



General Certificate of Secondary Education
2017–2018

Centre Number

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Candidate Number

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Science: Single Award

Unit 3 (Physics)
Foundation Tier



[GSS31]

FRIDAY 23 FEBRUARY 2018, MORNING

TIME

1 hour.

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.
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

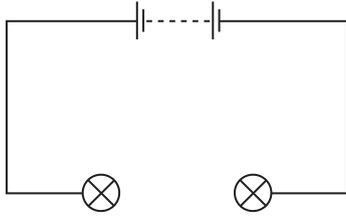
The total mark for this paper is 60.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

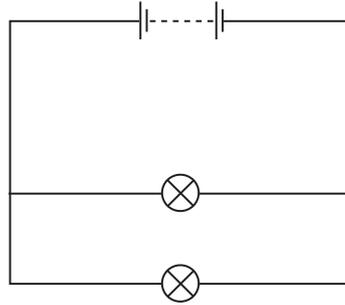
Quality of written communication will be assessed in Question **8(a)**.

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

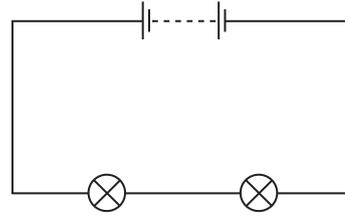
1 Shown below are three circuit diagrams.



A



B



C

Source: Principal Examiner

(a) In which circuit (**A**, **B** or **C**):

(i) will the bulbs **not** be lit?

Answer _____ [1]

(ii) will the bulbs be brightest?

Answer _____ [1]

(b) In circuit **C**, if one bulb is broken what will happen to the other bulb?

_____ [1]

Examiner Only	
Marks	Remark

- (c) The table below shows the effects of increasing the number of bulbs in circuit C.

Number of bulbs	Voltage across each bulb/V	Brightness of bulbs
2	6	Very bright
3	4	Bright
4	3	Dim
6	2	Very dim

- (i) Complete the following sentence to describe fully these results.

As the number of bulbs increases _____

_____ [2]

- (ii) What will happen to the current flowing in circuit C when the number of bulbs increases?

Circle the correct answer.

increases **decreases** **unchanged** [1]

- (d) (i) Name the meter used to measure current flowing in a circuit.

_____ [1]

- (ii) What term describes how this meter should be connected to measure current?

Choose from:

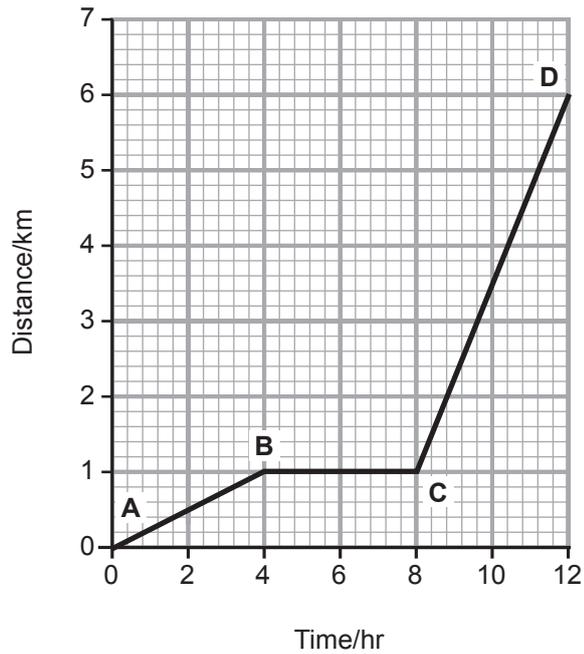
parallel **separate** **series**

Answer _____ [1]

Examiner Only

Marks Remark

2 Shown below is a distance-time graph for an object travelling from **A** to **D**.



Source: Principal Examiner

(a) How far has the object travelled during the first 4 hours?

Answer _____ km [1]

(b) Use the equation:

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

to calculate the average speed from **A** to **D**.

(Show your working out.)

Answer _____ km/hr [2]

Examiner Only	
Marks	Remark

(c) Complete the following sentence.

Choose from:

faster than : **slower than** : **the same as**

The speed of the object between **C** and **D**

is _____ the speed from **A** to **B**. [1]

(d) Describe the motion of the object, if any, between **B** and **C**.

