



General Certificate of Secondary Education
2012–2013

Centre Number

71

Candidate Number

Science: Single Award

Unit 3 (Physics)

Higher Tier

[GSS32]



THURSDAY 23 MAY 2013, MORNING

TIME

1 hour 15 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.
Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

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

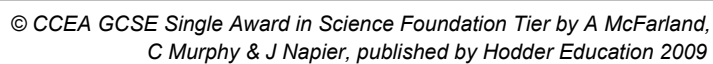
Quality of written communication will be assessed in questions **5** and **10(a)**.

For Examiner's
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Total
Marks

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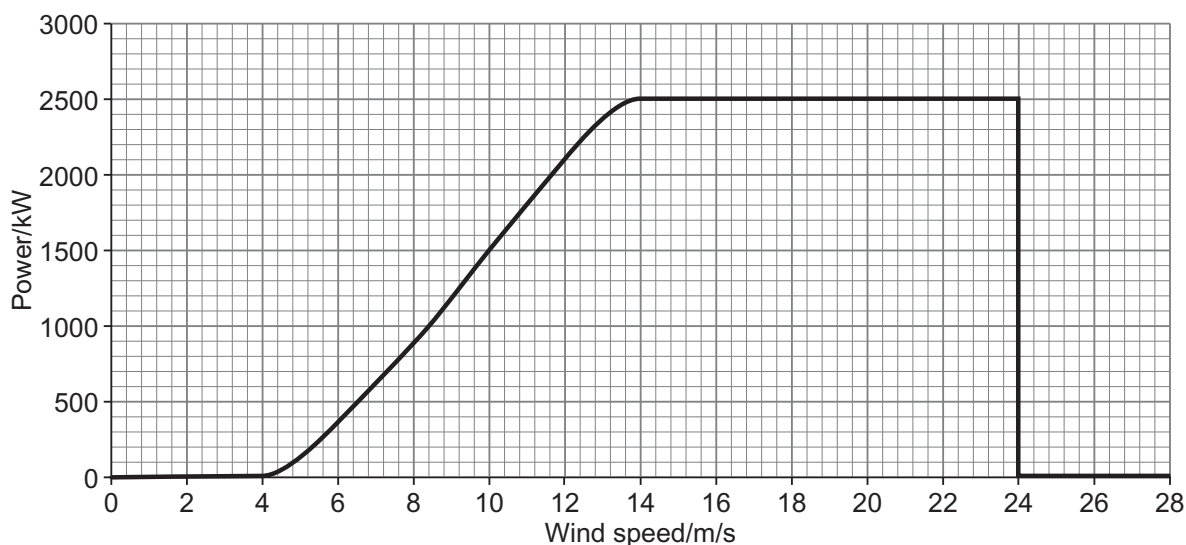
(a) Suggest the effect on the amount of current produced if:

1. a weaker magnet is used.

2. more coils of wire are used.

 [2]8627

- (b) The graph below shows how the wind speed affects the amount of power produced.



- (i) Describe fully how the power produced by the turbine changes with wind speed.

[3]

- (ii) Suggest why the turbine is designed to stop at high wind speeds.

[1]

- (c) Explain fully why the government has introduced more wind turbines in the past ten years.

[2]

- (d) Suggest **one** reason why some people object to wind turbines near their home.

[1]

