CCEA GCSE SCIENCE: SINGLE AWARD (MODULAR)

SCIENCE



EXAM QUESTION PACK

MODULE 6 FOUNDATION TIER GSC61 PAPERS

STEMUP

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2012

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space Module 6

Foundation Tier

[GSC61]

GSC61

WEDNESDAY 14 NOVEMBER 2012, AFTERNOON

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

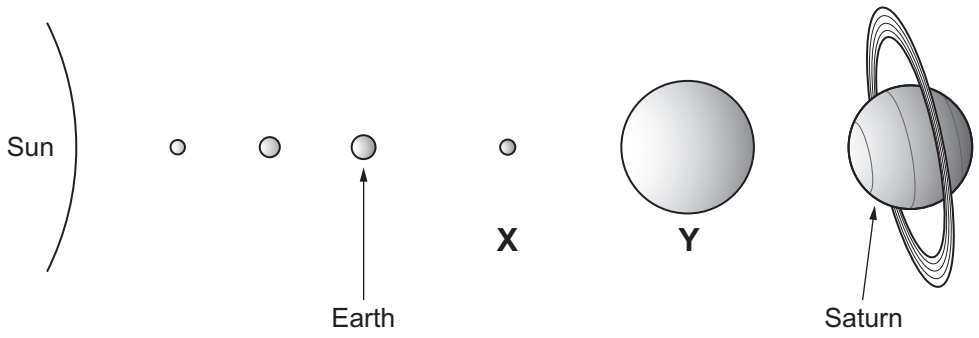
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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

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Examiner Only	
Marks	Remark

1 **(a)** The diagram below shows part of our Solar System.



Name the **two** planets **X** and **Y** between the Earth and Saturn.

X _____

Y _____ [2]

(b) Complete the sentences below.

Choose from:

fission **pulled** **fusion**

pushed **nitrogen** **hydrogen**

Our Sun is a star. It is made of a gas called _____.

This gas is _____ together by gravity, producing

energy in a process called nuclear _____. [3]

(c) The table below shows the strength of gravity on some planets from our Solar System.

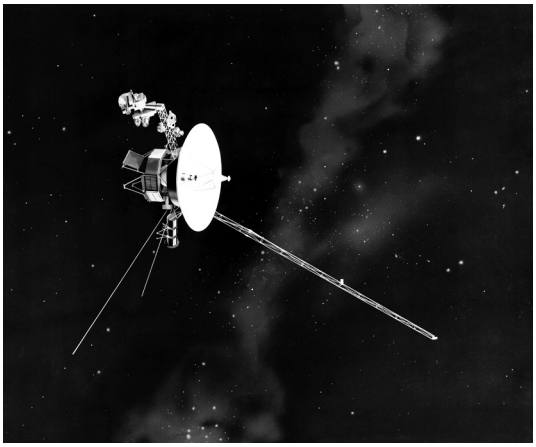
Planet	Strength of gravity N/kg
A	4
B	9
C	10
D	4
E	26

On which planet **A**, **B**, **C**, **D** or **E** would your weight be the biggest?

_____ [1]

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(d) The photograph below shows Voyager 1. It was launched in 1977 to search for life on other planets.



© NASA/JPL / Science Photo Library

What name is given to life which may be found on other planets?

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** Below are some statements. Which **two**, **A**, **B**, **C**, **D** or **E**, are correct for fossil fuels?

A They take hundreds of years to make.

B They do not increase global warming when burnt.

C They take millions of years to make.

D They are made from the remains of plants and animals.

E They will last forever.

_____ and _____ [2]

(b) Lignite is a fossil fuel found in Northern Ireland.
Suggest **one** advantage and **one** disadvantage of lignite mining for people who live in the local community.

Advantage

_____

_____

Disadvantage

_____

_____ [2]

(c) Name **two** other fossil fuels apart from lignite.

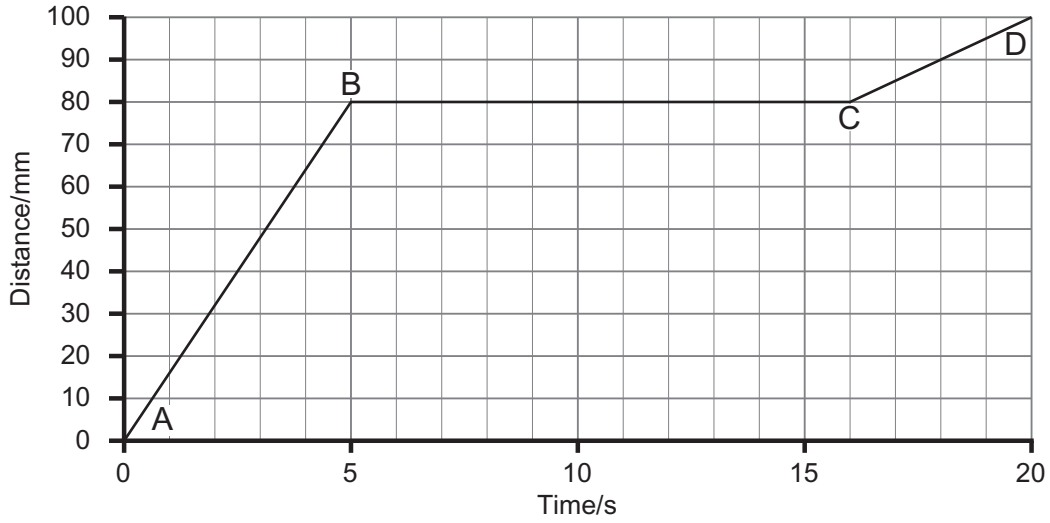
1. _____

2. _____ [2]

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Examiner Only	
Marks	Remark

3 **(a)** Shown below is a distance–time graph for a caterpillar crawling across a leaf.



(i) Describe the motion of the caterpillar from A to B.

Choose from:

stopped : steady speed : accelerating

_____ [1]

(ii) During which part of the journey is the caterpillar crawling at the fastest speed?

Choose from:

A to **B** : **B** to **C** : **C** to **D**

_____ [1]

(iii) Use the equation:

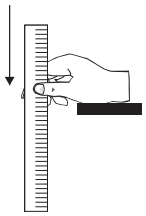
$$\textbf{average speed} = \frac{\textbf{total distance}}{\textbf{total time}}$$

to calculate the average speed of the caterpillar from **A** to **D**.
(Show your working out.)

_____ mm/s [2]

Examiner Only	
Marks	Remark

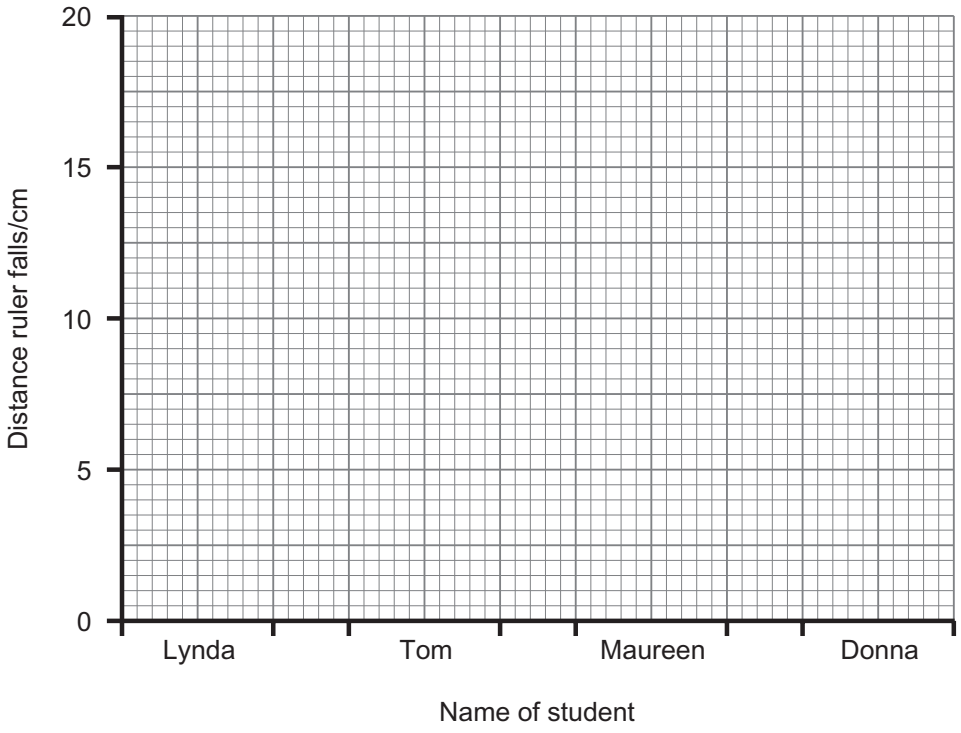
(b) Quick reactions are very important when driving a car. The simple experiment shown below can test reactions by catching a falling ruler.



The results for four students are shown below.

Name of student	Distance ruler falls/cm
Lynda	20
Tom	10
Maureen	14
Donna	8

(i) Draw a **bar graph** of their results on the grid below.



[2]

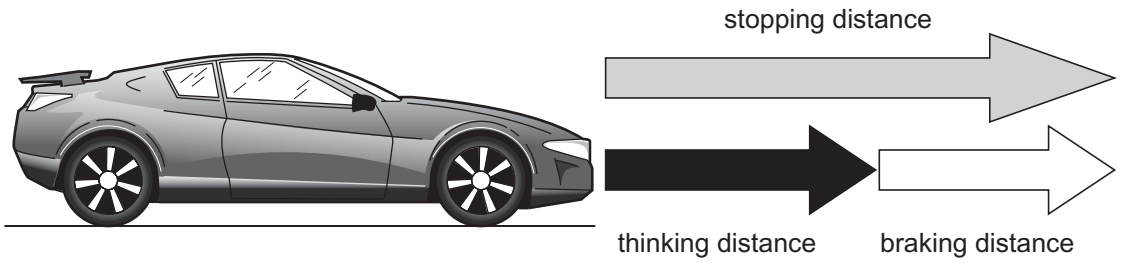
(ii) Name the student with the fastest reactions.

_____ [1]

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Examiner Only	
Marks	Remark

(c) The stopping distance of a car can be calculated by adding the thinking distance to the braking distance.

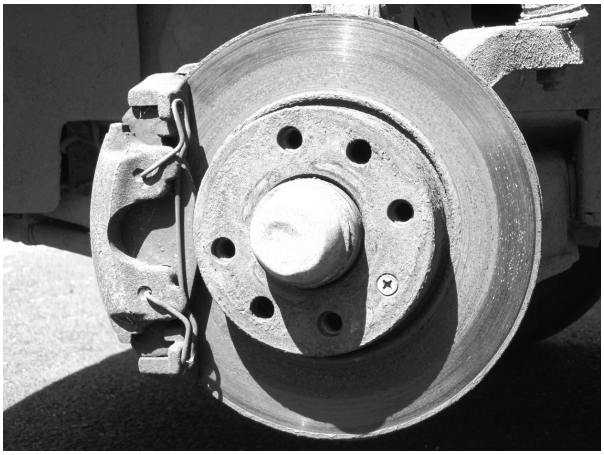


Use this information to complete the table below.

Speed/mph	Thinking distance/m	Braking distance/m	Stopping distance/m
20	6	6	12
30	9	14	
40		24	36
50	15	38	53

[2]

(d) The photograph below shows a brake from a car. Brakes rubbing against the wheel stop the car.



Source: Principal Examiner

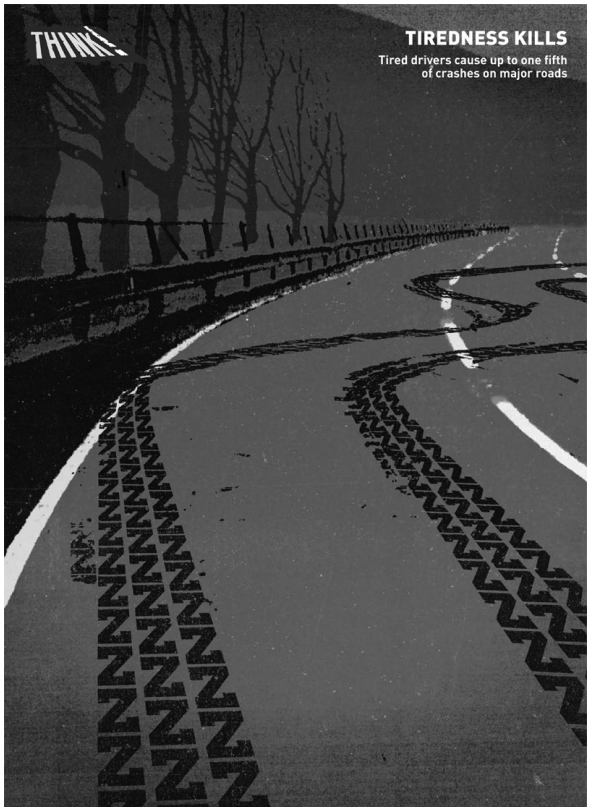
(i) Name the force between the brake and the wheel which causes the car to stop.

_____ [1]

(ii) Name the type of energy wasted during braking.

_____ [1]

(e) The poster below has been used to warn drivers of the dangers of driving when tired. Tiredness can slow a driver's reactions.



© Crown copyright

Complete the table below using a tick (✓) to show the effects tiredness will have.

	Decrease	No change	Increase
Reaction time			
Thinking distance			
Braking distance			

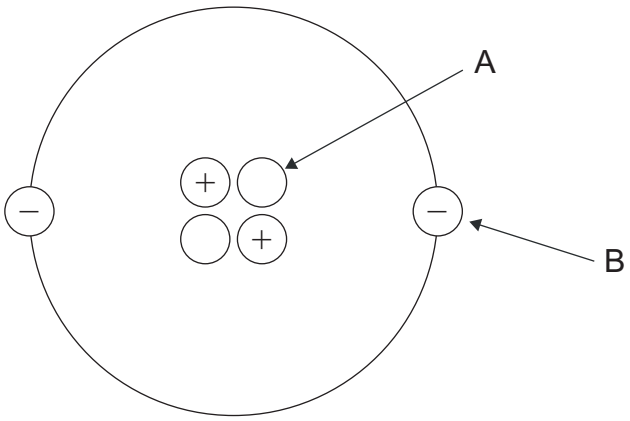
[3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

4 The diagram below shows the structure of an atom.

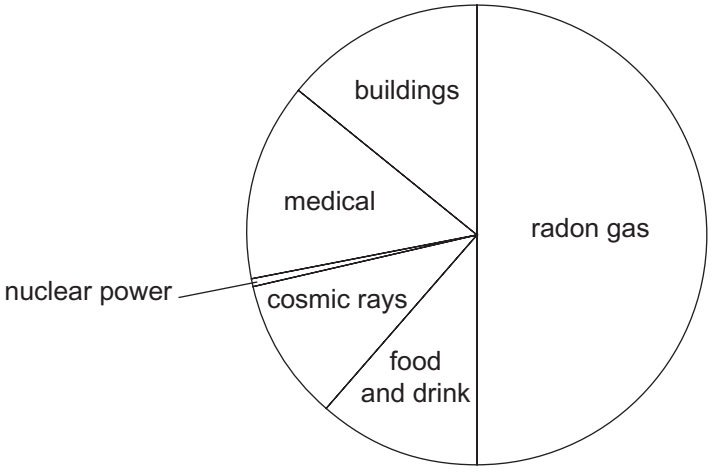


(a) Name the particles labelled A and B.

A _____

B _____ [2]

(b) The pie chart below shows sources of radiation.



(i) Use the pie chart to name **one** man-made source of radiation.

_____ [1]

(ii) What name is given to radiation which is always around us?

Circle the correct answer.

surround **background** **foreground** **underground**

[1]

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Marks	Remark

5 **(a)** The photograph below shows the Toyota Prius, a hybrid car which uses two energy sources.



© Toyota (GB) Plc, 2012 http://www.toyota.co.uk/bv/CC2/Prius/gallery/images/assets/prius-ext-1.jpg

(i) Name the **two** energy sources.

1. _____

2. _____ [2]

(ii) Explain fully why the manufacturer claims this is an environmentally friendly car.

_____

_____

_____

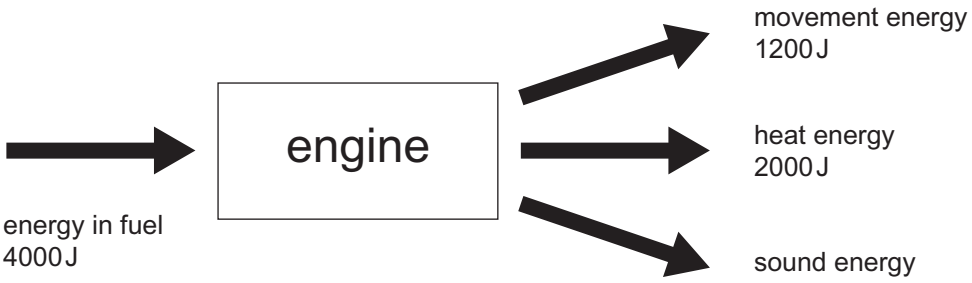
_____ [3]

(b) Manufacturers are always trying to improve the efficiency of their cars. What is meant by the term 'efficiency'?

_____

_____ [1]

(c) The diagram below shows the energy transfer in an engine.



(i) Calculate how much sound energy is produced.

_____ J [1]

(ii) Use the equation:

$$\textbf{efficiency} = \frac{\textbf{useful energy output}}{\textbf{total energy input}}$$

to calculate the efficiency of the engine.
(Show your working out.)

_____ [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 **(a)** Strontium-90 is radioactive and emits beta particles. Describe a simple experiment using a radiation counter, paper, aluminium and lead to show that beta particles are emitted.

_____

_____

_____

_____

_____

_____ [3]

(b) Strawberries are sometimes passed through a radioactive source.



© Ashley Jouhar / Science Photo Library

Explain fully how this radiation treatment is an advantage when storing strawberries.