_____ [1]

(e) Different types of roads have different speed limits. In towns the speed limit is 30 mph and on a motorway it is 70 mph.

(i) State **one** method used in a town which tries to keep vehicles within the speed limit.

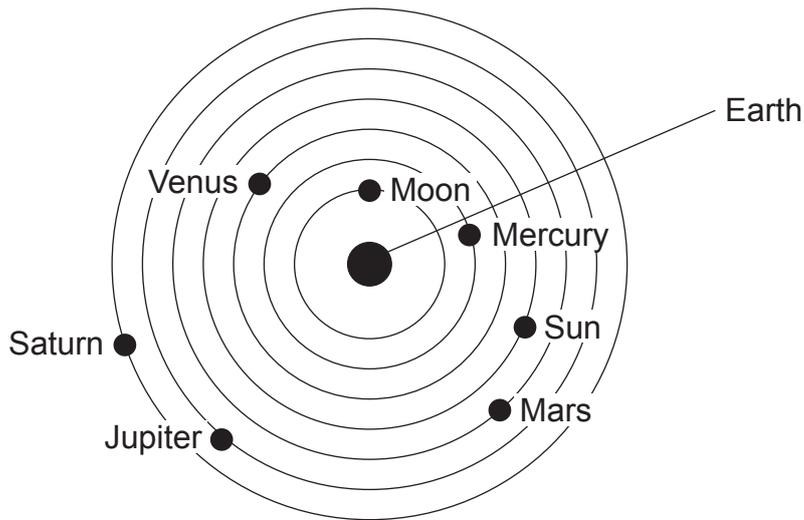
_____ [1]

(ii) Suggest **one** reason for having a lower speed limit in a town.

_____ [1]

Examiner Only	
Marks	Remark

3 (a) The diagram below shows the geocentric model of the Solar System.



Source: Principal Examiner

(i) State **two** differences between this model and the modern day model of the Solar System.

1. _____

2. _____

_____ [2]

(ii) Name the modern day model of the Solar System.

_____ [1]

(b) Name an object shown in the diagram above that is **not** a planet.

_____ [1]

Examiner Only	
Marks	Remark

- (c) The table below gives information about some planets in our Solar System.

Planet	Distance from Sun/ million km	Diameter (size)/ km	Gravity/ N/kg
Mercury	58	4900	4
Venus	108	12 000	9
Earth	150	12 750	10
Jupiter	778	143 000	26
Saturn	1429	120 000	11

- (i) On which planet would your weight be the greatest?

Answer _____ [1]

- (ii) Describe a trend shown by this information.

Circle the correct answer.

as distance from the Sun increases, diameter increases

as the diameter increases, gravity increases

as distance from the Sun increases, gravity increases

[1]

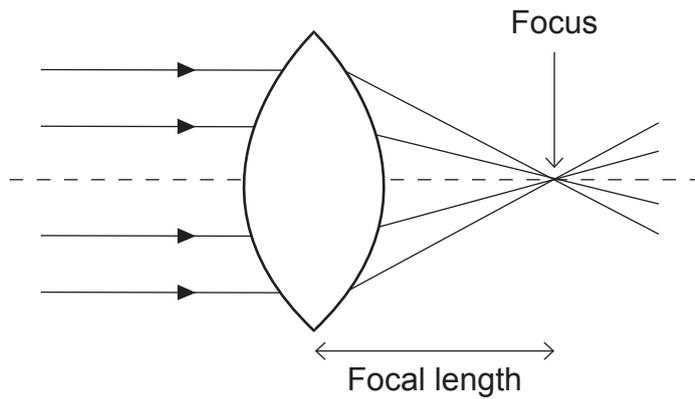
- (d) Our Solar System is part of a galaxy. What is the name of our galaxy?

_____ [1]

Examiner Only

Marks Remark

- 4 (a) The diagram below shows a lens focussing parallel rays of light.



Source: Principal Examiner

- (i) Name the type of lens shown in the diagram.

Answer _____ [1]

- (ii) What term describes the bending of light as shown in the diagram?

Choose from:

reflection

contraction

refraction

Answer _____ [1]

- (b) This type of lens is found in the eye to help produce an image. Name the part of the eye where an image is formed.

