



General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Road Safety, Radioactivity
and Earth in Space

Module 6

Foundation Tier

[GSC61]

MONDAY 14 NOVEMBER 2011

2.30 pm–3.15 pm



Centre Number

71

Candidate Number

TIME

45 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 six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.

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

For Examiner's
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	

Total
Marks

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1 (a) Complete the following sentence.

There are _____ planets in our Solar System. [1]

(b) The table below gives information about **some** of the planets in our Solar System.

Planet	Diameter/km	Distance from the Sun/ million km	Gravity/N/kg
Venus	12 200	108	9
Earth	12 800	150	10
Mars	6 800	230	4
Jupiter	143 000	780	26
Neptune	49 528	4497	12

Using **only** this information answer questions (i) and (ii) below.

(i) Name a planet which is colder than Earth and explain why it is colder.

 _____ [2]

(ii) Name the planet on which our weight would be biggest.

_____ [1]

Examiner Only	
Marks	Remark

(c) (i) What does the strength of a planet's gravity depend on?

Tick the correct answer.

The planet's distance from the Sun

The number of moons the planet has

The planet's size

[1]

(ii) Name the unit of weight.

Choose from:

kilogram : newton : joule

Answer _____ [1]

(d) Complete the following sentences.

Choose from:

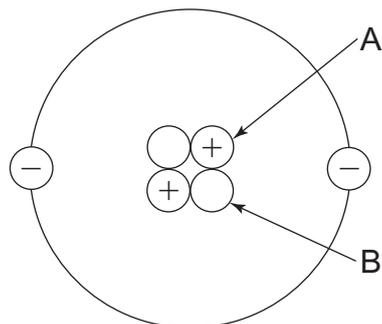
comets : water : rock

moons : gas

Our Solar System contains many objects such as asteroids which are made from _____. It also contains large chunks of ice called _____. [2]

Examiner Only	
Marks	Remark

2 The diagram below shows the structure of an atom.



(a) Name the particles labelled A and B.

Choose from:

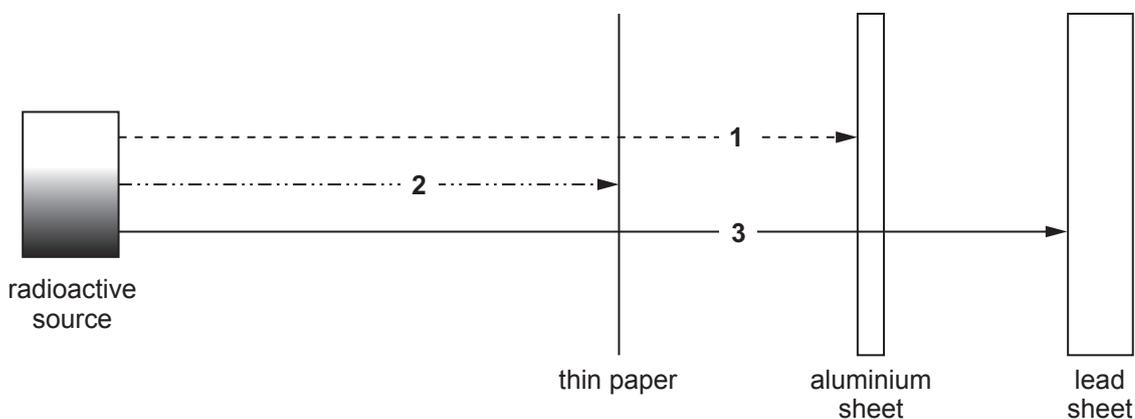
electron nucleus proton neutron

A _____

B _____

[2]

(b) The radioactive source shown below emits three different types of radiation (1, 2 and 3). Each type is stopped by a different material.



Use the diagram to name each type of radiation.

Choose from:

alpha beta gamma

1 _____

2 _____

3 _____

[2]

Examiner Only	
Marks	Remark

- 3 (a) The photograph below shows what can happen when cars drive on icy roads.