_____

_____

_____

_____ [2]

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Rewarding Learning

General Certificate of Secondary Education
2012

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space Module 6

Foundation Tier

[GSC61]

WEDNESDAY 14 NOVEMBER 2012
2.30 pm–3.15 pm

MARK SCHEME

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		AVAILABLE MARKS
1	**(a)** Mars [1] Jupiter [1] [2]	
	(b) Hydrogen [1] pulled [1] fusion [1] [3]	
	(c) E [1]	
	(d) Extra-terrestrial [1]	7
2	**(a)** C & D [2]	
	(b) Advantage – provides jobs for those close to mine [1] Disadvantage – dust pollution/noise pollution/visual eyesore/ destroys habitats [1] [2]	
	(c) Oil gas coal (any 2) [2]	6
3	**(a)** **(i)** steady speed [1]	
	(ii) A → B [1]	
	(iii) 100/20 [1] 5 [2] [2]	
	(b) **(i)** 4 bars correct [2] 2–3 bars correct [1] [2]	
	(ii) Donna [1]	
	(c) 23 m [1] 12 m [1] [2]	
	(d) **(i)** Friction [1]	
	(ii) Heat/Sound [1]	
	(e)	

	Decrease	No change	Increase
Reaction time			✓
Thinking distance			✓
Braking distance		✓	

[3] 14

				AVAILABLE MARKS
4	**(a)**	A – neutron [1] B – electron [1]	[2]	
	(b)	**(i)** Buildings/medical/nuclear power/food and drink	[1]	
		(ii) Background	[1]	4
5	**(a)**	**(i)** Battery [1] Petrol [1]	[2]	
		(ii) It uses less fossil fuel [1] Less carbon dioxide produced [1] Less global warming [1]	[3]	
	(b)	How good a device is at transferring energy	[1]	
	(c)	**(i)** 800 J	[1]	
		(ii) 1200/4000 [1] 0.3/30% [2]	[2]	9
6	**(a)**	Aluminium stops (alpha and) beta [1] Paper stops alpha [1] Lead stops all; three/gamma [1] keep counter/source same distance from material [1] *any 3*	[3]	
	(b)	Kills bacteria/fungus [1] longer shelf life [1]	[2]	5
			Total	**45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space Module 6

Foundation Tier

[GSC61]

GSC61

THURSDAY 24 MAY 2012, MORNING

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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Examiner Only	
Marks	Remark

1 **(a)** The table below shows some information about the planets in our Solar System.

Planet	Gravity/ N/kg	Distance from the Sun/ million km
Mercury	4	58
	9	108
Earth	10	150
Mars	4	228
Jupiter	26	778
	11	1427
Uranus	9	2870
Neptune	11	4497

(i) Complete the table above by adding the names of the missing planets. [2]

(ii) Name the planet on which your weight would be the greatest.

_____ [1]

(iii) From which planet would the Sun look dimmest? Explain your answer.

_____

_____

_____ [2]

(b) Suggest what would happen to all living creatures if the Earth was hit by a large asteroid.

_____

_____ [1]

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(c) Complete the following sentences.

Choose from:

Earth : Orbit : Sun

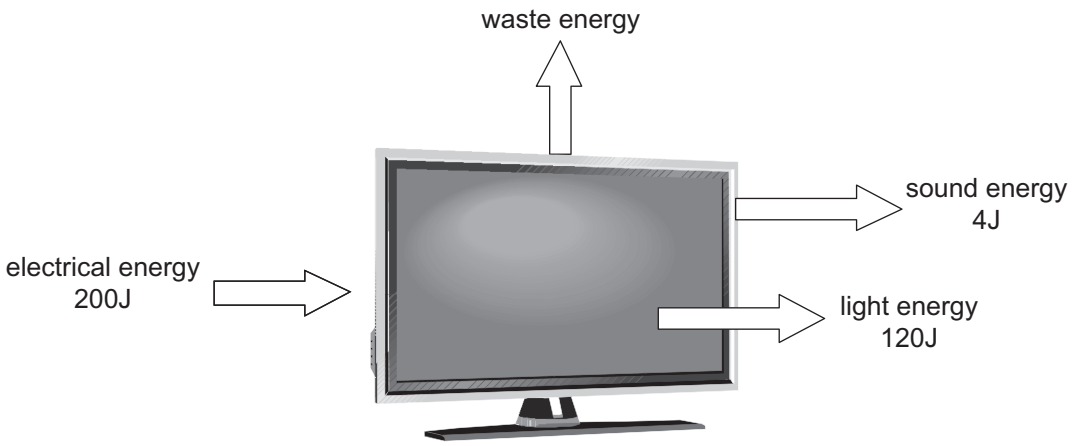
Moon : Gravity : Friction

Each planet moves in an _____ around the Sun. They do this because of the force of _____. People once believed that the _____ was at the centre of the Universe. [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** The diagram below shows the energy changes which take place in a television.



(i) Calculate how much useful energy is produced by the television.

_____ J [1]

(ii) Calculate how much energy is wasted by the television.

_____ J [1]

(iii) Name **one** type of energy wasted by the television.

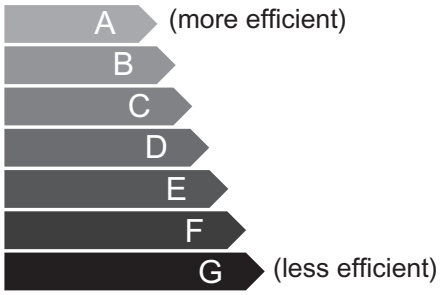
Choose from:

electrical : stored : heat : movement

_____ [1]

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The diagram below shows the energy efficiency label used on televisions.



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(b) Which television (A–G) would waste the least energy?

_____ [1]

(c) What is meant by the term **efficient**?

Tick (✓) the correct answer.

How much energy a device uses. ☐

How good a device is at changing energy into useful energy. ☐

How much it costs to run a device. ☐ [1]

(d) Give one **economic** reason why someone would buy a more efficient television.

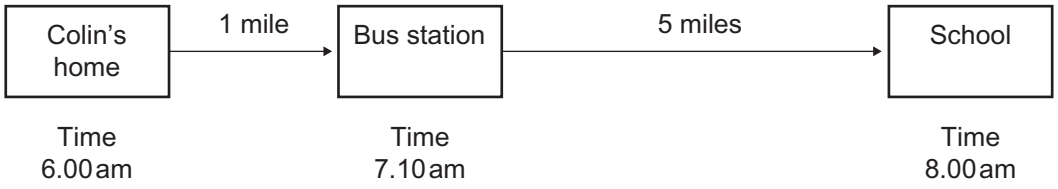
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

3 The diagram below shows Colin's journey to school including the time he left home and the time he arrived in school.



(a) (i) Calculate how far Colin's home is from the school.

_____ miles [1]

(ii) Calculate the time taken for this journey.

_____ hours [1]

(iii) Use the equation:

$$\textbf{average speed} = \frac{\textbf{total distance}}{\textbf{time taken}}$$

to calculate Colin's average speed travelling to school.
(Show your working out.)

_____ miles/hour [1]

(b) The next day Colin's journey to school took less time. What, if anything, will happen to his average speed?

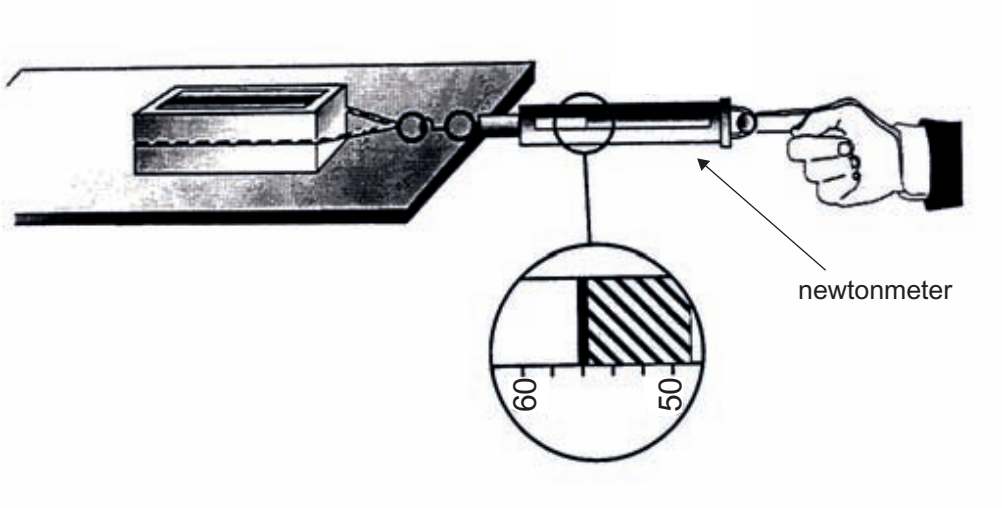
Choose from:

increase : stay the same : decrease

_____ [1]

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(c) The diagram below shows a brick being pulled across a bench by a newtonmeter.



(i) What is the reading on the newtonmeter?

_____ N [1]

(ii) Name the force which opposes the movement of the brick.

_____ [1]

(iii) If the surface of the bench was rougher, state the effect, if any, this would have on the size of force needed to move the brick.

_____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** What word is used to describe the small amount of radiation that is always around us?

Circle the correct answer.

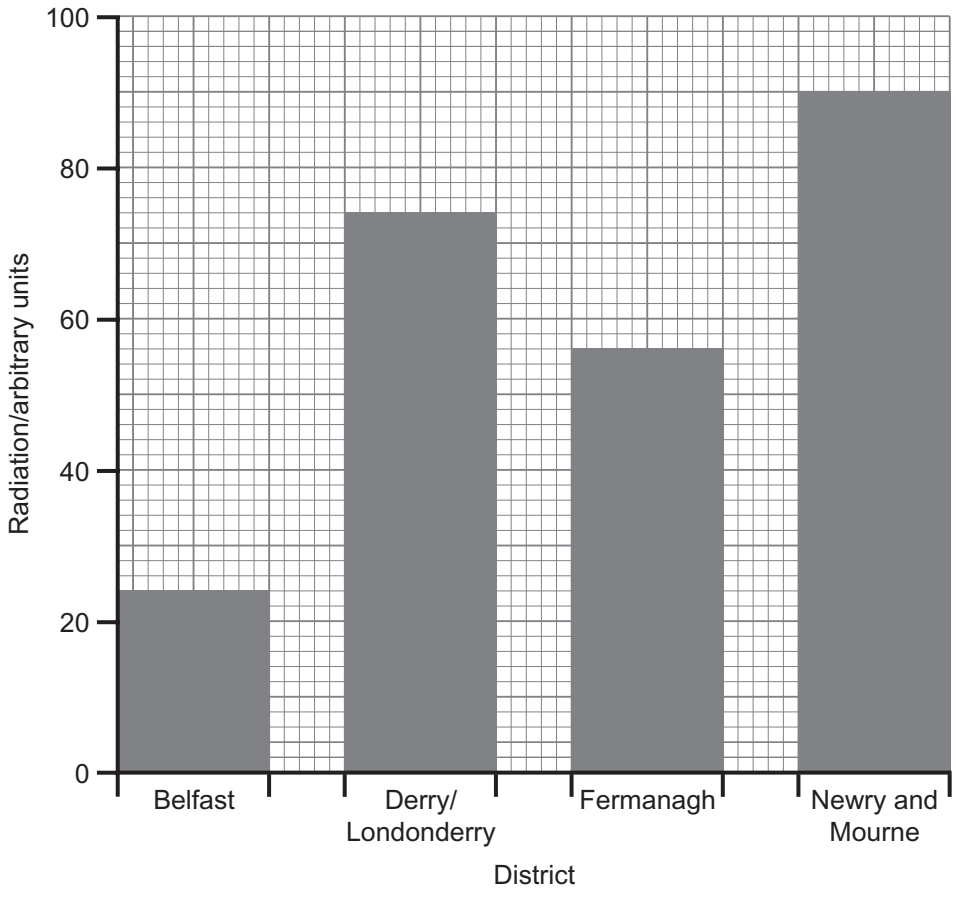
background : surround : foreground : underground [1]

(b) Some of this radiation is caused by humans. Place a tick (✓) by each source caused by humans.

Source	Caused by humans
Nuclear weapons	
Cosmic rays	
Granite rocks	
X-rays from hospitals	

[2]

The bar chart below shows radiation levels in different districts of Northern Ireland.



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(c) Name the district where a person receives the largest dose of radiation.

_____ [1]

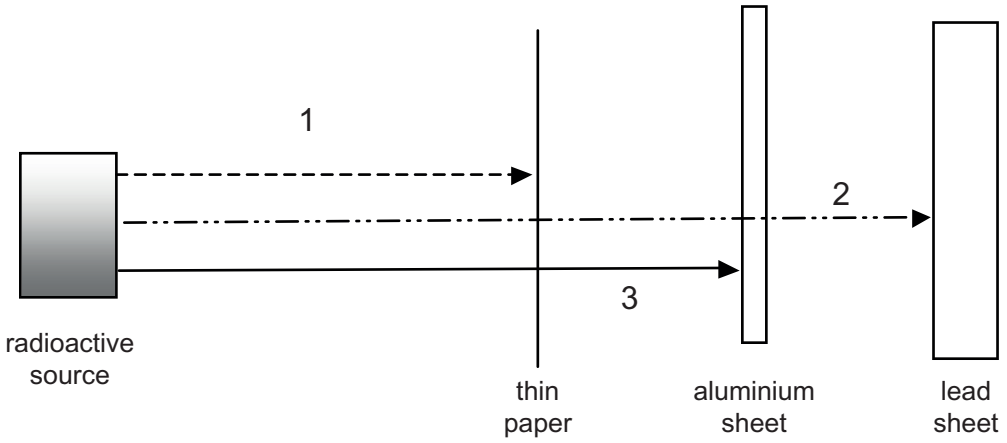
(d) Explain fully how too much radiation affects living tissue.

_____

_____

_____ [2]

(e) A radioactive source emits alpha, beta and gamma radiation. Each type is stopped by a different material as shown below.



Use the diagram to name each type of radiation (1, 2 and 3).

1. _____

2. _____

3. _____ [2]

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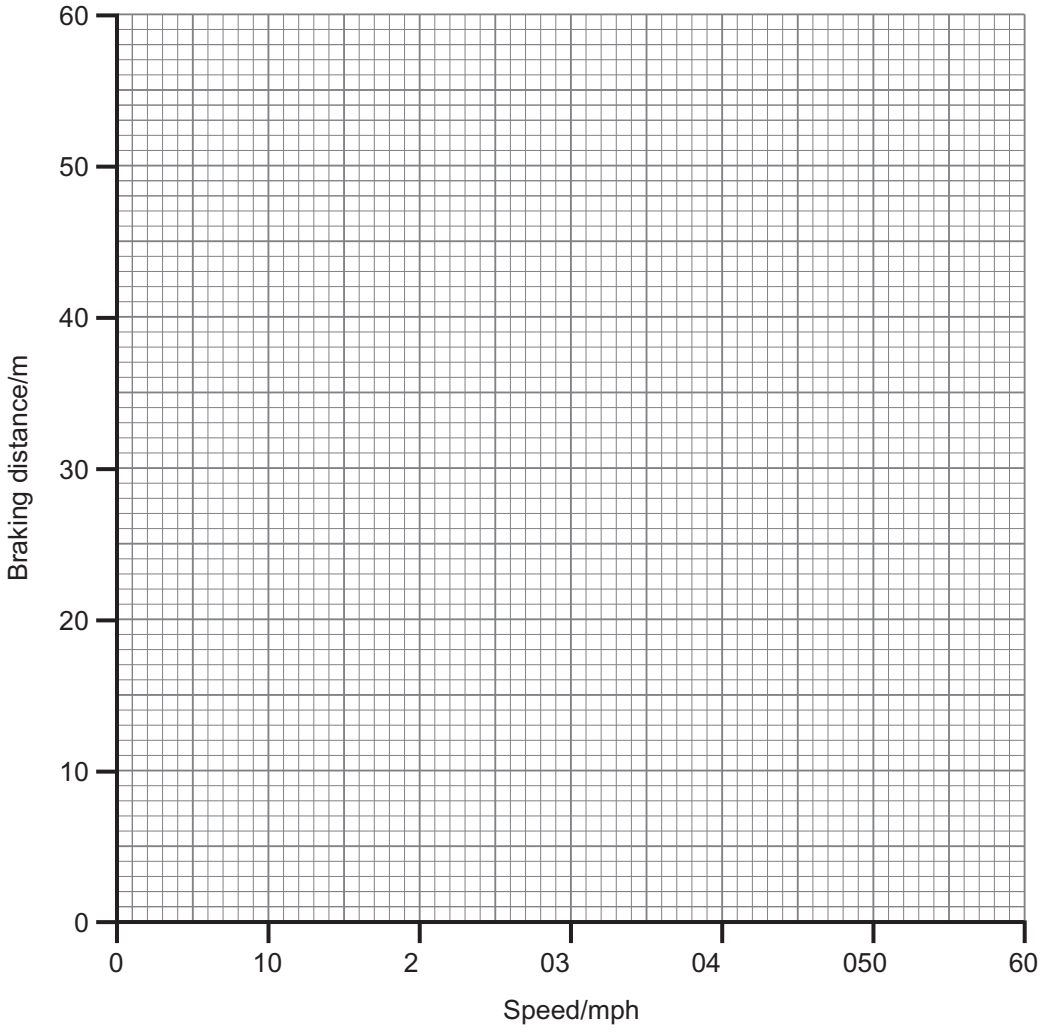
Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** The table below gives information about the braking distance at different speeds.

Speed/mph	Braking distance/m
20	6
30	14
40	24
50	38
60	54

(i) Use the information in the table to plot and draw a line graph on the grid below.



[3]

(ii) Describe a trend shown by these results.

_____

_____ [1]

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(b) Apart from speed give **one** other factor that will increase the braking distance. Explain your answer in terms of forces.

_____

_____

_____ [2]

(c) The photograph below shows a car which was involved in a collision. The front has collapsed to help reduce injuries.



© TRL Ltd / Science Photo Library

What name is given to the front part of a car which collapses in this way? Suggest how this helps reduce injuries to the driver.

_____

_____

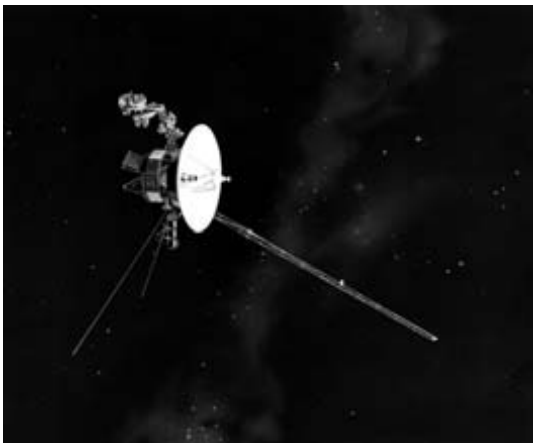
_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 The picture below shows the spacecraft Voyager 1 on its journey to the edge of the Solar System and beyond.



© NASA / JPL / Science Photo Library

(a) Explain fully why it is unlikely that this spacecraft will reach any planet outside our Solar System.

_____

_____

_____ [2]

(b) Space exploration is very expensive. Suggest **two** reasons why scientists continue to explore space.

_____

_____

_____ [2]

(c) Explain fully the formation of the Sun.

