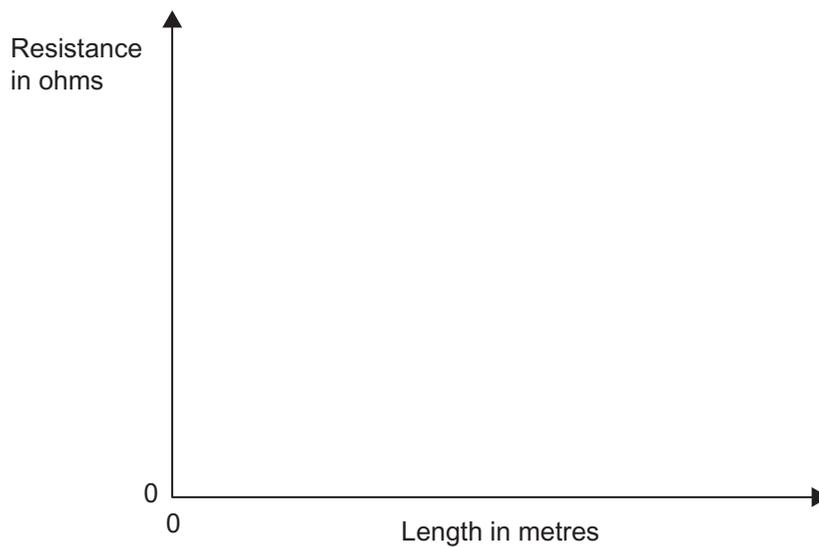
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The pupil used the circuit to measure the resistance of different lengths of wire of the same material.

(iii) On the axes below draw the graph he would expect to get when he plotted his results. [1]



(iv) An 80 cm length of this wire was found to have a resistance of $12\ \Omega$. Calculate the resistance of a 60 cm length of the same wire.

You are advised to show clearly how you get your answer.

Resistance = _____ Ω [2]

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Marks	Remark

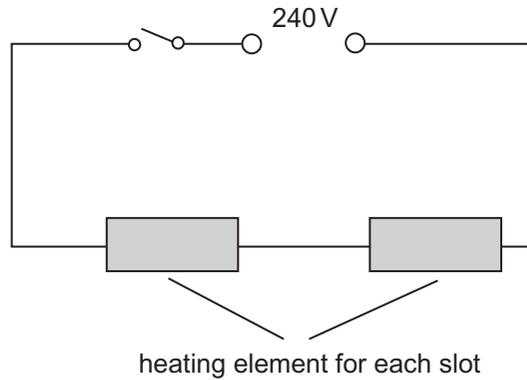
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28GPH2113

- (c) The toaster shown in the picture, which can take two slices of bread, always has both toasting slots switched on when in use. This wastes electrical energy if only one slice of toast is required. The diagram below shows the basic circuit for the toaster.

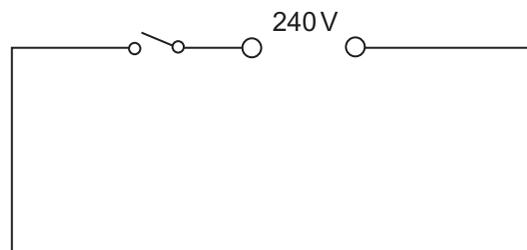


- (i) Explain why it is **not** possible to have only one element on.

[1]

- (ii) By rearranging the heating elements and adding additional switches it is possible to make a toaster to toast either one or two slices of bread as required.

Complete the diagram below to show how the circuit could be arranged.



[2]

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Marks	Remark

Total Question 3





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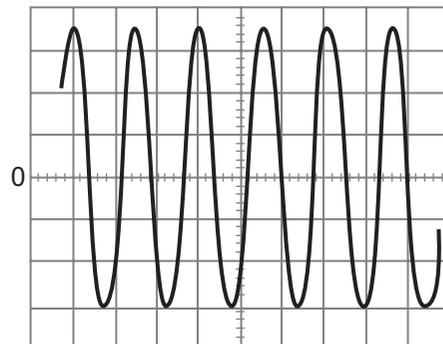
28GPH2117

4 (a) Electrical signals can be either a.c. or d.c.
What is meant by the abbreviations a.c. and d.c.?

(i) a.c. _____ [1]

(ii) d.c. _____ [1]

(b) An electrical signal is connected to a CRO (cathode ray oscilloscope) and a student makes a sketch of the waveform obtained, as shown below.



(i) How can you tell from the sketch that the electrical signal is a.c.?

_____ [1]

(ii) How can you tell from the sketch that the electrical signal has a constant frequency?

_____ [1]

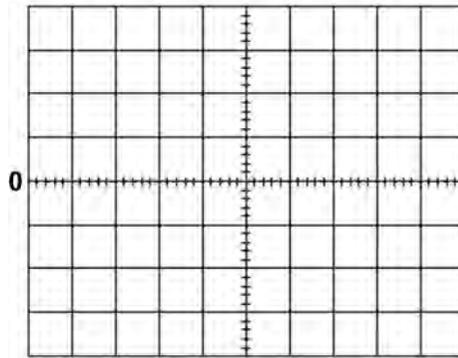
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Remark



(iii) Sketch below a graph to show what the student might see on the CRO screen if the signal was a **changing d.c.**



[2]

(iv) Name a source of d.c. _____ [1]

(v) Name a source of a.c. _____ [1]