Examiner Only	
Marks	Remark

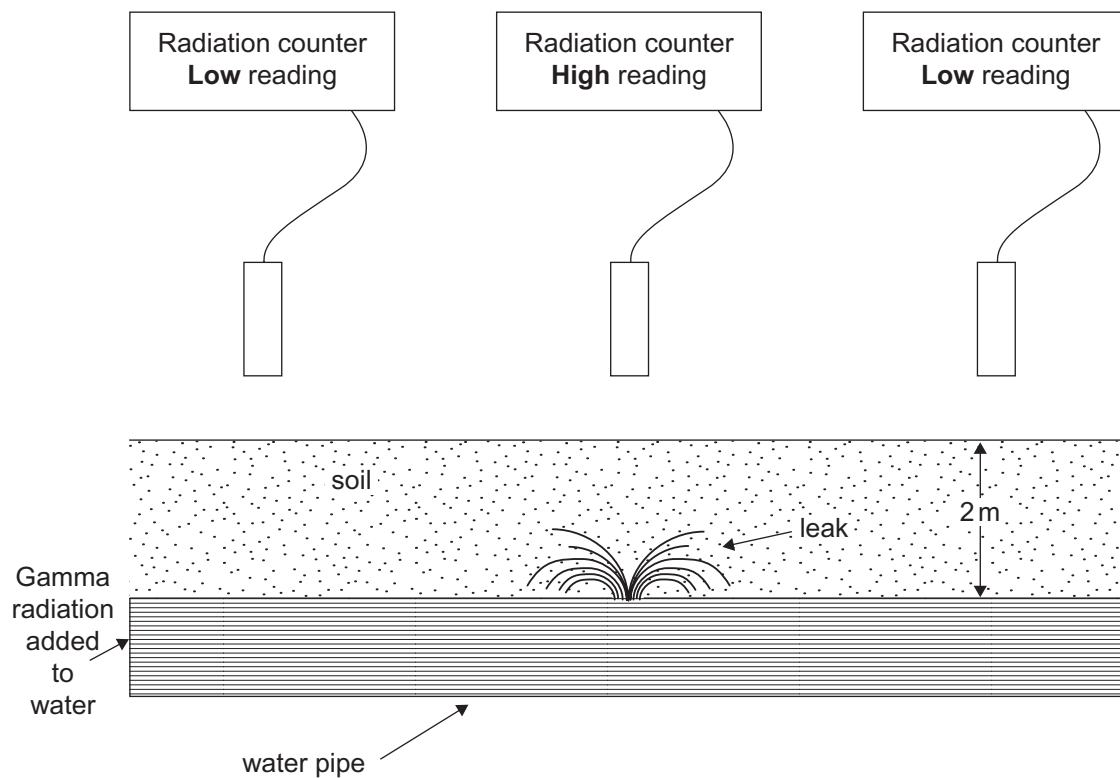


-
-
- [1]

-
-
-
- [2]

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(b) Gamma radiation can be used to check for leaks in water pipes.



Explain fully why gamma radiation is the best source to use.

[2]

Examiner Only	
Marks	Remark

(a) Which bulb is the most efficient?

_____ [1]

(b) Which bulb, including the cost to buy, would be the cheapest to run for 1000 hours?

_____ [1]

(c) The energy saving bulb uses 11 J of energy per second and has an efficiency of 0.6. What is its light energy output per second?

Use the equation:

$$\text{light energy output} = \text{efficiency} \times \text{energy input}$$

(Show your working out.)

Answer _____ J [2]

(e) The efficiency of a filament bulb is much less than the efficiency of an energy saving bulb. Explain fully why the government has recommended that the use of filament bulbs should be stopped.

[1]

Examiner Only	
Marks	Remark



[6]

[6]

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(Questions continue overleaf)

- 6 (a) The photograph below shows asteroid 243 Ida. It is 56 kilometres in length.



Source: NASA / Galileo Image Library

If an asteroid like the one shown above hit the Earth, describe fully how this could affect life on Earth.

[3]

- (b) The table below shows data on the asteroids most likely to hit Earth.

Name of asteroid	Possible impact year	Chance of hitting Earth/%	Impact velocity km/s	Estimated diameter m
2012 TY52	2014–2020	0.0003	14.13	180
2012 QD8	2042–2050	0.0007	20.77	18
2012 TC4	2020–2110	0.0049	6.51	16
2012 SY49	2031–2084	0.0013	15.66	23
2011 AG5	2040–2047	0.2000	9.55	140

- (i) Explain fully why scientists are **not** very concerned about impact from the asteroids shown in the table opposite.

[2]

- (ii) Name the asteroid that is least likely to hit Earth.

[1]

Examiner Only	
Marks	Remark



-
-
-
-
-
- [3]

- Use the equation:

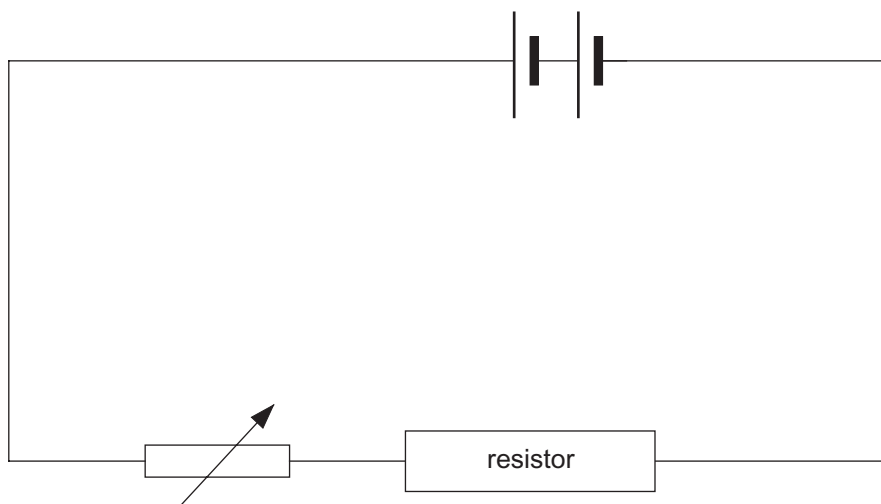
$$\text{frequency} = \frac{\text{speed}}{\text{wavelength}}$$

to calculate the frequency of these waves.