_____

_____

_____

_____

_____ [3]

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Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space Module 6

Foundation Tier

[GSC61]

THURSDAY 24 MAY 2012
9.15 am–10.00 am

MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	**(i)**	Venus Saturn	[2]	
		(ii)	Jupiter	[1]	
		(iii)	Neptune [1]; furthest away from the Sun [1]	[2]	
	(b)		Extinction	[1]	
	(c)		orbit; gravity; Earth.	[3]	9
2	**(a)**	**(i)**	124	[1]	
		(ii)	76	[1]	
		(iii)	heat	[1]	
	(b)		A	[1]	
	(c)		How much energy a device uses. ☐ How good a device is at changing energy into useful energy. ✓ How much it costs to run a device. ☐	[1]	
	(d)		Use less electricity saving money. (not cheaper)	[1]	6
3	**(a)**	**(i)**	6 miles	[1]	
		(ii)	2 hours	[1]	
		(iii)	3 miles/hour (allow consequential marking)	[1]	
	(b)		Increase	[1]	
	(c)	**(i)**	56 N	[1]	
		(ii)	Friction	[1]	
		(iii)	Increase the force	[1]	7

				AVAILABLE MARKS
4	**(a)**	Background	[1]	
	(b)			

Source	Caused by humans
Nuclear weapons	✓
Cosmic rays	
Granite rocks	
X-rays from hospitals	✓

[2]

(c) Newry and Mourne [1]

(d) Damage DNA/cells or mutation;
causes cancer [2]

(e) 1. Alpha
2. Gamma
3. Beta
All 3 correct = 2 marks, 1 or 2 correct = 1 mark [2] — 8

5 **(a)** **(i)** 5 points correct – 2 marks
4 points correct – 1 mark
correct line = 1 mark [3]

(ii) as the speed increases the braking distance increases. [1]

(b) Ice/rains/gravel/mud/ref to condition of tyres;
reduces the friction. [2]

(c) Crumple zone;
absorbs the energy in a crash. [2] — 8

6 **(a)** Any two from: Distances very large; power supply insufficient;
time scale would be too great. [2]

(b) Any two from:
- Looking for other natural resource/any named natural resource
- Earth is becoming overpopulated/looking for planet similar to Earth
- Looking for extra-terrestrials [2]

(c) Clouds of hydrogen;
pulled together by gravity;
nuclear fusion takes place/helium formed.
(must be in order) [3] — 7

Total — **45**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space

Module 6

Foundation Tier

[GSC61]

GSC61

WEDNESDAY 29 FEBRUARY 2012
11.00 am–11.45 am

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

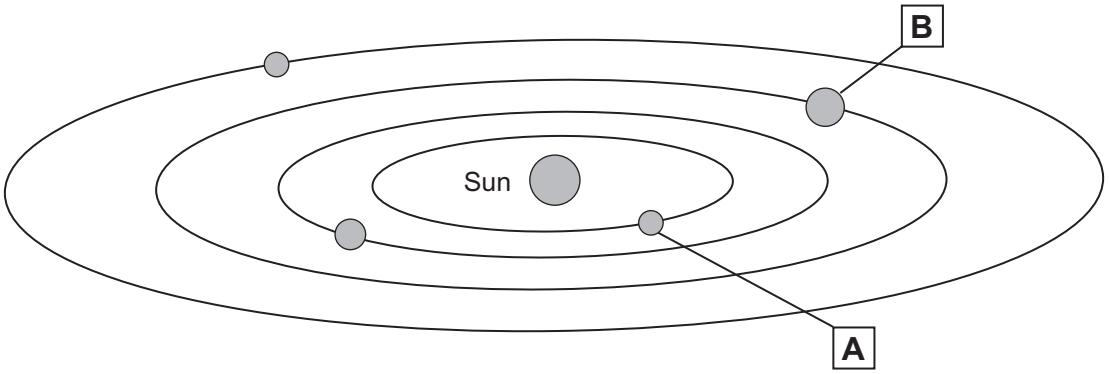
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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

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Examiner Only	
Marks	Remark

1 The diagram below shows the Sun and its four closest planets.



(a) Name the planets labelled **A** and **B**.

Planet **A** _____

Planet **B** _____ [2]

(b) Below are some terms used in the study of space and their descriptions. Using lines, link each term with its correct description.

Term	Description
	A huge collection of stars
Galaxy	
	Orbits around a planet
Star	
	Produces its own energy
Universe	
	Contains everything which exists

[3]

(c) The Sun, Earth and Moon are all part of the Solar System.
Tick (✓) the box for the two that are closest.

Sun and Earth	☐
Earth and Moon	☐
Sun and Moon	☐

[1]

(d) Which of the following statements is correct? Tick (✓) the box.

The Sun orbits the Earth	☐
The Sun orbits the Moon	☐
The Moon orbits the Earth	☐
The planets orbit the Earth	☐

[1]

Examiner Only

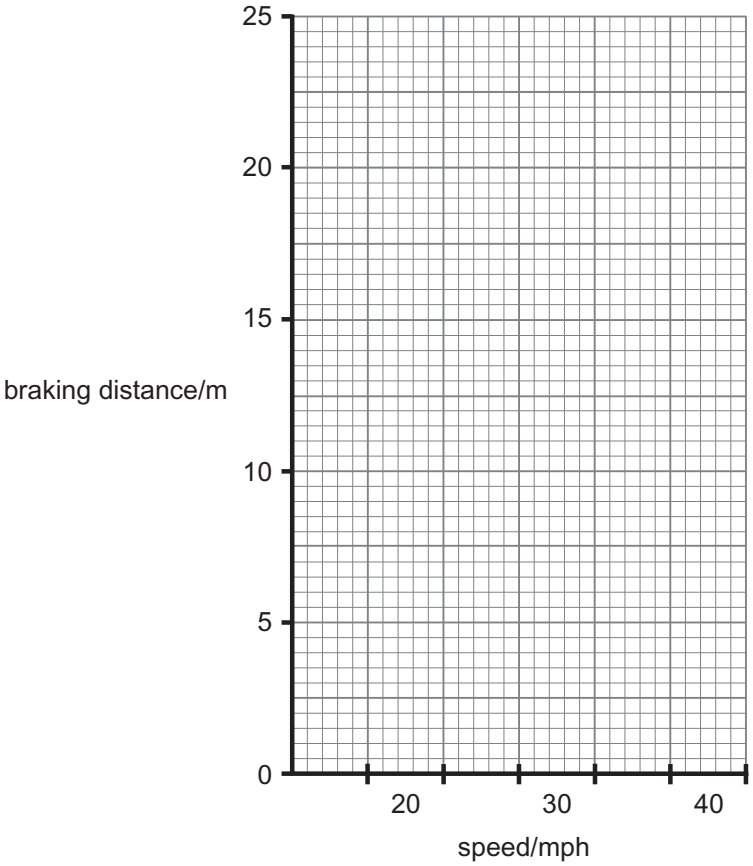
Marks	Remark

Examiner Only	
Marks	Remark

2 The table below shows how the braking distance changes with the speed of a car on a **dry** road.

Speed/mph	Braking distance/m
20	6
30	14
40	24

(a) (i) Draw a **bar chart** for these results.



[2]

(ii) Complete the sentence below.

As speed increases the braking distance _____.

[1]

(b) What is meant by the term 'thinking distance'?

_____

_____ [1]

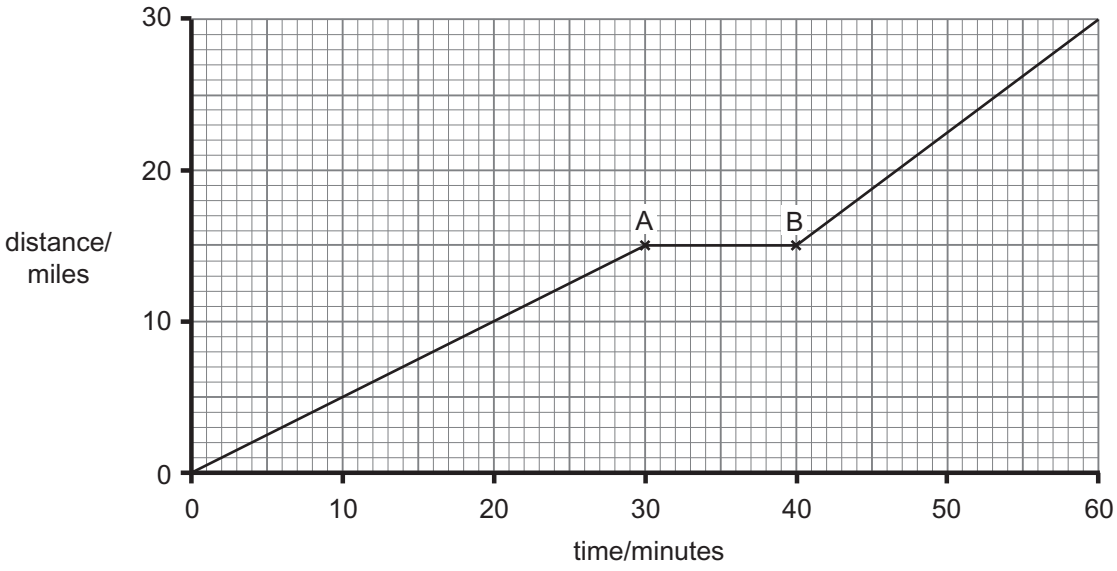
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(c) State how each of the following will change on a **wet** road.

Braking distance _____

Thinking distance _____ [2]

(d) The graph below is a distance–time graph for a car.



(i) Describe the motion of the car from A to B.

Choose from:

Stopped : Steady speed : Accelerating

_____ [1]

(ii) Use the graph to find the distance the car travels in the first 20 minutes.

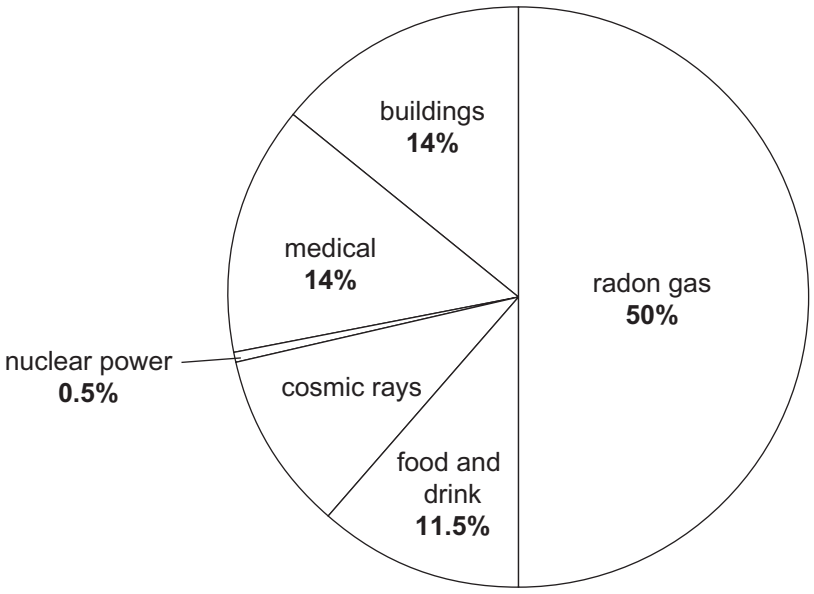
Distance _____ miles [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

3 The pie chart below shows sources of radiation that are always around us.



(a) Calculate the percentage of radiation that comes from cosmic rays.

(Show your working out.)

_____ % [2]

(b) Complete the following sentence.

Choose from:

background **foreground** **surround**

The small amount of radiation always around us is called

_____ radiation. [1]

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(c) **(i)** Use the pie chart to name one natural source of radiation.

_____ [1]

(ii) Name a disease caused by too much radiation.

_____ [1]

(d) Complete the table about types of radiation.

Choose from:

alpha **beta** **gamma**

Type of radiation	Material needed to stop it
	aluminium sheet
	thick lead sheet
	thin paper

[2]

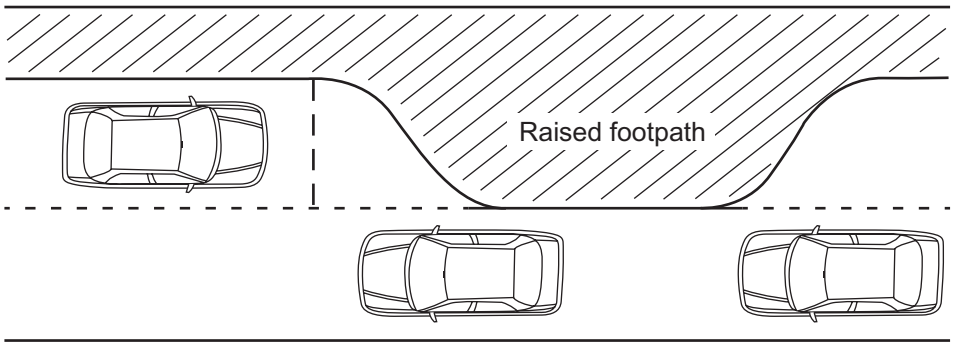
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** The diagram below shows a road narrowing scheme.



(i) Explain fully why road narrowing schemes are used in housing estates.

_____

_____

_____ [2]

(ii) Speed bumps are another feature of roads in housing estates. Suggest how speed bumps might affect emergency service response time.

_____

_____ [1]

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(b) The photograph below shows the air bags in a car after an accident.



© TRL Ltd / Science Photo Library

Explain fully how an air bag prevents serious injury to the driver during an accident.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(c) The table below shows the Euro NCAP safety ratings for four cars A, B, C and D.

★ = safe
☆ = not safe

	Car A	Car B	Car C	Car D
Front and side impact rating	★★★☆☆	★★★★☆	★★★☆☆	★★★★★
Pedestrian test rating	★★★☆	★☆☆☆	★★☆☆	★★☆☆
Child protection rating	★★★★☆	★★★★☆	★★☆☆☆	★★☆☆☆

Use the information in the table to answer parts **(i)** and **(ii)**.

(i) Which is the safest car for a family with young children to travel in? Explain your answer.

_____

_____

_____ [2]

(ii) Which car is the most dangerous for pedestrians in an accident?

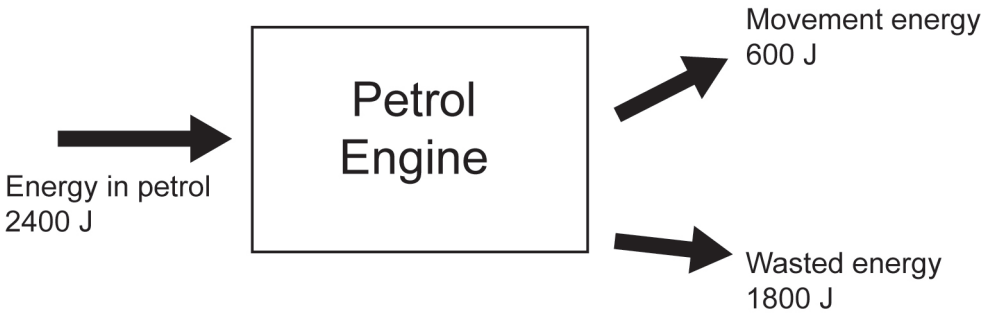
_____ [1]

(d) State **one** way in which a pedestrian can reduce the risk of being knocked down by a car.

_____ [1]

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5 The diagram below shows the energy transfer in a petrol engine.



(a) Name a type of energy wasted by a car engine.

_____ [1]

(b) **(i)** Use the equation:

$$\textbf{efficiency} = \frac{\textbf{useful energy output}}{\textbf{total energy input}}$$

to calculate the efficiency of the petrol engine.

(Show your working out.)

Efficiency _____ [2]

(ii) Explain fully how more efficient engines can reduce global warming.

_____

_____

_____ [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 **(a)** The Sun is the nearest star to Earth.

Describe how the Sun was formed. Your answer should include the materials and forces involved.

[3]

(b) State **one** way that scientists study distant stars and galaxies.

[1]

(c) Astronomers have detected planets orbiting distant stars many light years away.

Explain fully what is meant by the term ‘light year’.

[2]

(d) Neptune is one of the outer planets in the Solar System. An unmanned satellite called Voyager-2 took 12 years to reach it.

Explain fully why it is unlikely that there will be a manned space flight to Neptune.

[3]

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Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space

Module 6

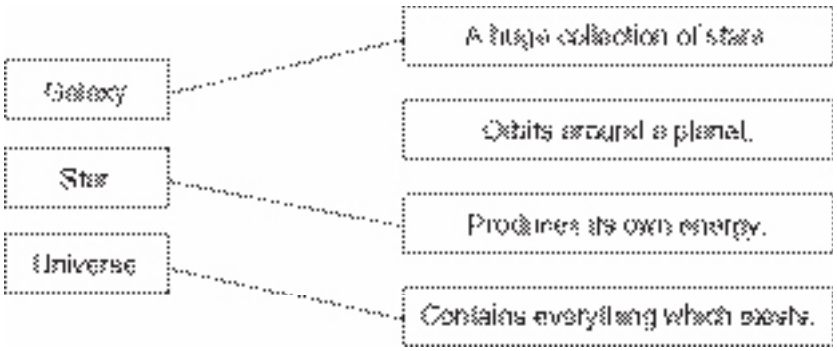
Foundation Tier

[GSC61]

WEDNESDAY 29 FEBRUARY 2012
11.00 am–11.45 am

MARK SCHEME

STEMUP.CO.UK

			AVAILABLE MARKS
1	**(a)** Mercury Earth	[2]	
	(b) 		
	1 mark for each correct line, −1 for each extra line	[3]	
	(c) Earth and Moon	[1]	
	(d) The Moon orbits the Earth	[1]	7
2	**(a)** **(i)** 2 marks for 3 correct bars 1 mark for 1–2 correct bars	[2]	
	(ii) Increases/longer	[1]	
	(b) The distance travelled during the driver's thinking/reaction time	[1]	
	(c) Braking distance increases/longer Thinking distance stays the same 1 mark each	[2]	
	(d) **(i)** Stopped	[1]	
	(ii) 10 miles	[1]	8
3	**(a)** 50 + 11.5 + 0.5 + 14 + 14 = 90 [1] 100 − 90 = 10 [1]	[2]	
	(b) background	[1]	
	(c) **(i)** Cosmic rays/radon gas	[1]	
	(ii) Cancer (named)	[1]	
	(d) Beta Gamma Alpha 1 correct 1 mark	[2]	7

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					AVAILABLE MARKS
4	**(a)**	**(i)**	They slow cars down; less chance of a serious accident if a pedestrian is hit	[2]	
		(ii)	increase/implied	[1]	
	(b)		The air bag inflates; Prevents driver's head hitting the steering wheel/windscreen/ reduces drivers impact/absorbs energy	[2]	
	(c)	**(i)**	Car B: The highest number of safety stars for impact and child protection	[2]	
		(ii)	Car B	[1]	
	(d)		Wear bright coloured clothing/use crossings/face on-coming traffic/use footpath	[1]	9
5	**(a)**		Heat/thermal/sound	[1]	
	(b)	**(i)**	600/2400 [1] 0.25/25%/¼	[2]	
		(ii)	Engines use less fossil fuels; less carbon dioxide produced/less greenhouse gases	[2]	5
6	**(a)**		Hydrogen gas; Pulled together by gravity: Fusion begins	[3]	
	(b)		Radio telescopes/light telescopes/satellites/probes *any 1*	[1]	
	(c)		The distance: travelled by light in 1 year	[2]	
	(d)		Minimum 24 year round trip; large supply of food would be difficult to carry; large supply of oxygen required; difficult to cope with major illnesses over such a distance; larger spaceship so more fuel technical failure/astronauts stranded (any three)	[3]	9
				Total	**45**

Rewarding Learning

Centre Number

71	

Candidate Number

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

GSC61

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

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Examiner Only	
Marks	Remark

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	12200	108	9
Earth	12800	150	10
Mars	6800	230	4
Jupiter	143000	780	26
Neptune	49528	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]

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(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]

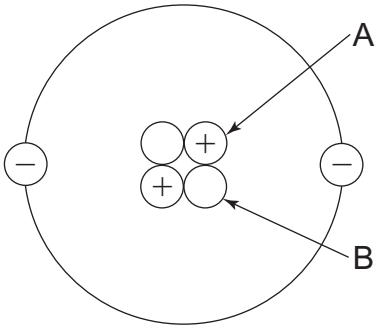
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

2 The diagram below shows the structure of an atom.



(a) Name the particles labelled A and B.

