



Centre Number

71

Candidate Number

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 3 (Physics)

Higher Tier

[GSS32]

ML

THURSDAY 23 MAY 2013, 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.

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

BLANK PAGE

1 Look at the table below. It shows how the percentage of children wearing seat belts in a car has changed from 1995 to 2012.

Age group	Year				
	1995	2000	2005	2010	2012
Under 1 year	96	97	98	98	100
1–4	65	82	92	96	97
5–9	49	68	82	94	94
10–13	47	65	82	93	95
All children	59	74	86	93	96

© Crown copyright – DOENI and NISRA

(a) Describe **two** trends that can be seen in this data.

1. _____

2. _____

_____ [2]

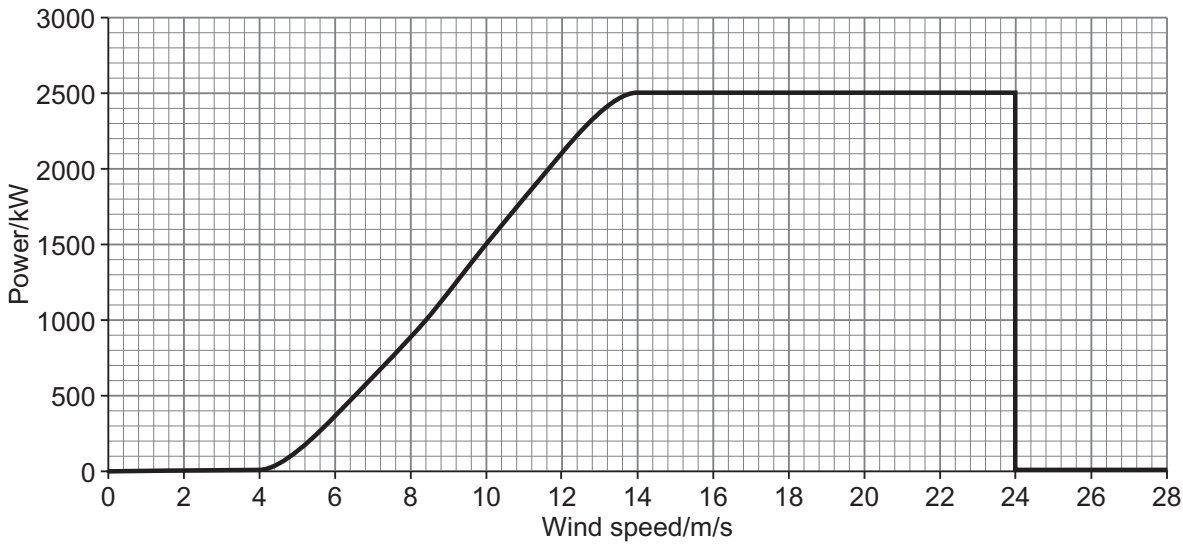
(b) The government are still advertising the need for children to wear seat belts. Use the information in the table to suggest why advertising is still necessary.

_____ [1]

Examiner Only	
Marks	Remark

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

Examiner Only	
Marks	Remark



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

[3]

(ii) Why is the turbine designed to stop at high wind speeds?

[1]