(Show your working out.)

Answer _____ Hz [2]

Examiner Only	
Marks	Remark



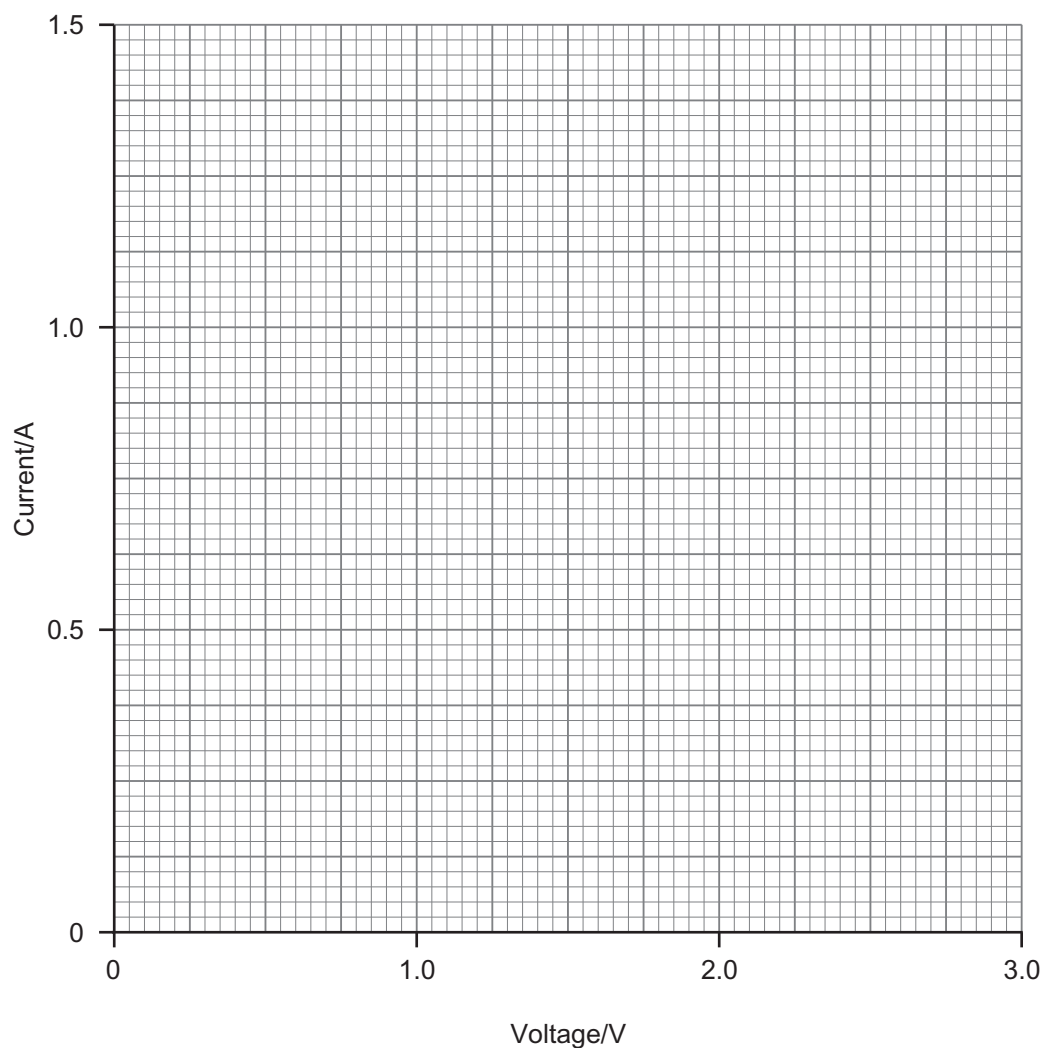
- (a)** Complete the circuit to show where he would place a voltmeter to measure the voltage across the resistor.

[1]

- (b)** Colin obtained the following results.

Voltage/V	Current/A
0.5	0.2
1.0	0.4
1.5	0.6
3.0	1.25

Examiner Only	
Marks	Remark



[3]

(ii) What conclusion can be drawn from these results?

[1]

(iii) From the graph what current flows when the voltage is 2.0 V?