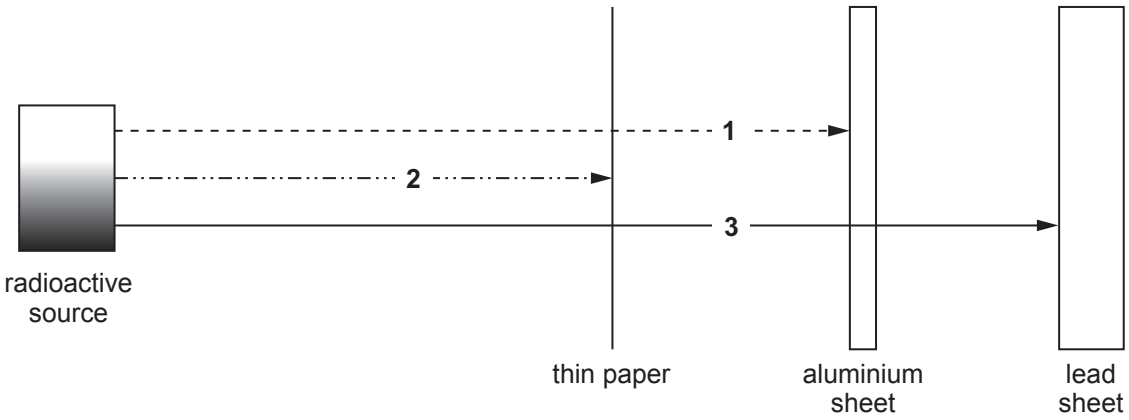
Choose from:

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]

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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]

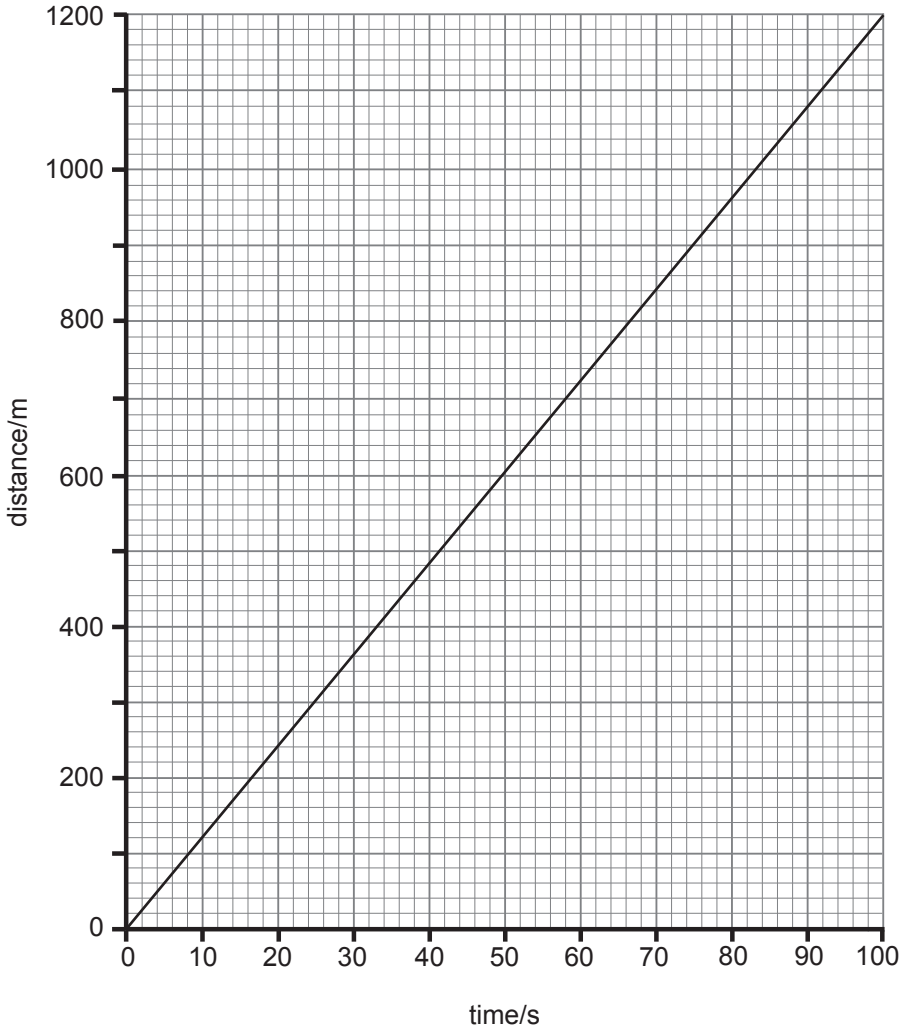
(ii) The driver was not seriously hurt in the crash. Give two safety features in the car that could have protected the driver during the crash.

1. _____

2. _____ [2]

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



Use the equation:

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

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]

Examiner Only

Marks	Remark

Examiner Only	
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?

_____

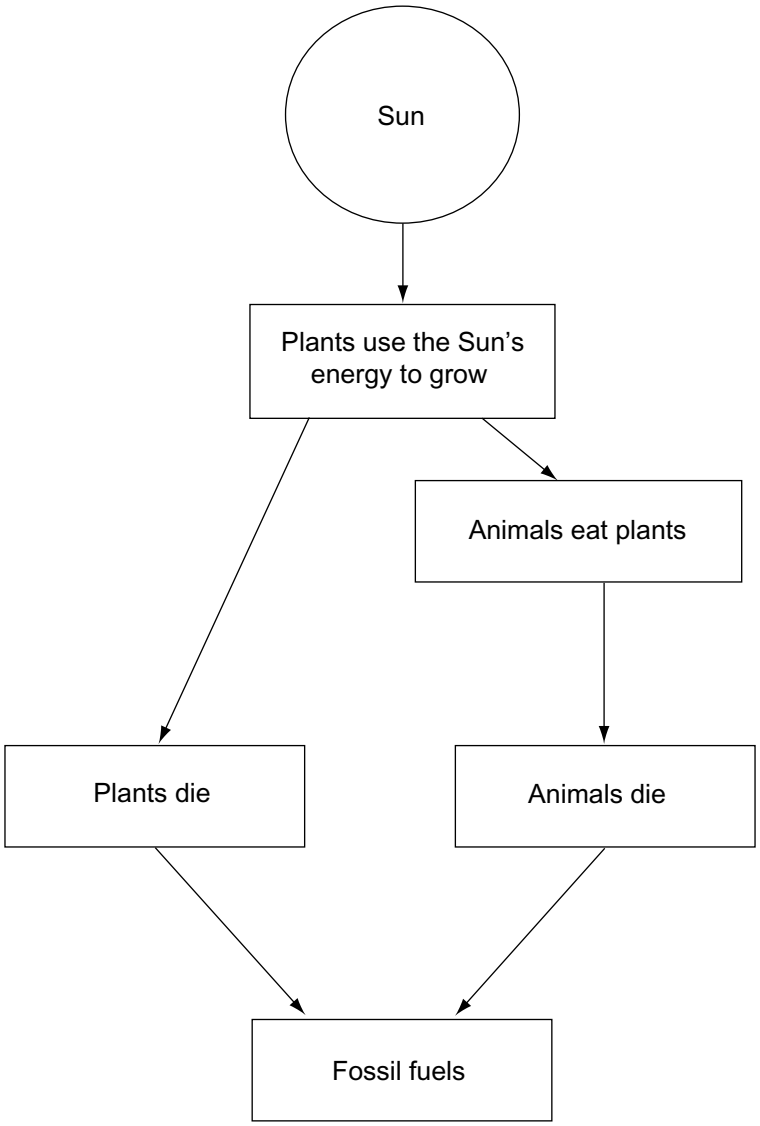
_____ [1]

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

_____ [1]

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(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

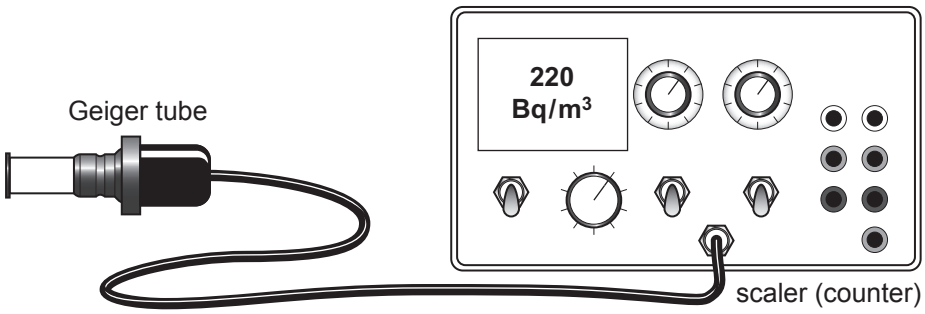
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Examiner Only	
Marks	Remark

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]

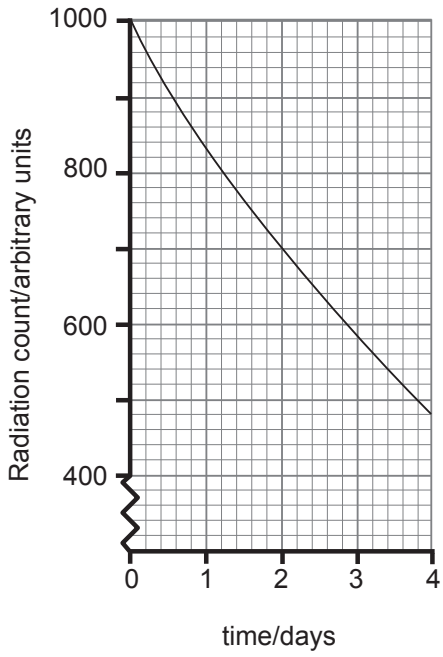
(ii) Explain fully how breathing in radon gas can be harmful to health.

_____

_____ [2]

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(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]

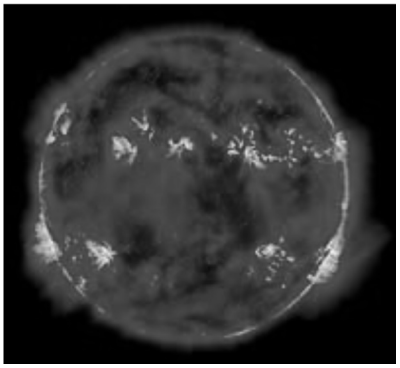
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Marks	Remark

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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]

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Rewarding Learning

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

MARK SCHEME

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		AVAILABLE MARKS
1	**(a)** 8 [1]	
	(b) **(i)** Neptune/Mars/Jupiter Further from the Sun (allow with incorrect name) [2]	
	(ii) Jupiter [1]	
	(c) **(i)** The planet's size [1]	
	(ii) Newton [1]	
	(d) Rock; Comets [2]	8
2	**(a)** Proton Neutron [2]	
	(b) 1 Beta 2 Alpha 3 Gamma 3 = 2 marks 1/2 correct – 1 mark [2]	4
3	**(a)** **(i)** No grip; increased breaking/stopping distance Ice reduces friction [2]	
	(ii) Any **two** from: Seatbelt; Crumple zone; Air bag [2]	
	(b) 1200/100 1 mark 12 m/s [2]	
	(c)	

worn brakes	
tiredness	✓
wet roads	
alcohol	✓
worn tyres	

[2]

	(d) **(i)** 14 96 [2]	
	(ii) Distance taken for the car to stop once the brakes are applied. [1]	11

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					AVAILABLE MARKS
4	**(a)**	**(i)**	Ethanol/biodiesel	[1]	
		(ii)	To conserve fossil fuels (or implied)	[1]	
	(b)		Lignite/brown coal	[1]	
	(c)		compressed; Over millions of years	[2]	
	(d)		Oil	[1]	6
5	**(a)**	**(i)**	Above/More than; Action level [2] More than/Above 200 [1]	[2]	
		(ii)	Damage (living) cells/D.N.A; Cause cancer	[2]	
	(b)	**(i)**	3.8 days	[1]	
		(ii)	7.6 days or consequential marking	[1]	
	(c)		combinations of protons and neutrons [1] unstable [1]	[2]	
	(d)		radiation kills microbes; increase shelf life/ keep fresh **longer**	[2]	10
6	**(a)**		Clouds of hydrogen gas; Pulled together by gravity; Nuclear fusion takes place	[3]	
	(b)		The distance; Light travels in 1 year	[2]	
	(c)		Radio telescopes/ref. to radio signal	[1]	6
				Total	**45**

STEMUP.CO.UK

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space
Module 6
Foundation Tier

[GSC61]

GSC61

FRIDAY 20 MAY 2011, AFTERNOON

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

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Total Marks	

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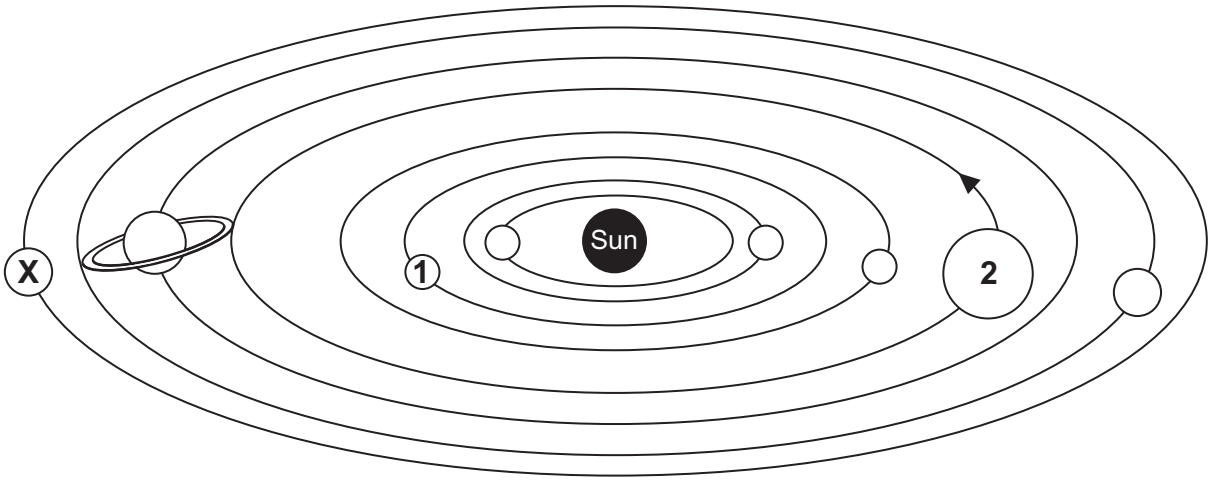
Examiner Only	
Marks	Remark

1 **(a)** Given below are names and descriptions used in the study of space. Using lines match each name to its correct description.

Name	Description
Milky Way	A galaxy
Sun	A planet
Uranus	A star

[2]

(b) The diagram below shows the Sun and its planets.



(i) Name the planet labelled X.

_____ [1]

(ii) The movement of planet **2** is shown on the diagram with an arrow. Mark on the diagram the movement of planet **1**. [1]

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Examiner Only	
Marks	Remark

(c) Complete the following sentences.

Choose from:

Earth : Moon : Solar System : Galaxy

The Sun and its planets are known as the _____.

Many centuries ago the Ancient Greeks believed that the _____ was at the centre of the Universe. [2]

(d) The photograph below shows a radio telescope at Jodrell Bank.



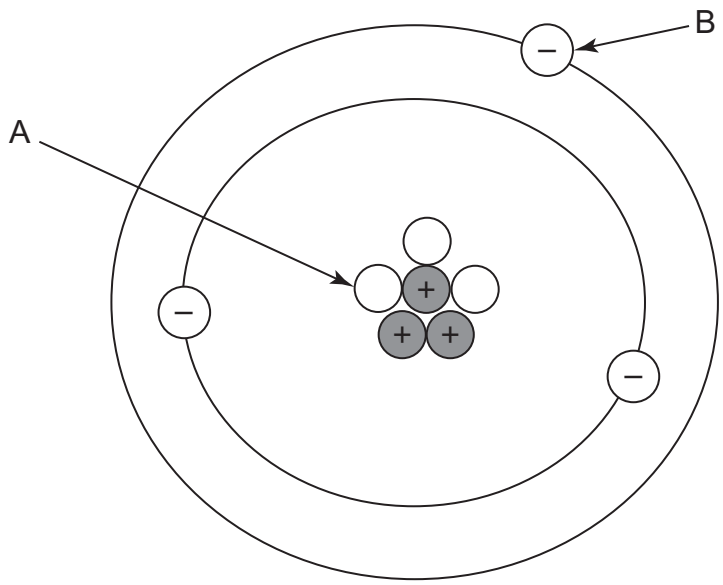
© iStockphoto / Thinkstock

The telescope is searching for radio signals from extra-terrestrial life forms.

Explain what is meant by the term **extra-terrestrial life**.