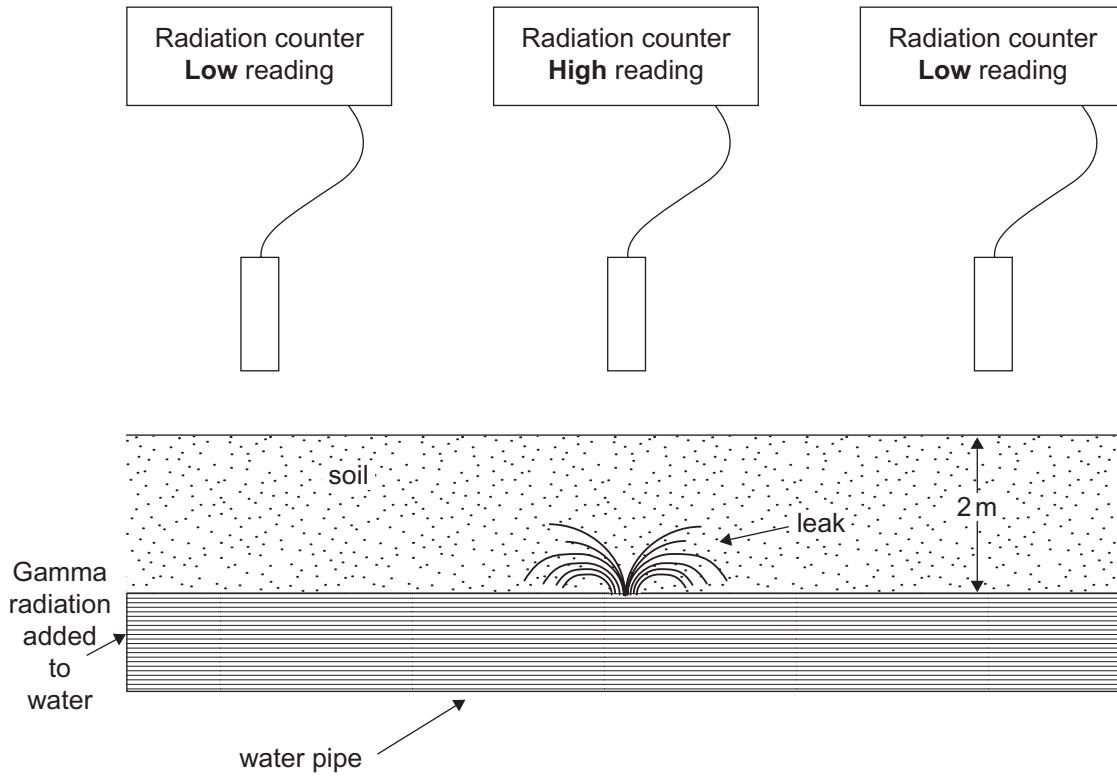
(c) Explain fully why the government has built more wind turbines in the past ten years.

[2]

(d) Write down **one** reason why some people do not want wind turbines near their home.

[1]

(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

- 4 The table below shows information about three types of bulb. Each bulb produces the **same** light power output.

	Energy saving bulb	Filament bulb	LED spotlight
	 © CCEA	 © CCEA	 © CCEA
Power input/W	11	60	7
Cost to run for 1000 hours	£1.87	£10.20	£1.19
Average life/hours	10 000	1000	20 000
Cost to buy	£3.50	£0.90	£10.00

- (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]

(d) Calculate how much energy this bulb wastes per second.

Answer _____ J [1]

(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

BLANK PAGE
(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

Examiner Only	
Marks	Remark

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

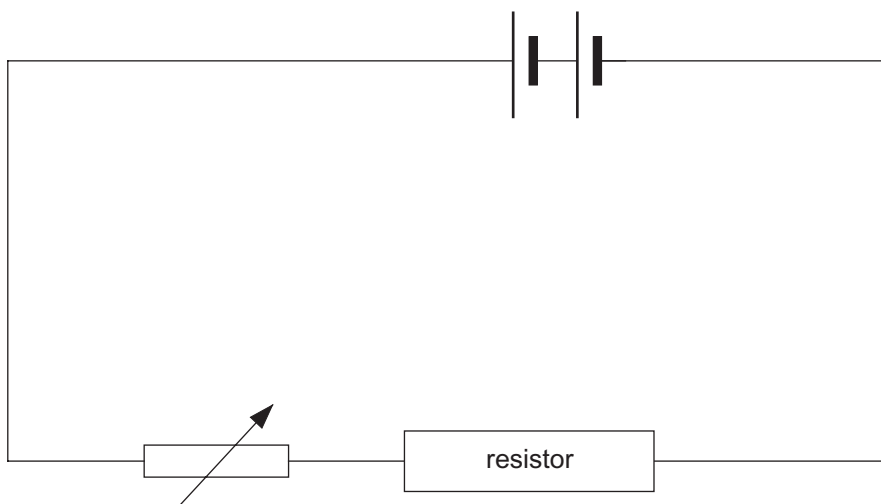
[2]