Choose from:

retina

iris

cornea

Answer _____ [1]

Examiner Only	
Marks	Remark

- (c) The table below shows how the focal length is affected by the thickness of the lens.

Lens thickness/mm	Focal length/mm
10.0	89
10.2	84
10.4	81
10.6	78
10.8	75
11.0	72

- (i) State how the focal length changes as the thickness of the lens increases.

_____ [1]

- (ii) Suggest **one** disadvantage of having thicker lenses in a pair of glasses.

_____ [1]

- (d) Visible light is one type of wave in the electromagnetic spectrum shown below.

Gamma rays		Ultra violet	Visible light		Micro waves	Radio waves
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- (i) Complete the spectrum by naming the other two types of wave.

[2]

- (ii) State **one** feature all electromagnetic waves have in common.

_____ [1]

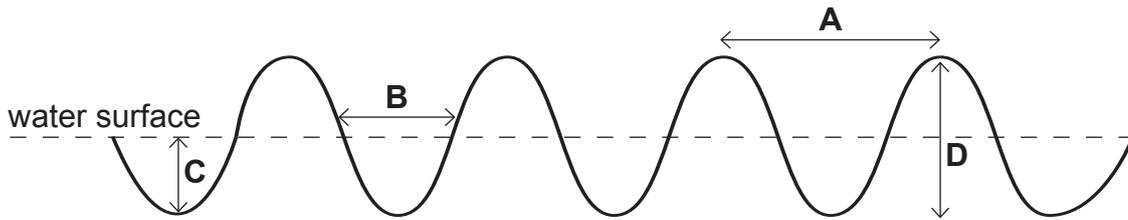
- (iii) State **one** feature that is different for all electromagnetic waves.

_____ [1]

Examiner Only

Marks Remark

5 The diagram below represents a water wave.



Source: Principal Examiner

(a) Which letter (A, B, C or D) represents:

(i) the amplitude?

Answer _____ [1]

(ii) the wavelength?

Answer _____ [1]

(b) Water waves are transverse waves.

(i) Which statement below describes how the particles vibrate in a transverse wave?

Circle the correct answer.

in the same direction as wave travel

at right angles to wave travel

in the opposite direction to wave travel

[1]

(ii) Transverse waves are one type of wave. Name the other type.

_____ [1]

Examiner Only	
Marks	Remark

- (c) The table below shows how the speed of sound changes with air temperature.

Air temperature/°C	Speed of sound/ m/s
-1	330.0
10	336.9
21	343.6
33	350.3
45	358.0

- (i) Describe the trend shown by this information.

_____ [1]

- (ii) Use the equation:

$$\text{frequency} = \frac{\text{wave speed}}{\text{wavelength}}$$

to calculate the frequency of a sound wave that has a wavelength of 0.02 m travelling through air which has a temperature of -1°C .

(Show your working out.)

Answer _____ [2]

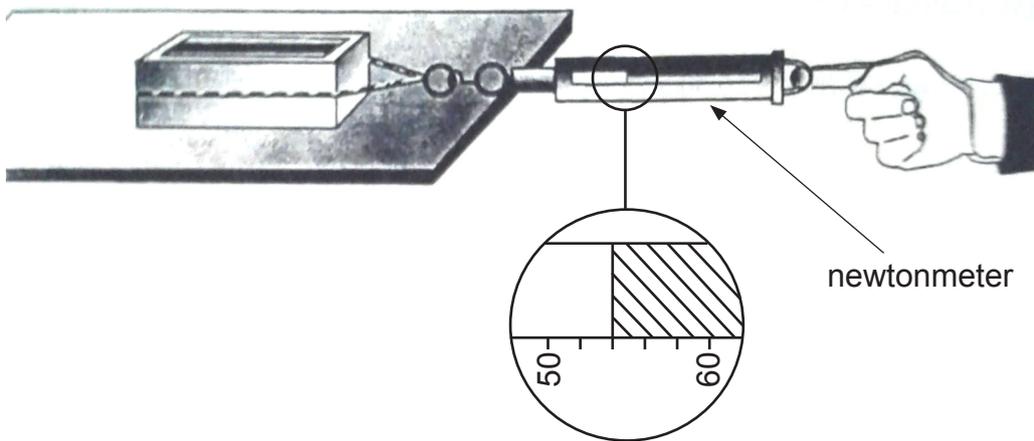
- (iii) State the unit of frequency.