_____ [1]

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 _____

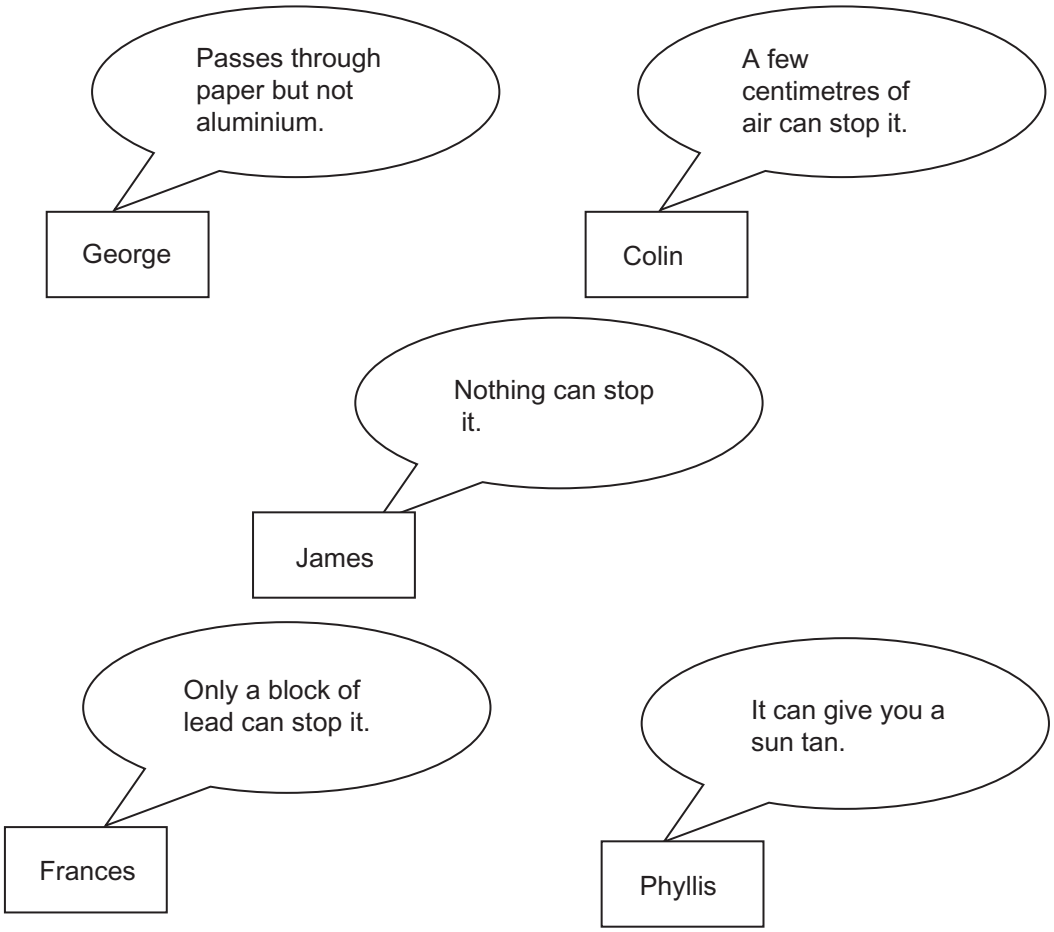
B _____

[2]

Examiner Only	
Marks	Remark

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(b) The speech bubbles below show five answers given by students when asked about radiation.



Name the student who gave the correct answer for:

(i) gamma radiation _____.

(ii) alpha radiation _____.

(iii) beta radiation _____.

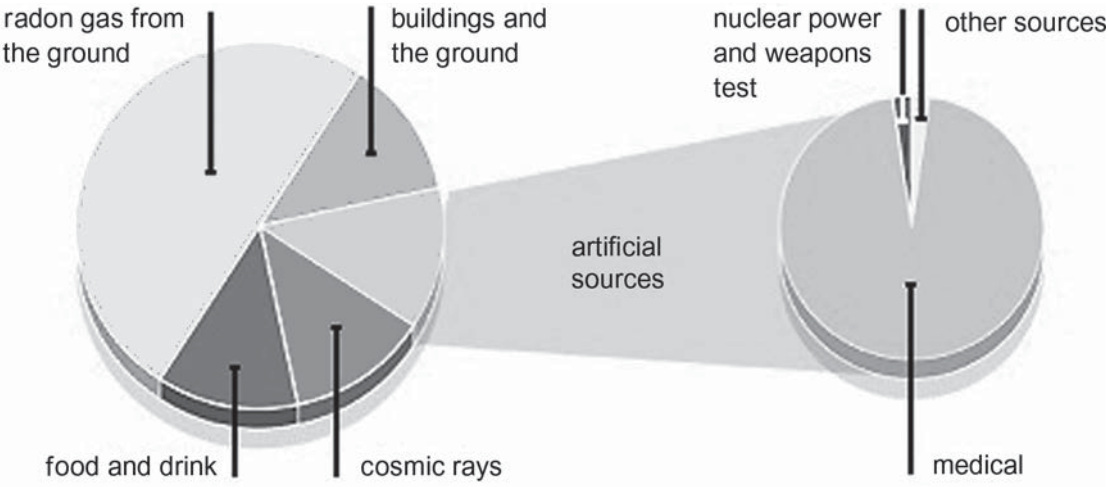
[3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

(c) The pie charts below show some sources of radiation in the atmosphere.



© BBC Bitesize http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/radiation/backgroundradiationrev2.shtml

(i) Name the biggest source of radiation in the atmosphere.

_____ [1]

(ii) Name one source of radiation caused by humans.

_____ [1]

(iii) Complete the following sentence.

Choose from:

background : foreground : surround

The small amount of radiation always in the atmosphere is called

_____ radiation. [1]

(d) Give **one** harmful effect of radiation.

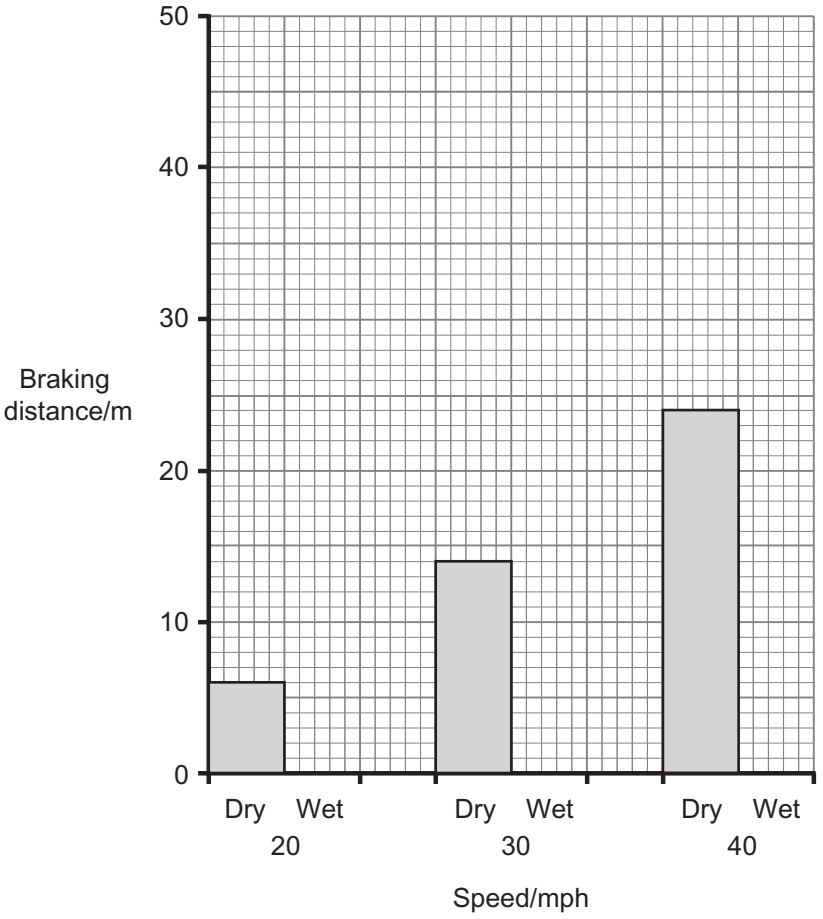
_____ [1]

Examiner Only	
Marks	Remark

3 **(a)** The information below shows the braking distance in wet and dry conditions at different speeds.

Speed/mph	Braking distance/m	
	dry	wet
20	6	12
30	14	27
40	24	49

(i) Complete the bar chart below to show the braking distance in **wet** conditions.



[2]

(ii) Use the information to state how the braking distance changes when it rains.

_____ [1]

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(iii) In what way, if any, does a wet road affect the thinking distance?

_____ [1]

(b) During a car crash the driver's head can hit the steering wheel, causing serious injury. Name two safety features which prevent the driver's head from hitting the steering wheel.

1. _____

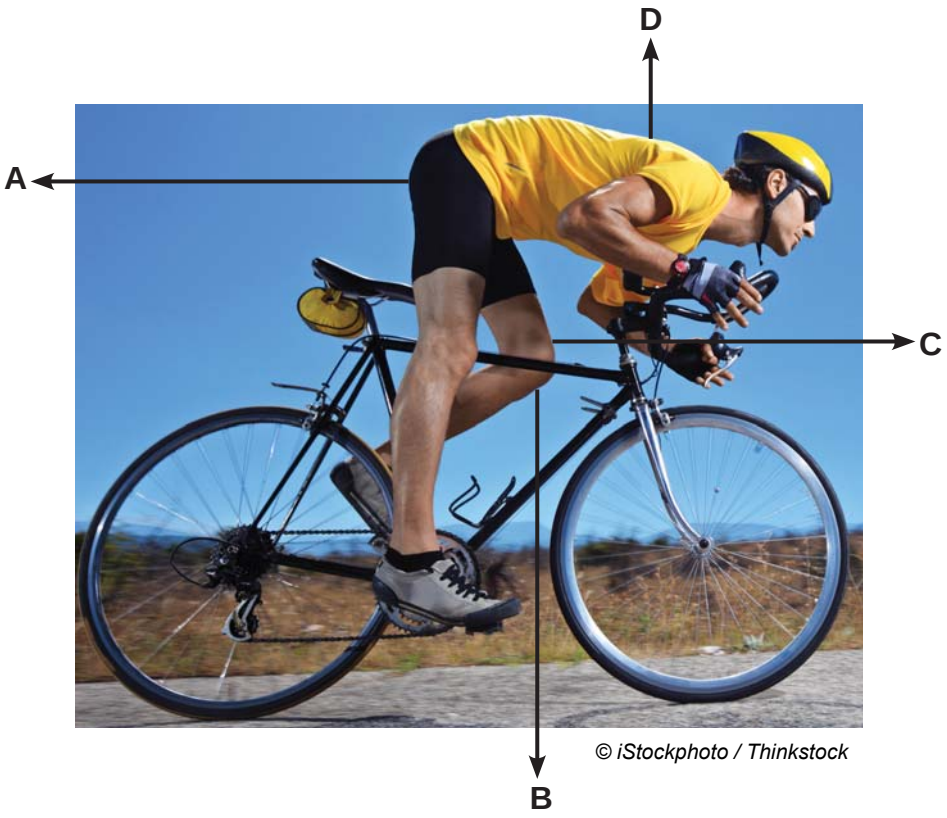
2. _____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** The diagram below shows four forces acting on a moving cyclist.



© *iStockphoto / Thinkstock*

(i) Which letter (**A**, **B**, **C** or **D**) represents the cyclist's weight?

_____ [1]

(ii) Which letter (**A**, **B**, **C** or **D**) represents the friction on the cyclist?

_____ [1]

(iii) If force **A** is equal to force **C** describe the motion of the cyclist.

_____ [1]

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(b) The table below describes the frictional forces that act when a bicycle is ridden. Friction can be **useful** or be a **nuisance**. Complete the table below by writing either useful or nuisance for each description.

Description	Useful or Nuisance
Friction on the rider from air	
Friction on the wheel rim when using the brakes	
Friction on the feet from the pedals	
Friction on the tyre from the road	

[2]

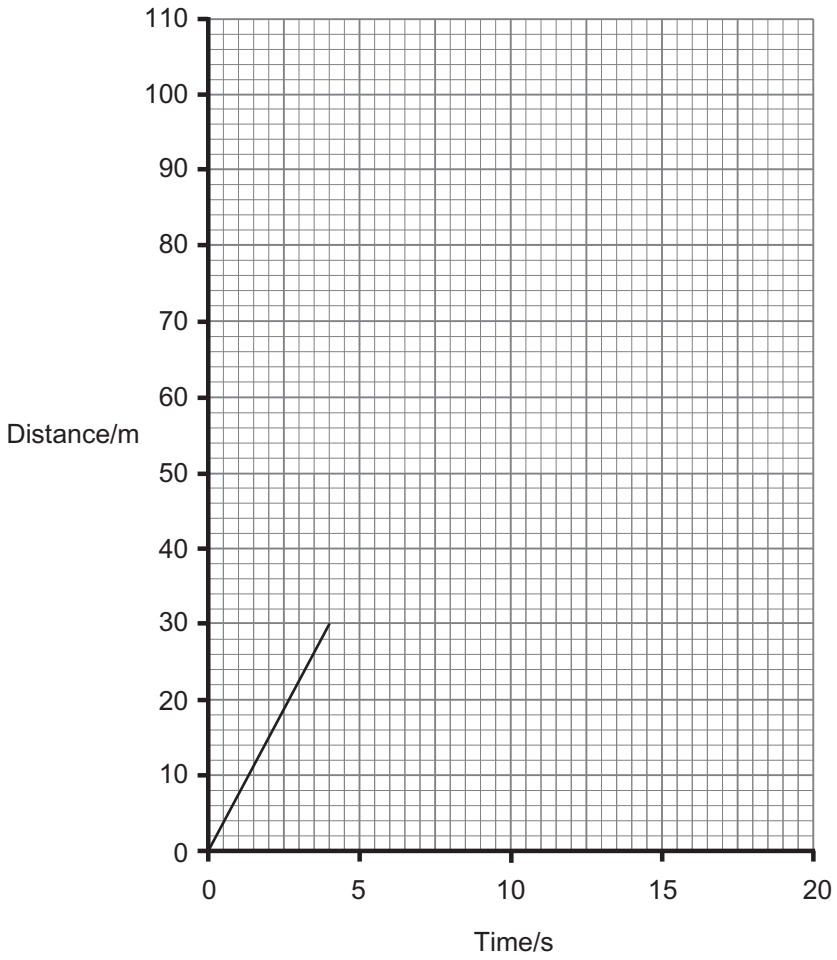
Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(c) A cyclist travels 30 m in 4 seconds.

He then stops for 6 seconds.

After stopping, he then travels a further 70 m in 10 seconds.



(i) Complete the distance–time graph using the information above. [2]

(ii) Calculate the speed of the cyclist over the first 4 seconds using the equation:

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

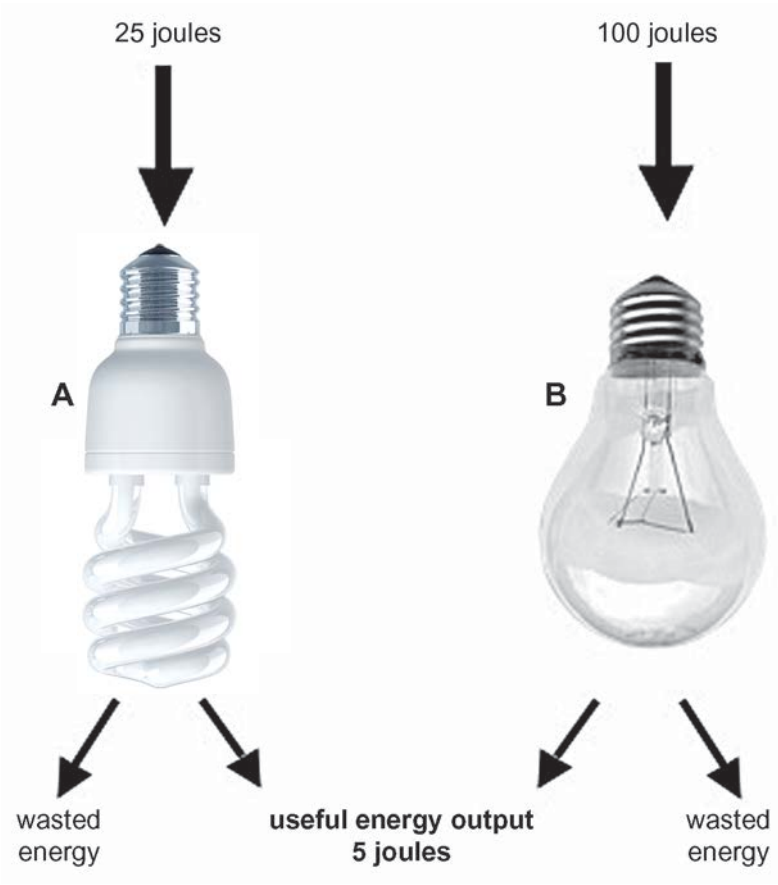
Show your working out.

_____ m/s [2]

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Examiner Only	
Marks	Remark

5 The diagram below shows the amount of electrical energy put into two types of lamp (**A** and **B**) to produce 5 joules of useful light energy per second.



© iStockphoto / Thinkstock

© Stockbyte / Thinkstock

(a) Name the type of energy wasted by the lamps.

_____ [1]

(b) (i) What is meant by the term efficiency?

_____

_____ [1]

(ii) Use the equation:

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

to calculate the efficiency of **lamp A**.

Show your working out.

Efficiency = _____ [2]

(c) Use the information and your knowledge to explain fully how the use of lamp A compared to lamp B can help the environment.

_____

_____

_____

_____

_____ [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 It is important that scientists try to work out how much fossil fuel remains in the world. Below are four statements about coal and oil reserves.

- In 2010 there was estimated to be 181 billion tonnes of oil left
- In 2010 there was estimated to be 847 billion tonnes of coal left
- The world supply of coal will last for approximately 119 years
- The world supply of oil will last for approximately 47 years

(a) **(i)** Use the information to estimate in what year the world supply of coal will run out.

_____ [1]

(ii) Suggest **two** reasons why it is difficult to predict how long reserves of coal and oil will last.

_____

_____

_____ [2]

(b) In the Ballymoney area there is estimated to be 700 million tonnes of lignite.

(i) Suggest **one** reason why it might be an advantage to mine lignite in this area.

_____

_____ [1]

(ii) Give **one** disadvantage of mining lignite in the Ballymoney area.

_____

_____ [1]

(c) Explain fully how fossil fuels are formed.