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

[1]

Examiner Only	
Marks	Remark

8 Colin set up the circuit below to measure the voltage across a resistor.



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

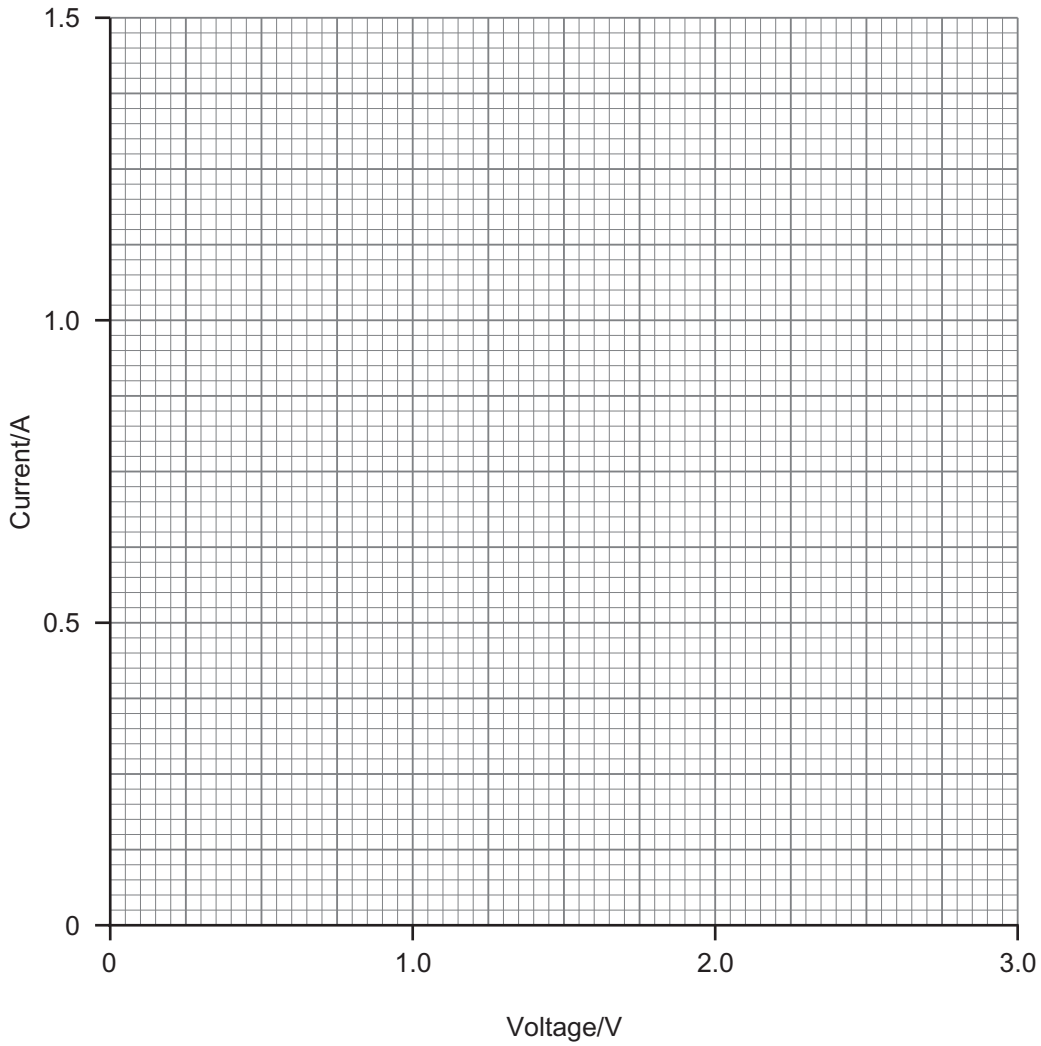
[1]

(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

(i) On the grid below plot and draw a line graph of these results.