© Dorset Fire and Rescue Service (DFRS)

- (i) Explain fully why the driver found it difficult to control the car on the icy road.

_____ [2]

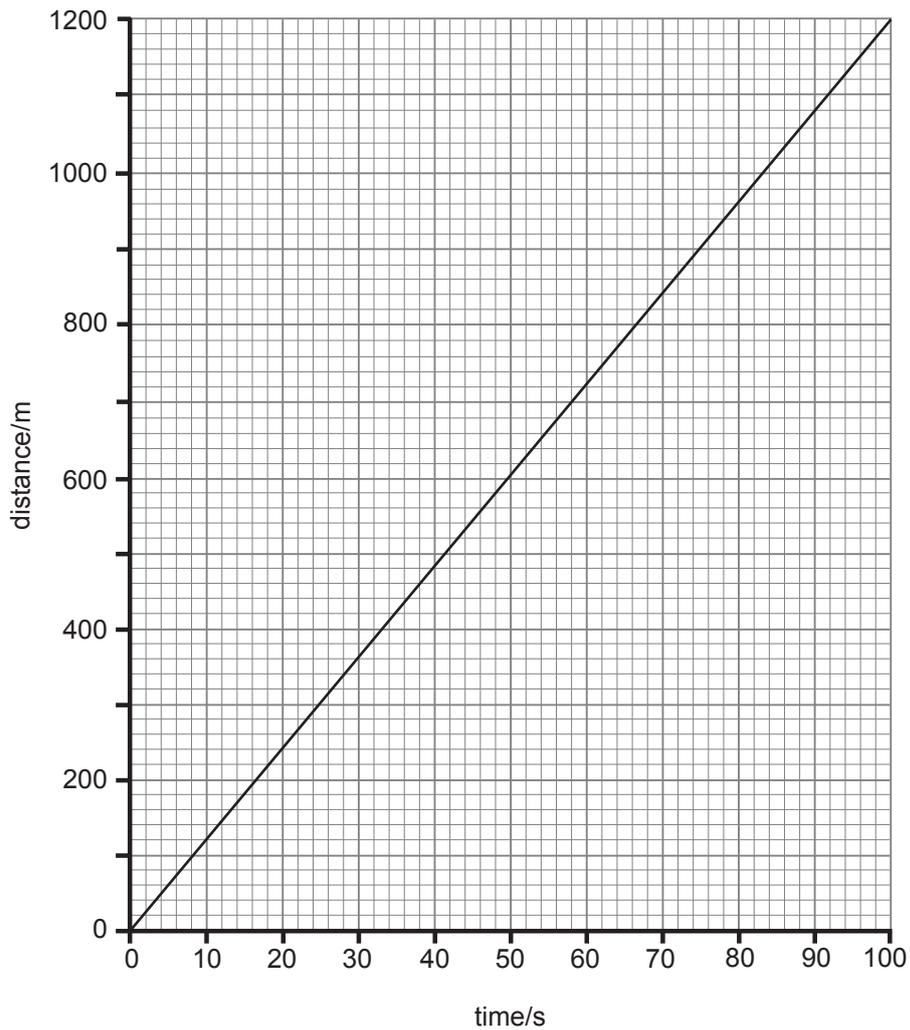
- (ii) The driver was not seriously hurt in the crash. Give two safety features in the car that could have protected the driver during the crash.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

- (b) The graph below shows the distance travelled by a car over a certain time.



Use the equation:

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

to calculate the car's average speed.

Show your working out.

Average speed _____ m/s [2]

Examiner Only	
Marks	Remark

- (c) Complete the table below with a tick (✓) to show which of the following will affect a driver's reaction time.

worn brakes	
tiredness	
wet roads	
alcohol	
worn tyres	

[2]

- (d) (i) The table below gives the stopping distances for cars travelling at different speeds. Complete the table.