_____

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space Module 6

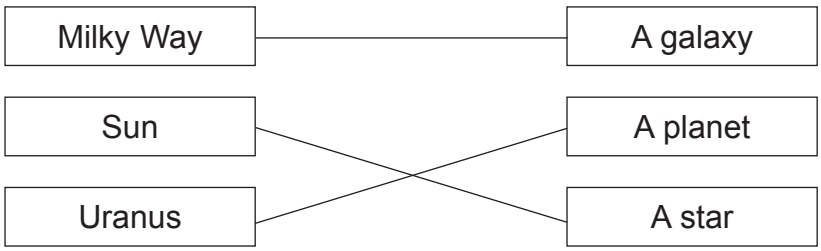
Foundation Tier

[GSC61]

FRIDAY 20 MAY 2011, AFTERNOON

MARK SCHEME

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			AVAILABLE MARKS
1	**(a)**	 All 3 correct = 2 1 or 2 correct = 1 [2]	
	(b) **(i)**	Neptune [1]	
	(ii)	Anticlockwise direction [1]	
	(c)	Solar system; Earth [2]	
	(d)	life on other planets/outside Earth/life in space [1]	7
2	**(a)**	**A** – neutron **B** – electron [2]	
	(b) **(i)**	Frances	
	(ii)	Colin	
	(iii)	George [3]	
	(c) **(i)**	Radon [1]	
	(ii)	Medical/Nuclear/X Rays [1]	
	(iii)	background [1]	
	(d)	kill cells/cancer/kills tissues/mutations [1]	9
3	**(a)** **(i)**	All 3 bars correct [2] 2 correct [1]	
	(ii)	Braking distance increases/implied [1]	
	(iii)	Does not affect thinking distance [1]	
	(b)	Seat belts; airbag [2]	6
4	**(a)** **(i)**	B [1]	
	(ii)	A [1]	
	(iii)	steady speed [1]	

			AVAILABLE MARKS
(b)			

Force	Useful or Nuisance
Friction on the rider from air	nuisance
Friction on the wheel rim when using the brakes	useful
Friction on the feet from the pedals	useful
Friction on the tyre from the road	useful

All 4 correct [2]
2 or 3 correct [1] [2]

(c) **(i)** 1st part of graph [1] (accuracy $\pm \frac{1}{2}$ square)
2nd part of graph [1] (accuracy $\pm \frac{1}{2}$ square)
consequential on first part [2]

(ii) 30/4 [1]
7.5 m/s [2] [2] 9

5 **(a)** Heat [1]

(b) **(i)** how good a device is at transferring energy/changing energy [1]

(ii) 5/25 [1]
0.20/20% [2] [2]

(c) They require less electrical energy; fewer fossil fuels are burnt to produce electricity; less carbon dioxide produced/less global warming/less greenhouse effect. [3] 7

6 **(a)** **(i)** 2129/2130 [1]

(ii) Don't know exactly what reserves are left/find more; we can't calculate how much countries are going to use each year. [2]

(b) **(i)** Provide jobs/provide cheaper fuel/don't have to import. [1]

(ii) Damage to habitats/visual pollution/dust pollution/noise pollution/loss of farmland. [1]

(c) Dead plants and animals; compressed or squashed over millions of years. [2] 7

Total **45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space
Module 6
Foundation Tier

[GSC61]

GSC61

FRIDAY 25 FEBRUARY 2011, MORNING

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

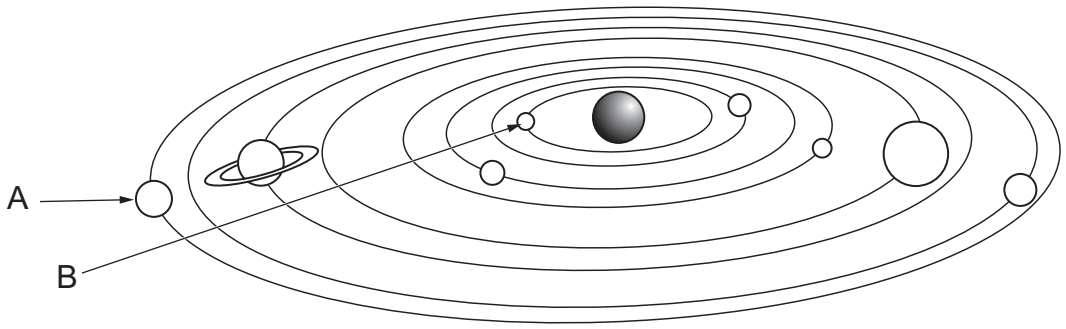
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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

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Examiner Only	
Marks	Remark

1 The diagram below shows the Sun and its eight planets.



(a) (i) What name is given to the Sun and its eight planets?

_____ [1]

(ii) Name the planets labelled A and B.

A is _____

B is _____ [2]

(b) Complete the following sentences.

Choose from:

Universe : Milky Way : Same

Opposite : Orbit : Square

Each planet moves in an _____ around the Sun. All the planets go round the Sun in the _____ direction. Our Sun and its planets are part of a galaxy called the _____. [3]

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(c) The photograph below shows the Barringer crater in Arizona.



© NASA http://rst.gsfc.nasa.gov/Sect18/Barringercrater.jpg

(i) Name the type of object which collided with Earth to make a crater like this.

_____ [1]

(ii) What might happen to plants and animals if a similar object was to collide with the Earth in the future?

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

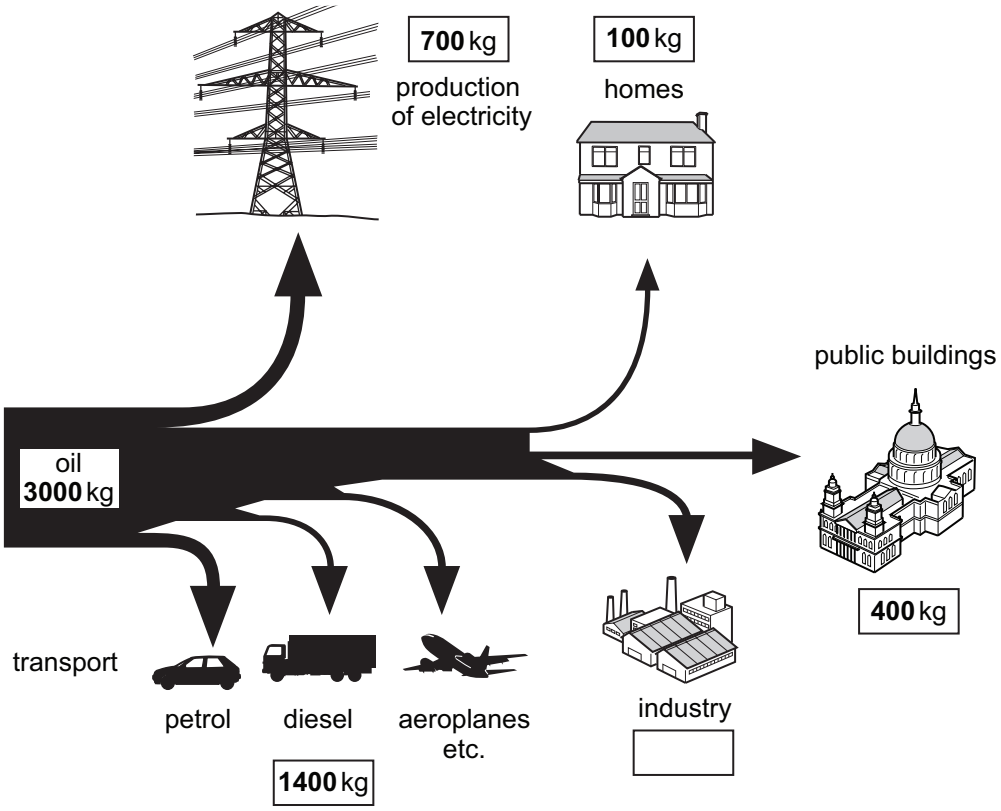
2 **(a)** The statements below describe how fossil fuels are made.

A	become buried by sediment
B	remain for millions of years
C	plants and animals die

Using the letters **A, B and C** put the statements in the correct order for producing fossil fuels.

_____ _____ _____ [1]

(b) The diagram shows how 3000 kg of oil is used in a small town.



Use the diagram to calculate how many kilograms of oil were used in industry.

Show your working out.

_____ kg [2]

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(c) Oil is a fossil fuel. Name another fossil fuel.

_____ [1]

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

_____ [1]

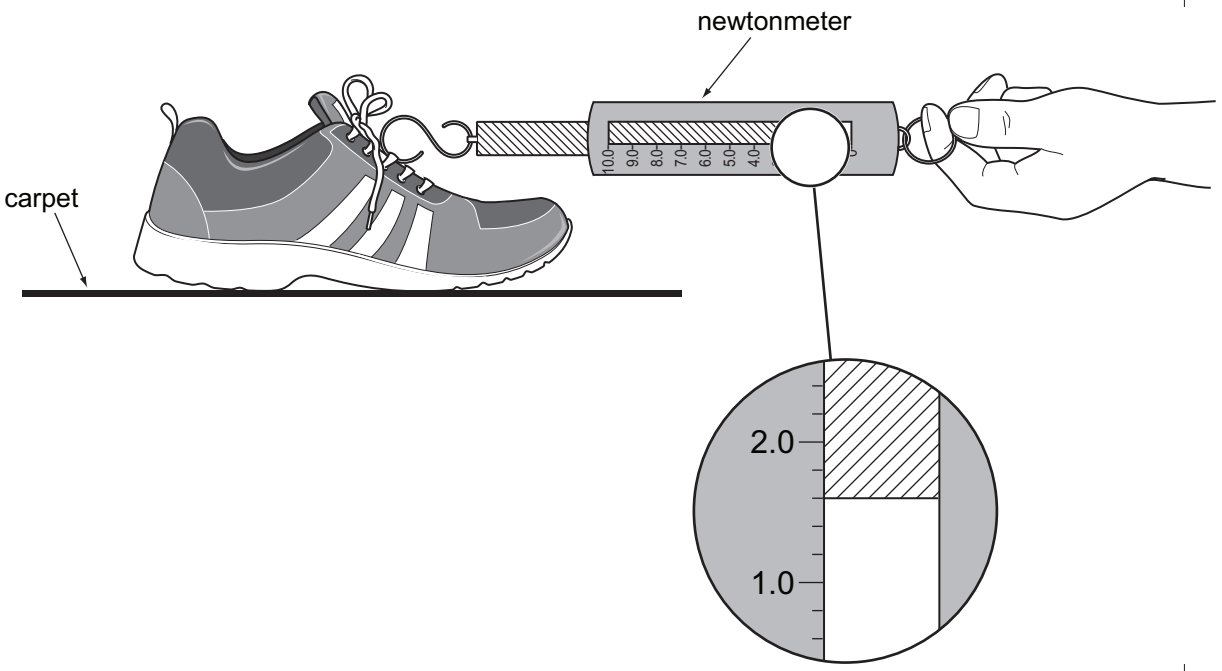
(e) Why is it important to develop alternatives for fossil fuels?

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 Lynda carried out an experiment to find out how the sole of a sports shoe affected its grip on different surfaces.



(a) (i) What is the reading on the newtonmeter?

_____ N [1]

(ii) Name the force which makes it difficult to move the shoes in this experiment.

_____ [1]

These are Lynda's results.

Type of shoe	Force needed to move shoe / N		
	Carpet	Wooden floor	Sand
Rugby boot	1.4	0.2	1.5
Running shoe	1.6	0.1	1.7
Tennis shoe	1.0	0.7	0.9
Trainers	0.9	0.6	0.8

(b) The game of squash is played on wooden floors and involves a lot of movement and changing direction. Suggest which shoe type would be best to wear when playing squash and explain your choice.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

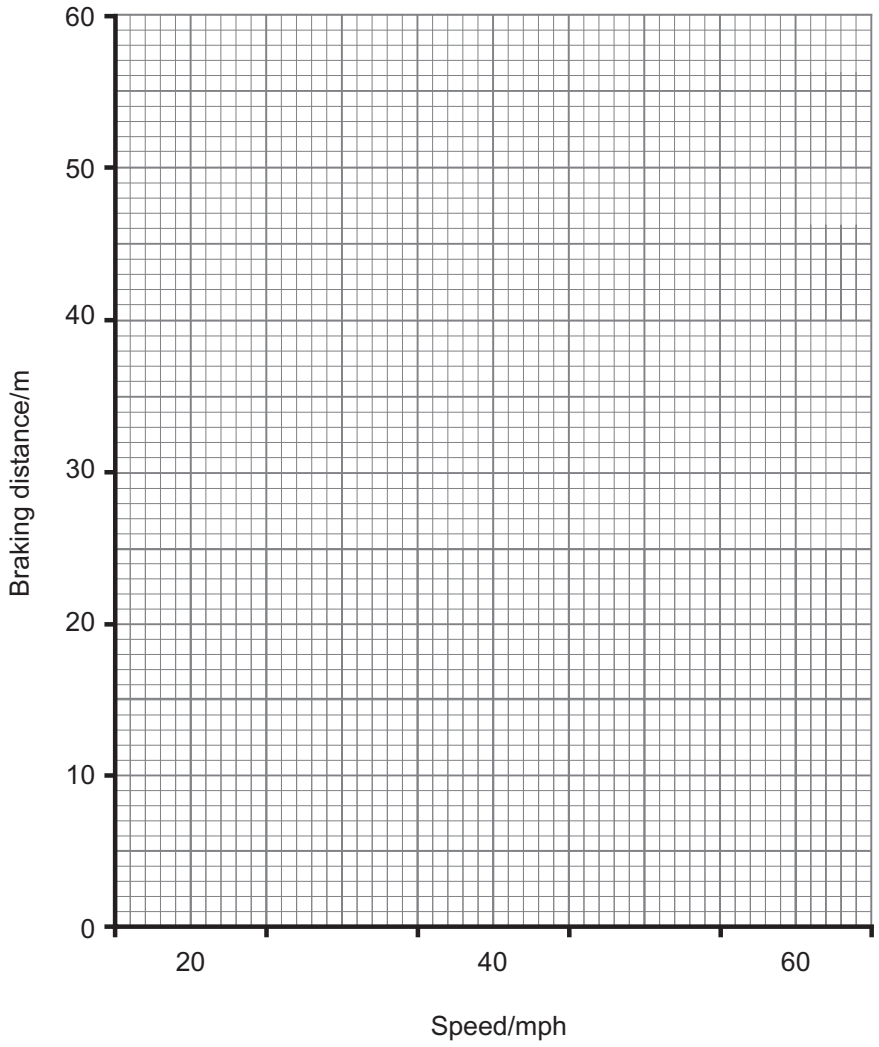
4 The table below shows both the thinking and braking distance at different speeds. The tests were carried out on a dry day.

Speed/mph	Thinking distance/m	Braking distance/m
60	18	55
40	12	24
20	6	6

(a) (i) Calculate the stopping distance at 40 mph.

_____ m [1]

(ii) Draw a bar chart for **braking distance** on the grid below.



[2]

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(iii) What difference, if any, would you expect in the **thinking distance** if the test had been carried out on a wet day?

Choose from:

no effect : a decrease : an increase

_____ [1]

(b) The diagram below shows how crash test dummies are used to test the safety of cars.



Use the diagram and your knowledge to name two safety features in a car and explain why they reduce injury.

Name_____

Explanation _____ [2]

Name_____

Explanation _____ [2]

Examiner Only

Marks	Remark

(c) State two ways in which pedestrians can reduce the risk of being knocked down by a car.

1. _____

2. _____ [2]

(d) Explain fully how speed-bumps can help improve road safety for pedestrians.

_____

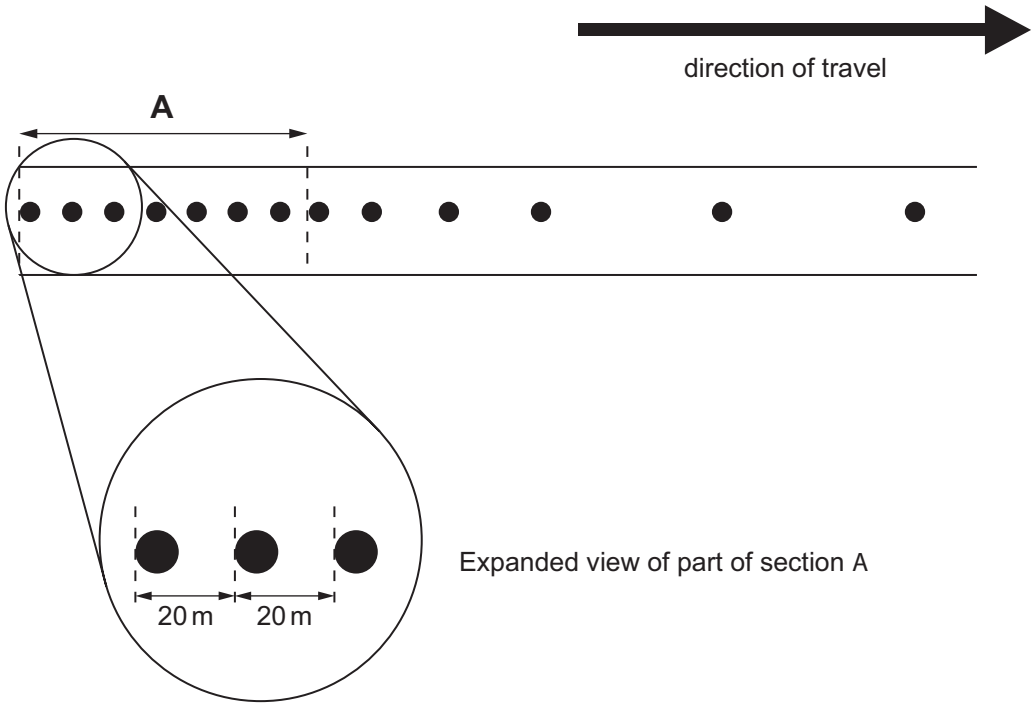
_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 An oil tanker is leaking oil. The drops of oil hit the ground at a regular time interval of 2 seconds as shown in the diagram below.



Expanded view of part of section A

(a) In section **A** all the oil drops are 20 m apart.

Use the equation:

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

to calculate the speed of the tanker in section **A**.

Speed = _____ m/s [2]

(b) Is the speed of the oil tanker increasing, decreasing, or staying the same over the entire journey? Explain your answer.

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

6 Radon is a naturally occurring radioactive gas. The table below shows the levels of radon in different council areas.

Council area	Number of houses tested	Highest radon concentration level/ Bq/m^3
Carrickfergus	30	62
Down	3950	38
Derry	1343	4900
Newtownabbey	75	130
Fermanagh	549	3900

(a) Radon gas is a source of background radiation. What is meant by the term **background radiation**?

_____

_____ [1]

(b) Explain fully why a nucleus may be radioactive.

_____

_____ [2]

(c) **(i)** Use the information in the table to suggest how the results for Carrickfergus could be made more reliable.

_____ [1]

(ii) The government has set an action level of **200 Bq/m^3**. Below this level there is little harm done to humans. Name the council areas which have high enough levels of radon to damage humans.

_____ [1]

(iii) Explain fully how radioactive radon can harm humans.

_____

_____

_____ [2]

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(d) You have been given a radioactive sample. You are provided with sheets of aluminium, paper and lead. You also have a radiation counter.

Describe a simple experiment to show which type of radiation (alpha, beta or gamma) is emitted. Include in your answer one way to keep your results valid.