Answer _____ A [1]

Examiner Only	
Marks	Remark



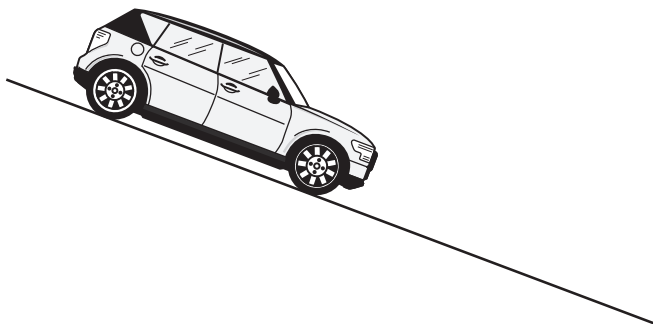
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- [1]

1. _____

2. _____ [2]

-
- [1]

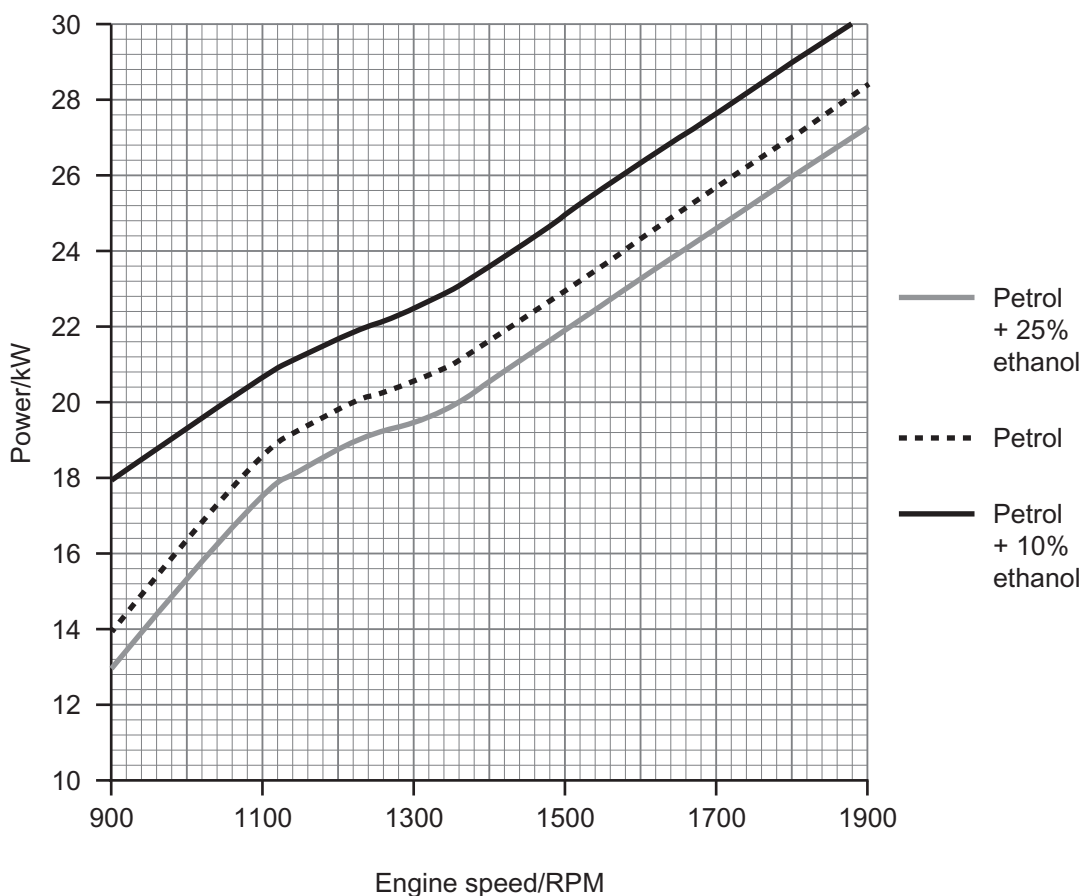
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[3]

Examiner Only	
Marks	Remark

- (d) The graph below shows how extenders affect the power produced by an engine.



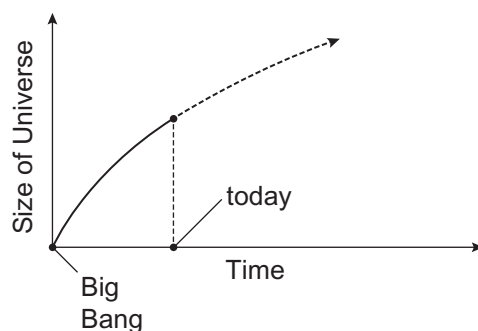
To save fossil fuels, manufacturers are designing cars to use petrol which contains an extender (ethanol). Use the graph to fully describe the effect of the extenders.

_____ [2]

- (e) Name **one** substitute fuel that can be used instead of fossil fuels.

_____ [1]

Examiner Only	
Marks	Remark



Describe fully the Big Bang theory. Explain how the graph above supports this theory.

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

[6]

Examiner Only	
Marks	Remark

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