[3]

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

_____ [1]

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

Answer _____ A [1]

Examiner Only	
Marks	Remark

- 9 (a) The diagram below shows a car on a straight road. The forces **A** and **B** are equal.



- (i) What is the value of the resultant force on the car?

_____ [1]

- (ii) What are the **two** possible states of motion of this car?

1. _____

2. _____ [2]

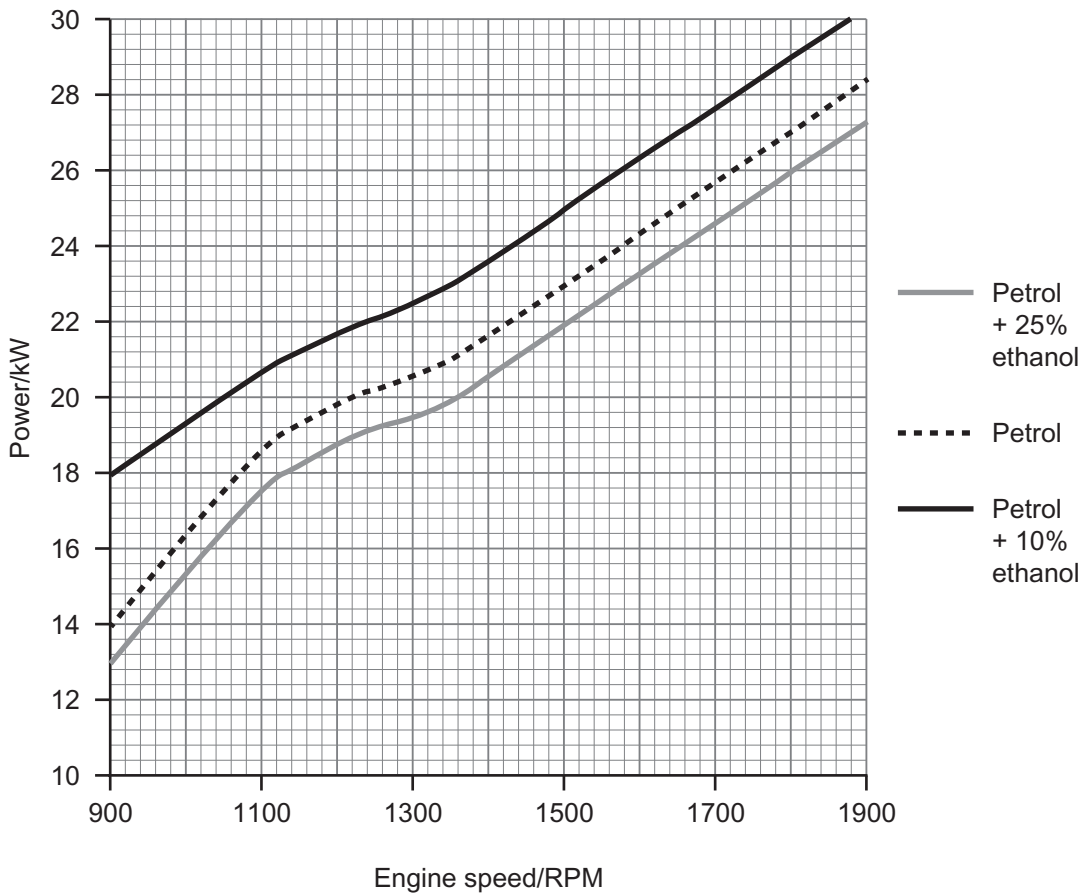
- (b) Force **A** is now decreased. What effect, if any, will this have on the movement of the car?

_____ [1]

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

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA
will be happy to rectify any omissions of acknowledgement in future if notified.