Answer _____ [1]

Examiner Only

Marks Remark

- 6 (a) The diagram below shows a newtonmeter being used to pull a brick across a flat table.



Source: CCEA Artwork

- (i) What size of force is shown on the newtonmeter?

Answer _____ N [1]

- (ii) As the brick moves across the surface of the table a force is produced which opposes motion. Name this force.

_____ [1]

- (iii) Suggest **one** way that the size of this force could be reduced.

 _____ [1]

Examiner Only	
Marks	Remark

- (b) The table below gives the recommended safe distance between vehicles moving at different speeds, in order to avoid an accident.

Speed/ mph	Safe distance for good road conditions/metres	Safe distance for poor road conditions/metres
25	34	42
35	51	61
45	61	73
55	73	
65	89	105
75	102	120

- (i) Complete the table by suggesting a value for the safe distance at 55 mph. [1]

- (ii) Suggest **one** example of poor road conditions.

_____ [1]

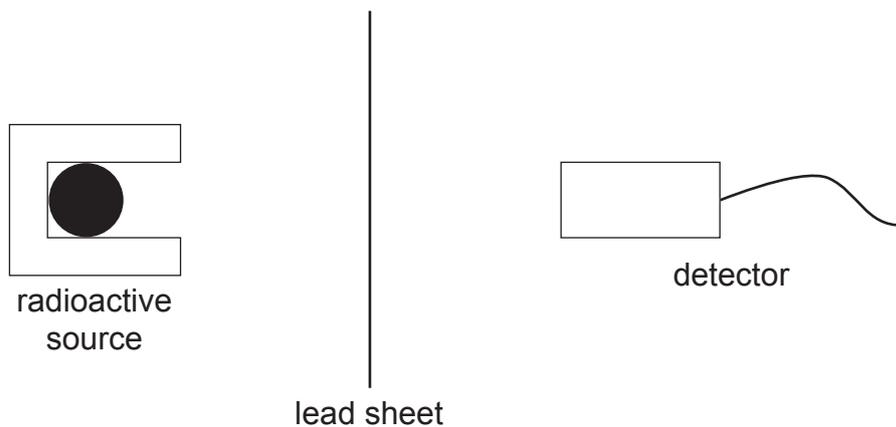
- (iii) Use this information to describe fully the effect of speed and road conditions on safe distances.

_____ [2]

Examiner Only

Marks Remark

- 7 The diagram below shows the apparatus used to investigate how the thickness of lead affects the amount of radiation that can pass through to reach the detector.



Source: Principal Examiner

- (a) There are three types of radiation. However, gamma is the only type suitable for this investigation.
- (i) Name the other **two** types of radiation.

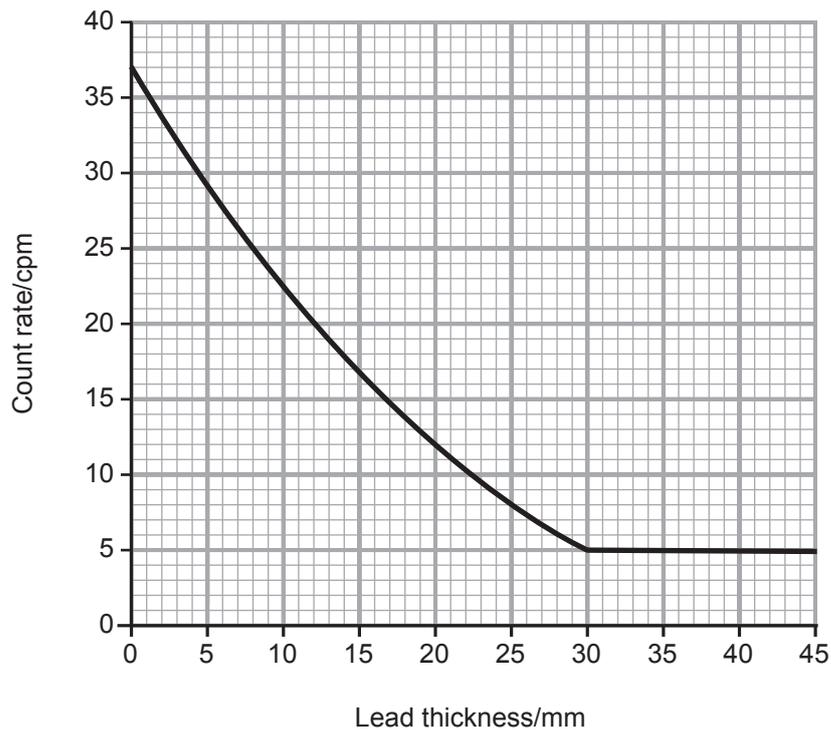
_____ and _____ [1]