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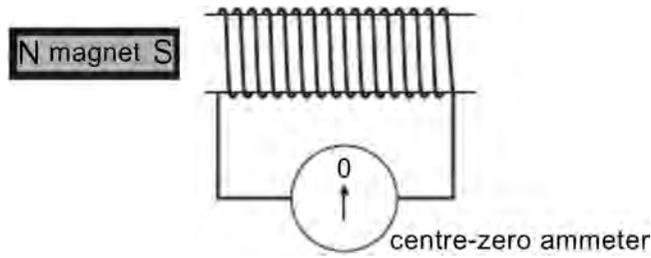
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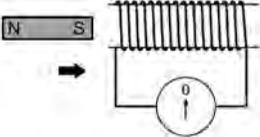
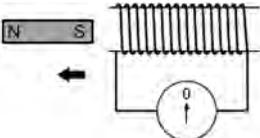
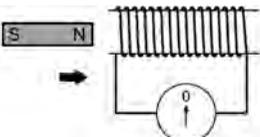
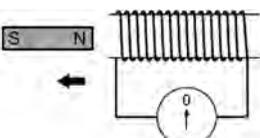


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(c) Caroline is investigating electromagnetic induction using a bar magnet, a coil of wire and a centre-zero ammeter.



When Caroline moves the south pole of the magnet towards the coil, the ammeter needle deflects to the left. This deflection has been entered into her results table below.

Movement of magnet	Deflection: LEFT, RIGHT or NONE
<p>South pole moves towards coil</p> 	LEFT
<p>South pole moves away from coil</p> 	
<p>North pole moves towards coil</p> 	
<p>North pole moves away from coil</p> 	

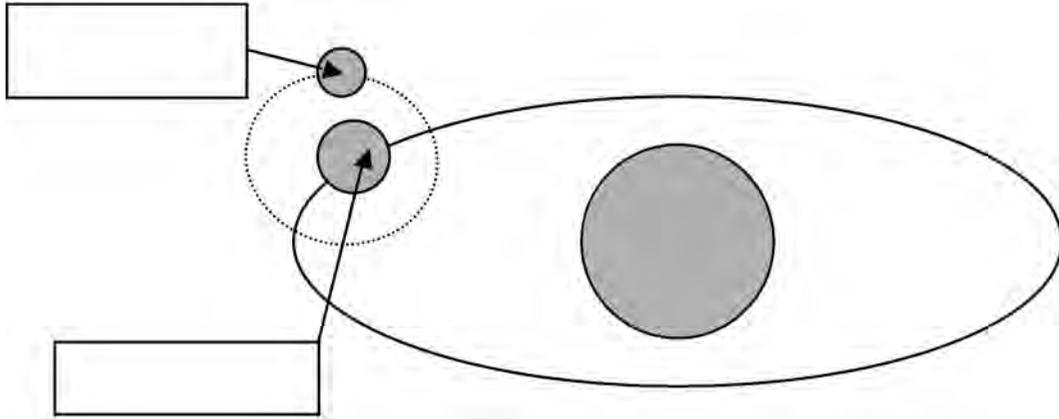
(i) Complete the results table above to show the deflection, if any, of the ammeter needle. [3]

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Marks	Remark



- 5 (a) The diagram below shows the Sun, Earth and Moon. Write the names of those objects indicated by arrows inside the boxes provided.



[2]

- (b) (i) With the present method of space travel, why is it unlikely that we will ever travel to a planet outside our solar system?

[1]

- (ii) State one piece of evidence that the inhabitants of another planet might detect, that would show that life exists on Earth.

[1]

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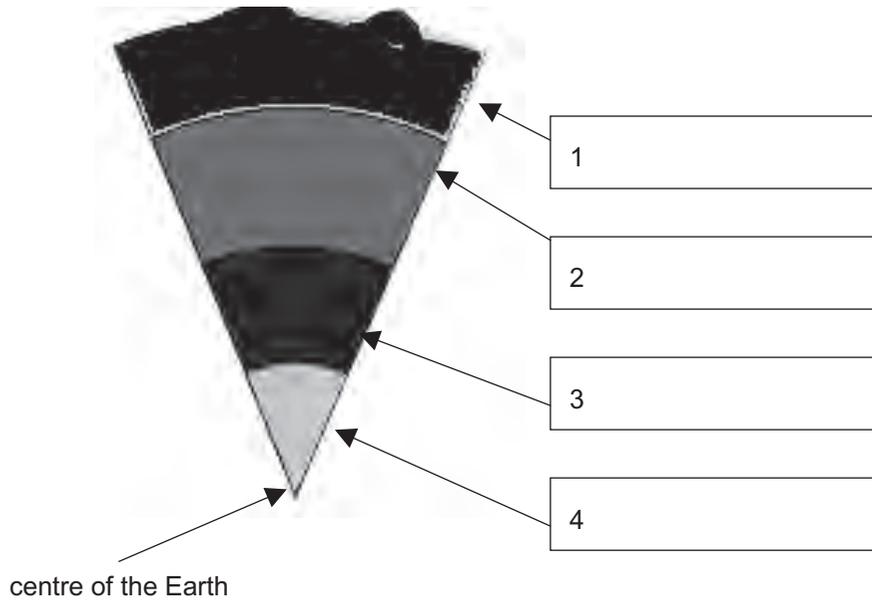
Marks Remark



6 (a) The Earth is divided into layers. These layers have different properties and compositions.

(i) On the diagram below label each of the layers marked by arrows. Write the name in the box provided. Choose your answers from the words listed below.

Inner Core Mantle Crust Outer Core Water Air



[4]

(ii) Name the layer or layers which are solid.

_____ [2]

(iii) Iron is one of the two main elements that are present in layer 4. Name the other element.

_____ [1]

(iv) What are layer 1 and the upper part of layer 2 collectively known as?

_____ [1]

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Question Number	Marks
1	
2	
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