Speed/mph	Thinking distance/m	Braking distance/m	Stopping distance/m
20	6	6	12
30	9		23
50	15	38	53
70	21	75	

[2]

- (ii) What is meant by the term braking distance?

_____ [1]

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Marks Remark

4 (a) The two most common fuels used in cars in Northern Ireland are petrol and diesel. These fuels are becoming more expensive. Many car manufacturers have designed cars whose engines will run on fuels such as ethanol and biodiesel.

(i) Use the information in the passage above to name **one** alternative fuel.

_____ [1]

(ii) Why is it important that more alternative fuels are used rather than fossil fuels?

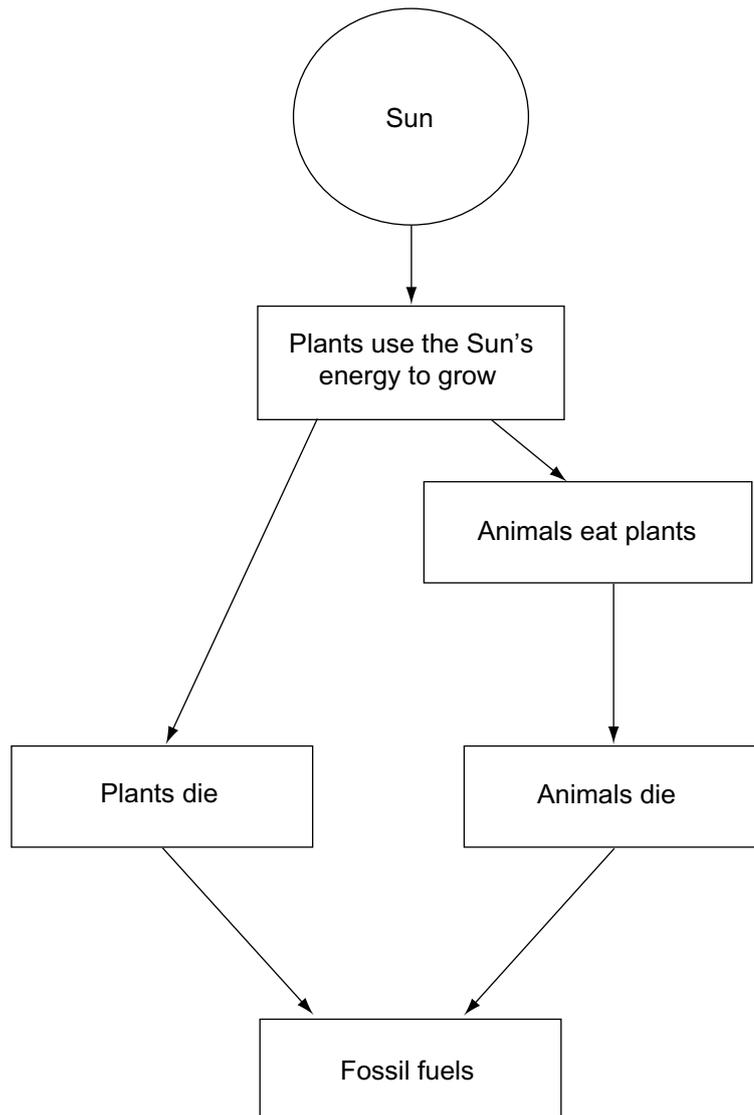
_____ [1]

(b) Name a fossil fuel found in large amounts in Northern Ireland.

_____ [1]

Examiner Only	
Marks	Remark

(c) The diagram below shows how fossil fuels are formed.



Explain fully how fossil fuels are formed from the dead plants and animals.

[2]

(d) Name the fossil fuel that petrol and diesel are made from.