_____

_____

_____

_____

_____

_____ [4]

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Marks	Remark

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General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space
Module 6
Foundation Tier

[GSC61]

FRIDAY 25 FEBRUARY 2011, MORNING

MARK SCHEME

STEMUP.CO.UK

				AVAILABLE MARKS
1	**(a)**	**(i)** The Solar System	[1]	
		(ii) A – Neptune B – Mercury	[2]	
	(b)	orbit; same; Milky Way	[3]	
	(c)	**(i)** Asteroid **accept** meteor/comet/meteorite	[1]	
		(ii) Become extinct/die out	[1]	8
2	**(a)**	C A B	[1]	
	(b)	1400 + 700 + 100 + 400 = 2600 [1] 3000 – 2600 = 400 [1]	[2]	
	(c)	Coal/gas/lignite **accept** brown coal no derivatives (✗)	[1]	
	(d)	Lignite	[1]	
	(e)	Non-renewable/less CO_2/less global warming/fossil fuels last longer	[1]	6
3	**(a)**	**(i)** 1.6 N	[1]	
		(ii) Friction	[1]	
	(b)	**tennis shoe** [1] more grip/highest friction/less chance of slipping [1] maximum [2] must have tennis shoe to get 2nd mark	[2]	4
4	**(a)**	**(i)** 36 m	[1]	
		(ii) 3 bars correct [2]/or 2 bars correct [1]	[2]	
		(iii) No effect	[1]	
	(b)	Air bags: prevent driver hitting wheel/windscreen. Seat belt; prevent driver/passenger hitting windscreen. Crumple zone; absorbs the (kinetic) energy on impact. } Any **two** [1] for the measure [1] for the reason, maximum [2]	[4]	
	(c)	Any **two** from ● Bright coloured clothing ● use zebra crossing/pelican crossing ● face oncoming traffic ● use green cross code ● use footpath ● use right hand side of road	[2]	
	(d)	Slow the car down/reduces breaking distance; less chance of a **serious** accident/injury.	[2]	12

		AVAILABLE MARKS
5	**(a)** speed =140/14 or 20/2; 10 m/s [2]	
	(b) **Increasing**; the dots are further apart. [2]	4
6	**(a)** Radiation that is always around us. [1]	
	(b) The combinations of neutrons and protons; are unstable. [2]	
	(c) **(i)** Test more houses [1]	
	(ii) Derry + Fermanagh [1]	
	(iii) Radiation can harm/damage/change/kill living tissue/cell; which causes cancer (allow only lung cancer). [2]	
	(d) Measure the radioactivity levels when sheets of thick lead, aluminium and paper are placed consecutively in front of source; Lead stops alpha, beta and gamma: Aluminium stops alpha and beta; Paper stops alpha. Any **three** [1] each maximum [3] [3]	
	Same distance from source → sheet/source → detector **or** materials same thickness [1]	11
	Total	**45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space
Module 6
Foundation Tier

[GSC61]

GSC61

FRIDAY 12 NOVEMBER 2010, AFTERNOON

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

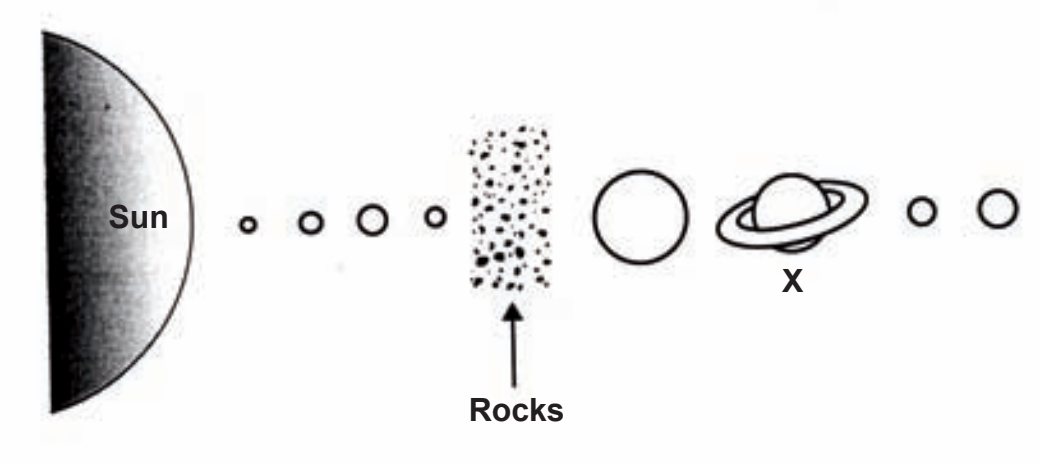
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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

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Examiner Only	
Marks	Remark

1 **(a)** The diagram below shows the Sun and its eight planets.



(i) Complete the sentence.

The Sun and its planets are called the _____

[1]

(ii) On the diagram above label the Earth with the letter E. [1]

(iii) Name the planet marked **X**.

_____ [1]

(iv) What is the name given to the **rocks** shown in the diagram above?

Tick (✓) the correct answer.

Comets ☐

Asteroids ☐

Stars ☐

[1]

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Examiner Only	
Marks	Remark

(b) Complete the following sentences.

Choose from:

planet : star : galaxy : moon : universe

(i) A _____ is a large body which makes its own energy. [1]

(ii) A _____ is a body which orbits a star. [1]

(iii) A _____ is a body which orbits a planet. [1]

(c) The photograph below shows the Allen telescopes.



© Dr Seth Shostak/SETI Institute

(i) These telescopes are being used to search for extra-terrestrial life. What is meant by the term **extra-terrestrial life**?

_____ [1]

(ii) Suggest why each telescope is facing a slightly different direction.

_____ [1]

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Examiner Only	
Marks	Remark

2 **(a)** Most of the electricity in Northern Ireland is produced from fossil fuels.

Tick (✓) **two** correct statements below about fossil fuels.

They take less than a hundred years to make. ☐

They will last forever. ☐

They will run out. ☐

They are made from dead plants and animals. ☐

[2]

(b) Lignite is a fossil fuel which is found in Northern Ireland. The photograph below shows a site near Ballymoney from which it is hoped to mine lignite.



© S Roulston http://www.geographyinaction.co.uk/Issues/Lignite.htm

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(i) Suggest **one** advantage and **one** disadvantage of lignite mining for people who live in the local community.

Advantage

_____

_____ [1]

Disadvantage

_____

_____ [1]

(ii) Name two other fossil fuels.

1. _____

2. _____

[2]

(c) Recently alternatives to fossil fuels are being used in cars. Name **one** example of an alternative fuel for cars and explain why we should be using more of it.

_____

_____

_____ [2]

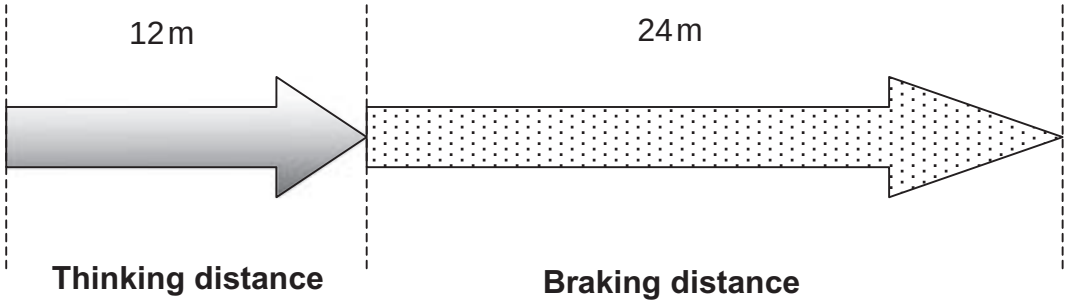
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

3 **(a)** The diagram below shows the thinking and braking distances for a car travelling at 40 miles per hour.



(i) Calculate the stopping distance for this car.

stopping distance _____ m [1]

(ii) The Highway Code states these distances are for perfect conditions. If the road is wet, what will be the effect, if any, on:

1. the braking distance?

_____ [1]

2. the size of the force of friction between the tyres and the road?

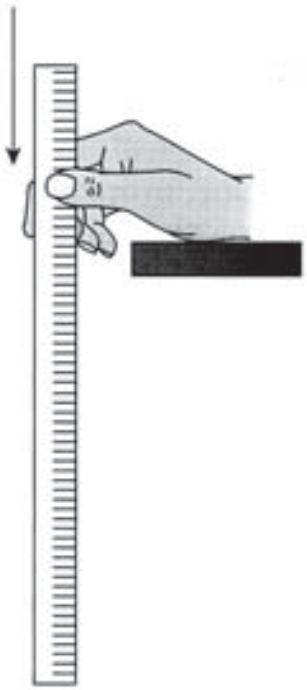
_____ [1]

3. the thinking distance?

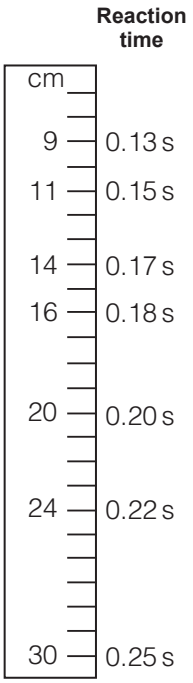
_____ [1]

Examiner Only	
Marks	Remark

(b) Quick reactions are very important whilst driving.
You can find how fast your reactions are by releasing and catching a ruler and then using the reaction time chart.



Reaction-time chart



(i) John did the test and caught the ruler at 16 cm.
Use the reaction-time chart to find his reaction time.

_____ s [1]

(ii) Using this apparatus how would you get a more reliable reaction time for John?

_____ [1]

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(c) The table below shows the frictional force for a smooth and patterned tyre on different road conditions.

Type of tyre	Road conditions	Frictional force/N
Smooth	dry	0.9
	wet	0.1
Patterned	dry	0.7
	wet	0.4

Use the information in the table to explain fully why a racing driver should use smooth tyres in dry conditions.

_____

_____

_____ [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** The information below was recently printed in a newspaper.

If a car hits a pedestrian…

- at 30 mph, they have a 20% chance of being killed
- at 35 mph, they have a 50% chance of being killed
- at 40 mph, they have a 90% chance of being killed.

(i) Complete the following sentence to give a trend shown by this information.

In an accident, the higher the speed _____

_____ [1]

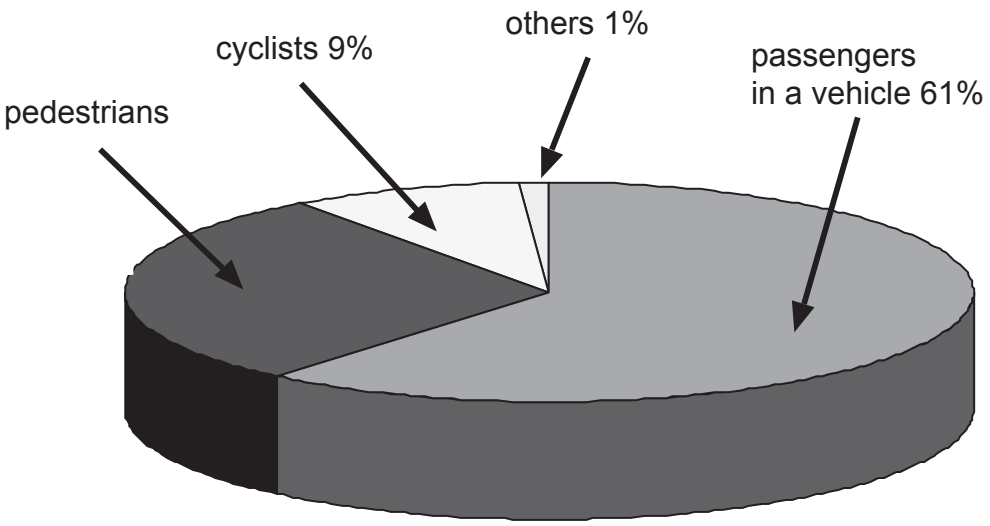
(ii) State **one** way in which speed limits can be enforced.

_____ [1]

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Examiner Only	
Marks	Remark

(b) The pie chart below shows the types of road accident that involved children.



From the pie chart calculate the percentage of accidents which involved pedestrians.

Show your working out.

Answer _____ % [2]

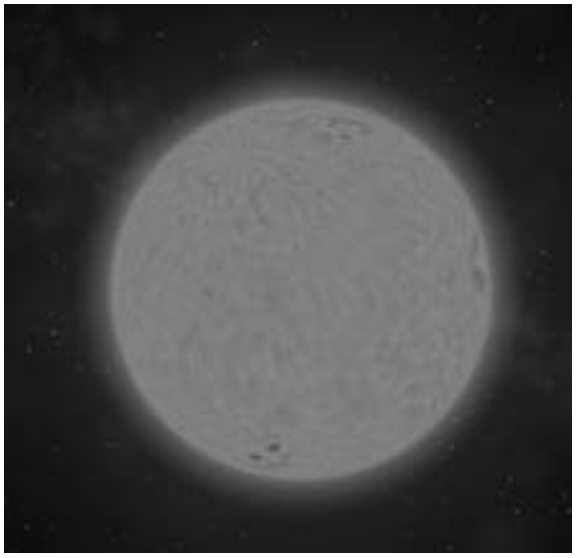
(c) State **two** ways in which pedestrians can reduce the risk of being knocked down by cars.

1. _____

2. _____ [2]

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5 The photograph below shows a star called Proxima Centauri.



upload.wikimedia.org/.../19/Proxima_Centari.jpg

A student gave the following account of how a star is formed. However, it contains some mistakes.

"A star forms when a cloud of gas, mainly nitrogen, is pushed together by the force of gravity. As the cloud collapses the centre heats up and becomes a Protostar. Eventually it becomes a fully fledged star when nuclear fission takes place."

(a) Complete the table below to identify the three words mistakenly used and give each correction.

Wrong word	Correct word

[3]

(b) Proxima Centauri is 4.2 light years from Earth. If a spaceship could move at the speed of light how long would it take the spaceship to travel from Earth to Proxima Centauri and back again?

_____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 **(a)** A teacher performed an experiment to see how beta radiation passed through different thicknesses of aluminium.

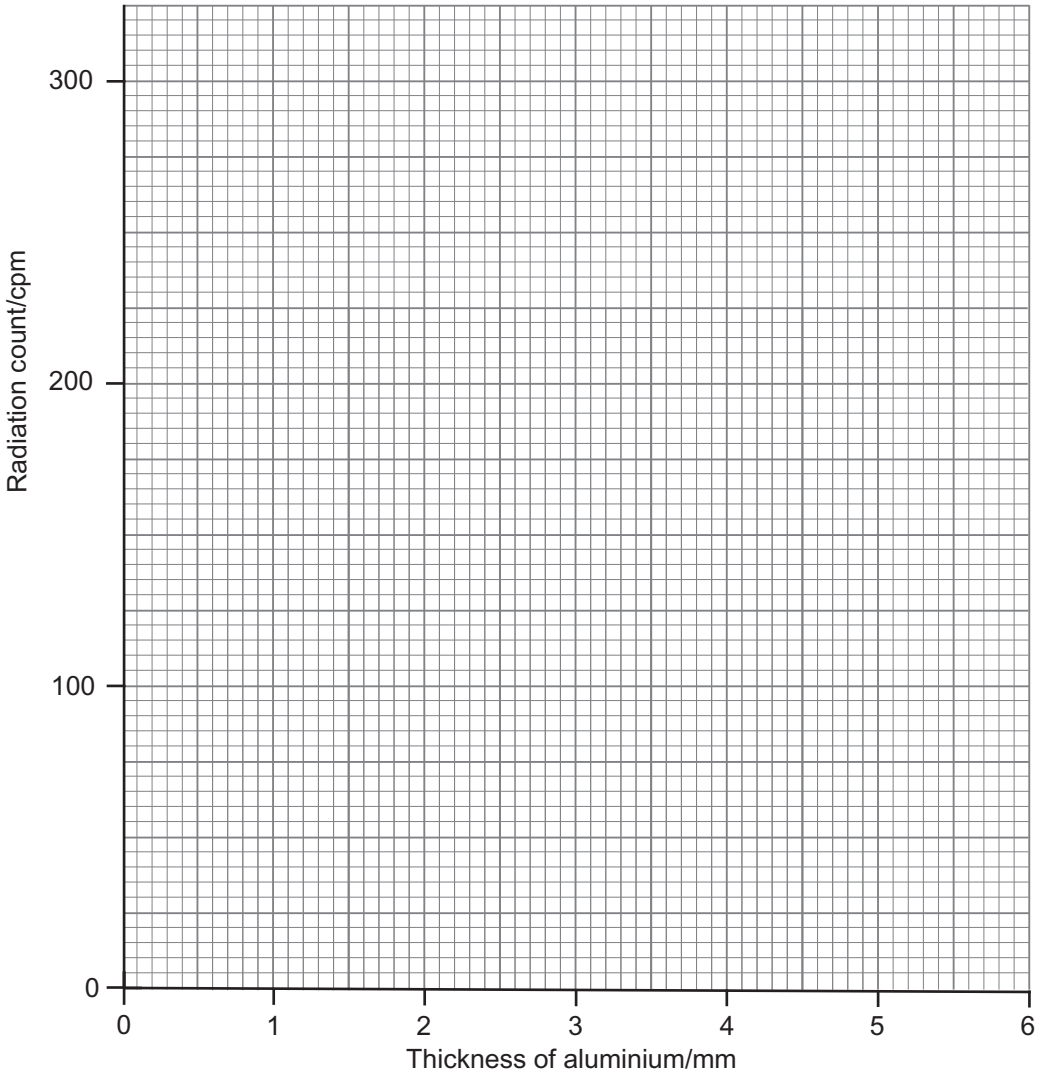


© GCSE Single Award Science for CCEA by T Laverty, J Napier & R White, page 257, published by Hodder Education, 2006 ISBN 978 0340 926000 Reproduced by permission of Hodder Education

His results are shown in the table below and include background radiation.

Thickness of aluminium/mm	1.0	2.0	3.0	4.0	5.0	6.0
Radiation count/ cpm	310	190	130	90	70	70

(i) Plot these points and draw a smooth curve on the axes below.



[3]

Examiner Only	
Marks	Remark

(ii) Use the information to suggest a value for background radiation.

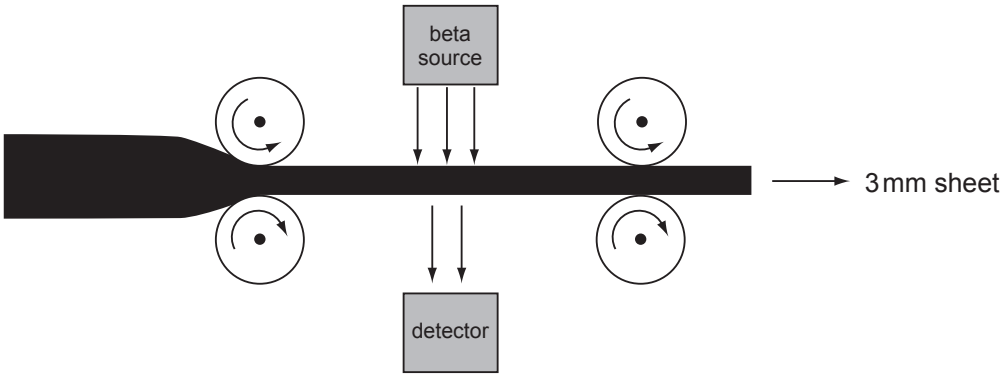
Answer _____ cpm [1]

(iii) Suggest **two** sources of background radiation.

1. _____

2. _____ [2]

(b) The machine shown below is used to produce aluminium sheets which are 3 mm thick by detecting a radiation count of 130 cpm.



(i) Use the information and your knowledge to explain fully why beta radiation is more suitable than alpha or gamma radiation in controlling the thickness of the aluminium sheets.

_____

_____

_____

_____ [3]

(ii) Radioactive phosphorus has a half-life of about 20 days. Explain why phosphorus would not be a suitable beta source in this machine.