- (ii) Explain why these types of radiation are **not** suitable for this investigation.

 _____ [1]

Examiner Only	
Marks	Remark

(b) The graph below shows the results of this investigation.



Source: Principal Examiner

(i) Describe fully the conclusion that can be made from these results.

[2]

(ii) Give **two** ways in which this investigation should have been carried out to make it a fair test.

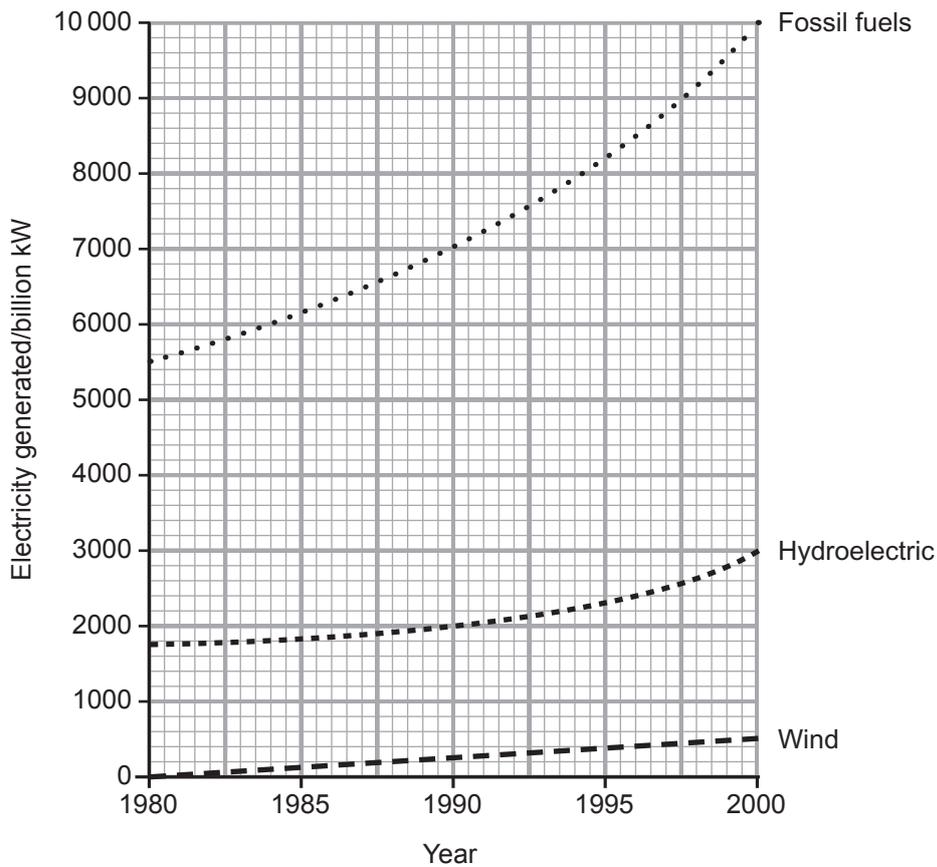
1.

2.

[2]

Examiner Only	
Marks	Remark

8 (a) The graph below shows how much electricity was generated worldwide from three different energy sources over 20 years.



Source: Principal Examiner

Compare the use of renewable and non-renewable energy sources during this 20-year period.

Your answer should include:

- the names of the renewable and non-renewable sources shown;
- the definition of a renewable energy source;
- one environmental disadvantage of each source.

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

Examiner Only	
Marks	Remark

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