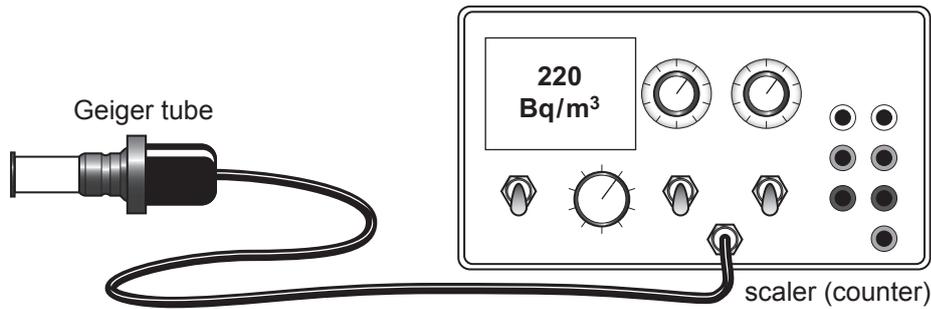
[1]

Examiner Only	
Marks	Remark

5 (a) Below are some statements about radon gas.

- Radon is a radioactive gas that comes mainly from the ground
- Radon can enter houses and build up to dangerous levels
- The average radon level in Northern Ireland is 20 Bq/m^3
- Once the radon level reaches an **action level**, which is ten times the average, the householder should take steps to reduce it

A householder set up a radiation counter to measure the background level of radon in his house.



(i) Use the information provided to explain fully why this householder should be concerned with this reading.

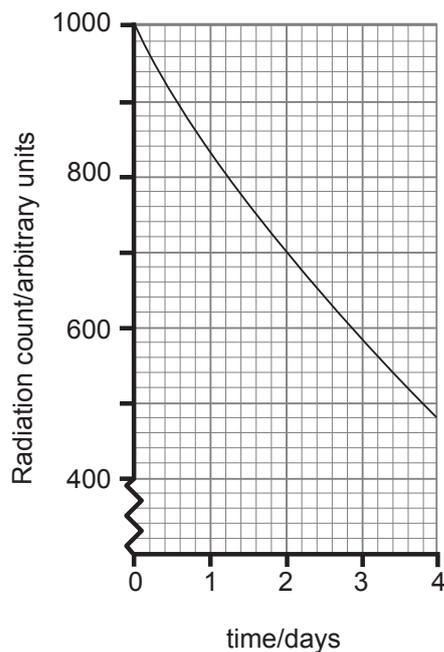
[2]

(ii) Explain fully how breathing in radon gas can be harmful to health.

[2]

Examiner Only	
Marks	Remark

- (b) The graph below shows how the count rate of radioactive radon changes with time.



- (i) Use the graph to find the half-life of radon.

_____ days [1]

- (ii) After how many days will the radiation count have fallen to 250 arbitrary units?

_____ days [1]

- (c) Explain fully why a nucleus may be radioactive.

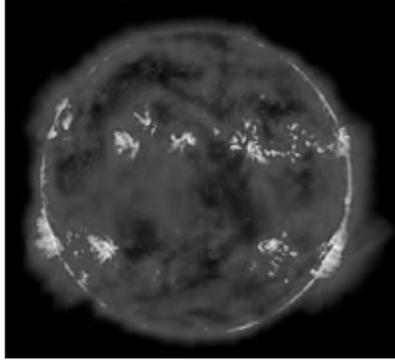
 _____ [2]

- (d) Explain fully why some fresh fruits such as strawberries are treated with radiation.

 _____ [2]

Examiner Only	
Marks	Remark

6 The Sun is the nearest star to Earth.



© NASA http://www.nasa.gov/images/content/105663main_planet1sunb.jpg

(a) Describe fully how the Sun was formed.

[3]

(b) The Sun is about 25 000 light years from the centre of our galaxy. Explain fully what is meant by the term light year.

[2]

(c) Scientists have discovered new planets many light years from Earth. Suggest how scientists search for extra-terrestrial life on these new planets.

[1]

THIS IS THE END OF THE QUESTION PAPER

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Marks Remark

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