_____

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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110966

Rewarding Learning

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space Module 6

Foundation Tier

[GSC61]

FRIDAY 12 NOVEMBER 2010, AFTERNOON

MARK SCHEME

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					AVAILABLE MARKS
1	(a)	(i)	Solar System	[1]	
		(ii)	E on third planet in	[1]	
		(iii)	Saturn	[1]	
		(iv)	Comets ☐		
			Asteroids ✓		
			Stars ☐	[1]	
	(b)	(i)	Star	[1]	
		(ii)	Planet	[1]	
		(iii)	Moon	[1]	
	(c)	(i)	Life on other planets	[1]	
		(ii)	Looking at whole universe	[1]	9
2	(a)		They take less than a hundred years to make. ☐		
			They will last forever. ☐		
			They will run out. ✓		
			They are made from dead plants and animals. ✓	[2]	
	(b)	(i)	Advantage – provide jobs for the local community Disadvantage – more traffic/damage habitats/visual pollution/dust pollution	[2]	
		(ii)	Coal; oil; peat; gas Any **two**	[2]	
	(c)		Biodiesel/alcohol/hydrogen [1]; fossil fuels will last longer/renewable [1]	[2]	8

					AVAILABLE MARKS
3	**(a)**	**(i)**	36 m	[1]	
		(ii)	1. Greater 2. Less 3. No effect	[3]	
	(b)	**(i)**	0.18 seconds	[1]	
		(ii)	Repeat experiment/average	[1]	
	(c)		More friction [1] this helps when they use the brakes/cornering [1] better grip [1]/go faster [1]/not slip [1] safer [0]	maximum [2]	8
4	**(a)**	**(i)**	The greater chance of being killed	[1]	
		(ii)	Speed camera/speed bumps/road narrowing	[1]	
	(b)		$9 + 1 + 61 = 71$; $100 - 71 = 29$	[2]	
	(c)		Use a zebra crossing/pedestrian crossing/traffic lights [1]; wear bright coloured clothes; face oncoming traffic; use green cross code [1] Any **two**	[2]	6

5 **(a)**

Wrong word	Correct word	
nitrogen	hydrogen	[1]
pushed	pulled	[1]
fission	fusion	[1]

[3]

(b) 8.4 years [1] 4

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					AVAILABLE MARKS
6	(a)	(i)	all points correct [2] 5 points [1] smooth curve [1] maximum [3]		
		(ii)	70 counts per minute	[1]	
		(iii)	gamma rays from ground; cosmic rays from space; hospitals; nuclear power stations; nuclear weapons testing Any **two**	[2]	
	(b)	(i)	Alpha does not pass through aluminium [1] Gamma all passes through [1] Beta amount depends on thickness [1]	[3]	
		(ii)	Activity decreases too quickly/has to be replaced more often	[1]	10
				Total	**45**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space Module 6

Foundation Tier

[GSC61]

FRIDAY 21 MAY 2010, MORNING

GSC61

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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Examiner Only	
Marks	Remark

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

Planet	Distance from the Sun (million km)	Surface temperature (°C)	Gravity (N/kg)
Mercury	58	430	4
	108	470	9
Earth	150	22	10
	228	–23	4
Jupiter	778	–150	26
Saturn	1427	–180	11
Uranus	2870	–210	12
Neptune	4497	–220	12

(i) Complete the table by naming the two missing planets. [2]

(ii) Suggest why the Earth is warmer than Saturn.

_____ [1]

(iii) On which of the planets would our weight be greatest?

_____ [1]

(b) Given below are a list of names used in astronomy (the study of space).

Earth : **Galaxy** : **Solar System** : **Sun** : **Universe**

Put them in order of size from largest to smallest. The first is done for you.

Universe — Largest

_____

_____

_____

_____ — Smallest [3]

(c) The photograph below shows the Ares IX rocket. These rockets may be used to set up bases on the moon by 2020.



© NASA http://www.nasa.gov/mission_pages/constellation/multimedia/aresIX_on_pad.html

Scientists have recently searched for water on the moon. Explain why finding water would help in setting up a base on the moon.

_____

_____ [2]

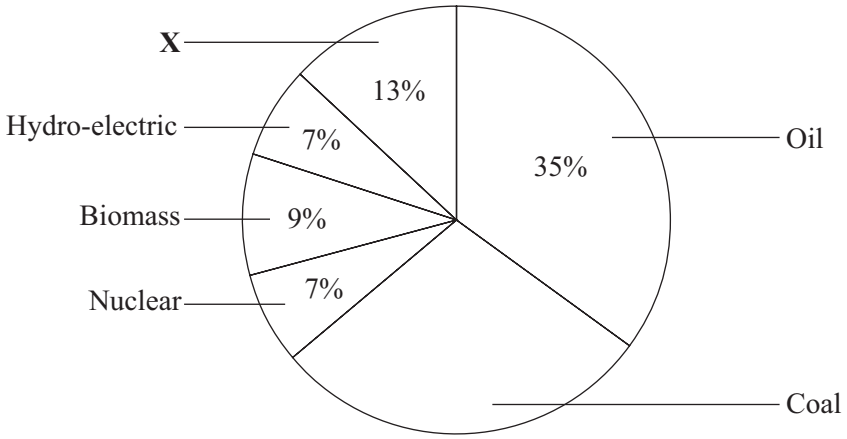
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

2 The pie chart below shows the World energy resources.



Use this information and your knowledge to answer the following questions.

(a) (i) Calculate the percentage of the energy resources which come from coal.

Show your working out.

_____ %
[2]

(ii) State the two fossil fuels named in the pie chart.

1. _____

2. _____ [2]

(iii) The **X** in the diagram represents another fossil fuel.
Suggest what it is.

_____ [1]

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(b) Given below are some statements about energy resources.

A They take hundreds of years to make

B They do not increase global warming

C They take millions of years to make

D They are made from the dead remains of plants and animals

E They are renewable

Which two statements (**A, B, C, D or E**) are true about **fossil** fuels?

Answer _____ and _____ [2]

(c) Name the gas produced when fossil fuels are burnt that causes global warming.

_____ [1]

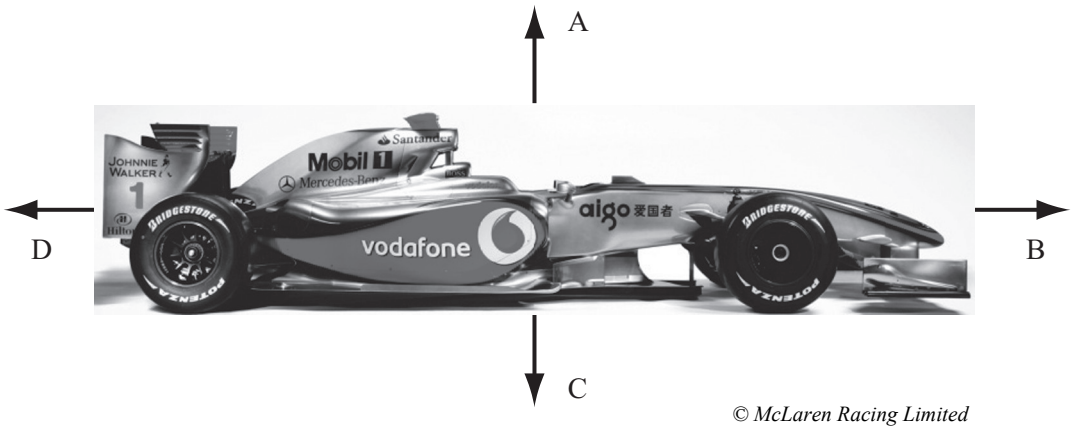
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

3 **(a)** The picture below shows the forces acting on a racing car moving to the right.



© *McLaren Racing Limited*

(i) Which arrow (A, B, C or D) shows the direction in which friction will act?

_____ [1]

(ii) Give two ways in which the friction on a race track is reduced.

1. _____

2. _____ [2]

(b) After a long race the driver's reactions may be slower because of tiredness. Complete the table below using a tick (✓) to show the effect this will have.

	Decrease	**No change**	**Increase**
Reaction time			
Thinking distance			
Braking distance			

[3]

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(Questions continue overleaf)

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4 Euro NCAP provides cars with a safety star rating.

★ = safe

☆ = not safe

Model	Front and side impact rating	Pedestrian test rating	Child protection rating
Seat Altea	★★★★★	★★★☆	★★★★☆
Kia Picanto	★★★☆☆	★☆☆☆	★★★★☆
Fiat Panda	★★★☆☆	★☆☆☆	★★☆☆☆
Hyundai Getz	★★★★☆	★☆☆☆	★★★★☆

(a) Use the information in the table to answer parts **(i)** and **(ii)**.

(i) Explain why the Seat Altea is the safest car for a driver.

_____ [1]

(ii) Overall which is the safest car in the test?

_____ [1]

(b) State two safety features found in a car which are designed to protect the passenger if a crash occurs.

1. _____

2. _____ [2]

Examiner Only

Marks	Remark

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(c) The photograph below shows a road narrowing scheme.



© Crown Copyright http://www.dft.gov.uk/adobepdf/165240/244921/244924/TAL_14-991.pdf

(i) Explain fully why these road narrowing schemes are safer for pedestrians.

_____

_____

_____ [2]

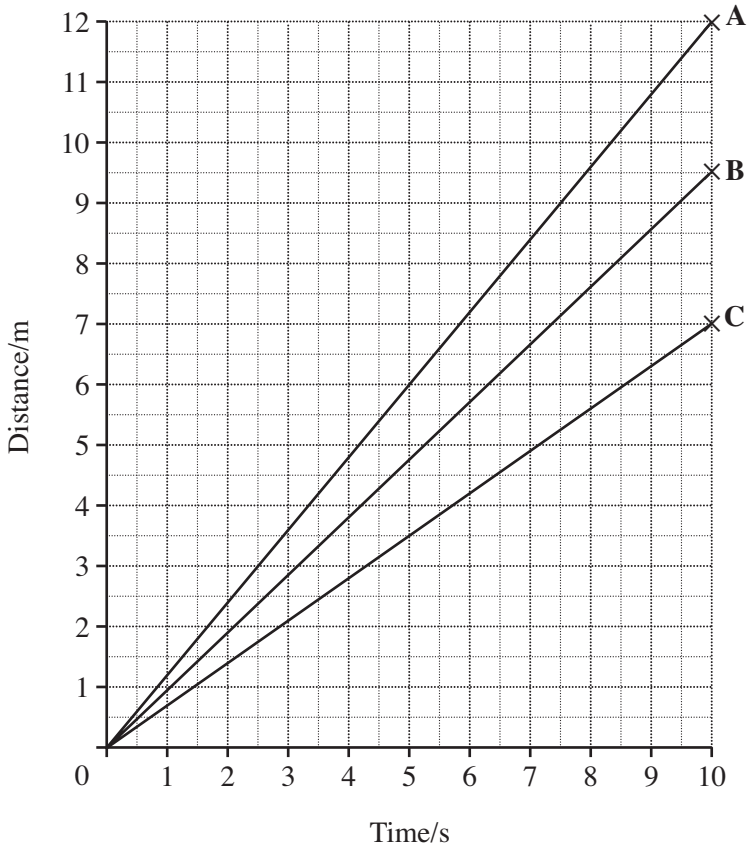
(ii) Give another example of a traffic calming measure.

_____ [1]

Examiner Only

Marks	Remark

5 **(a)** Distance-time graphs for three cars are shown below.



Which car (A, B or C) is moving at the greatest speed? Use the graphs to explain your answer.

_____

_____ [2]

Examiner Only

Marks	Remark

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(b) For every 160J of energy in petrol, 40J is changed to useful movement energy of a car.

(i) Calculate how much energy is wasted by the car.

Wasted energy _____J [1]

(ii) Use the equation:

$$\textbf{efficiency} = \frac{\textbf{useful energy output}}{\textbf{total energy input}}$$

to calculate the efficiency of the car.

Show your working out.

Efficiency _____ [2]

(c) In terms of forces explain why the wheels of a car slow down when the brakes are applied.

_____

_____ [2]

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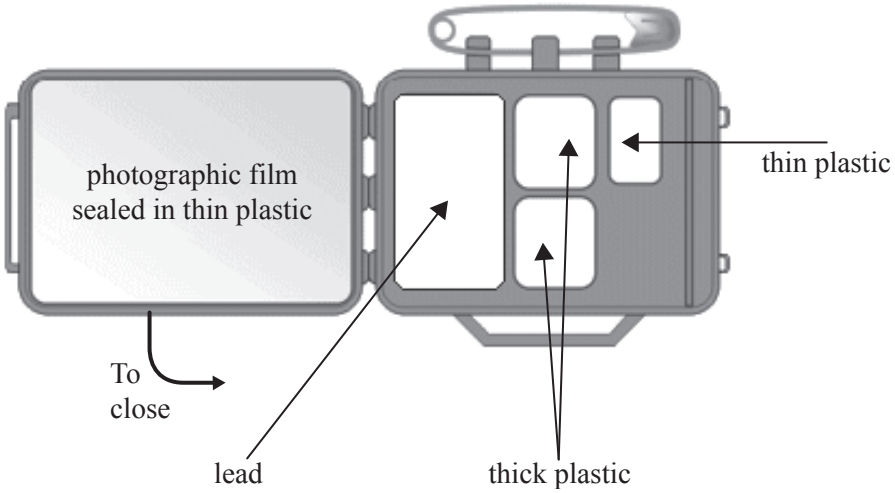
Marks	Remark

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Examiner Only	
Marks	Remark

6 **(a)** Nuclear power station workers have to wear film badges to indicate their absorbed dose of radiation.

Film badge (opened to show internal parts).



© BBC http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/radiation/radiocativerev5.shtml

When the film is developed it will turn black where it has been exposed to radiation.

If the worker is exposed to **beta** radiation, shade the parts which would show up black on the diagram below.



© BBC http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/radiation/radiocativerev5.shtml

[2]

(b) Explain fully why people who work in nuclear power stations may be worried about exposure to radiation.

_____

_____ [2]

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(c) (i) What is meant by the term background radiation?

_____ [1]

(ii) Suggest **one** source that might produce background radiation.

_____ [1]

(d) Explain fully why some nuclei may be radioactive.

_____

_____ [2]

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Marks	Remark

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GCSE

Science: Single Award (Modular)

End of Module Tests

May 2010

Mark Schemes

Issued: October 2010

Rewarding Learning

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Road Safety, Radioactivity
and Earth in Space
Module 6

Foundation Tier

[GSC61]

FRIDAY 21 MAY 2010, MORNING

MARK SCHEME

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		AVAILABLE MARKS
1	**(a)** **(i)** Venus, Mars [2]	
	(ii) Nearer to **the Sun** [1]	
	(iii) Jupiter [1]	
	(b) Galaxy, Solar System, Sun, Earth 3–4 correct = [3], 2 correct = [2], 1 correct = [1] Correct position only [3]	
	(c) Water needed to live [1] **or** implied They don't have to carry it with them [1] **or** implied [2]	9
2	**(a)** **(i)** 13+7+7+9+35 = 71 [1] 29% [2] [2]	
	(ii) Oil; coal [2]	
	(iii) (natural) gas/lignite/peat/turf **not** petrol/diesel [1]	
	(b) C; D any order [2]	
	(c) Carbon dioxide / CO_2 [1]	8
3	**(a)** **(i)** D [1]	
	(ii) ice; oil; gravel; stones; water no ref. tyres smooth track; mud less weight [2]	

(b)

	Decrease	No change	Increase
Reaction time			✓
Thinking distance			✓
Braking distance		✓	

[1] each [3] 6

4	**(a)** **(i)** **Most** (black full) **stars** (for front and side impact) [1]	
	(ii) Seat Altea [1]	
	(b) crumple zones; head rests; side impact bars; S.R.S; air bags; seat belts Any **two** [2]	

			AVAILABLE MARKS
(c)	**(i)**	slow cars down [1]: if there is an accident less chance of **serious** injury or less chance of accident [2]	
	(ii)	Speed bumps; speed camera [1]	7
5	**(a)**	Vehicle A [1] Steepest implied gradient (slope) Ref. to Dist/Time [1] [2]	
	(b)	**(i)** 120 J [1]	
		(ii) 40/160 [1] 0.25 (if 25 must be %) [2] with incorrect unit [–1] [2]	
	(c)	Brakes increase friction more (friction implied in terms of braking) [1] Larger braking force than forward force [1] [2]	7
6	**(a)**		
		If first box shaded no marks mark vertical columns	
		3 correct columns [2], 2 correct columns [1] [2]	
	(b)	radiation causes damage to (living) tissues / cells; may lead to cancer [1] each [2]	
	(c)	**(i)** radiation that is in the air, always around us, natural from source, from the earth [1]	
		(ii) rocks; space; cosmic ray; sun; nuclear power stations; nuclear waste [1]	
	(d)	The combinations of neutrons and protons [1] are unstable [1] [2]	8
		Total	**45**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Road Safety, Radioactivity and Earth in Space
Module 6
Foundation Tier

[GSC61]

GSC61

FRIDAY 26 FEBRUARY 2010, MORNING

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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Examiner Only	
Marks	Remark

1 **(a)** The diagram below shows the Sun and its planets.

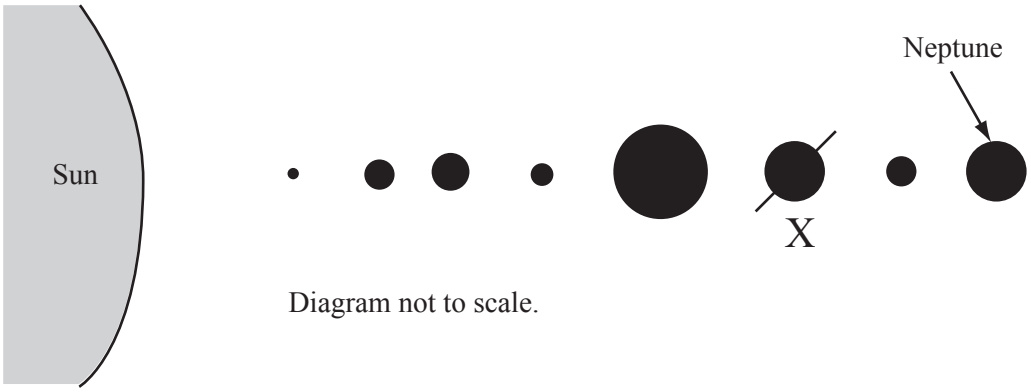


Diagram not to scale.

(i) Label the planet Earth on the diagram with a letter E. [1]

(ii) Name the planet marked X.

_____ [1]

(iii) Neptune is the coldest planet, suggest a reason why it is the coldest.

_____ [1]

(iv) Complete the following sentence.
The Sun and its eight planets are known as the

_____ [1]

(b) Choose words from the list below to answer parts **(i)** and **(ii)**.

Milky Way : Galaxy : Universe

(i) Name the largest system. _____ [1]

(ii) Our Galaxy is called the _____ [1]

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(c) The picture below shows NASA's Phoenix Lander.

It is travelling to Mars to search for extra-terrestrial life.



© NASA/JPL

Explain what is meant by the term **extra-terrestrial life**.

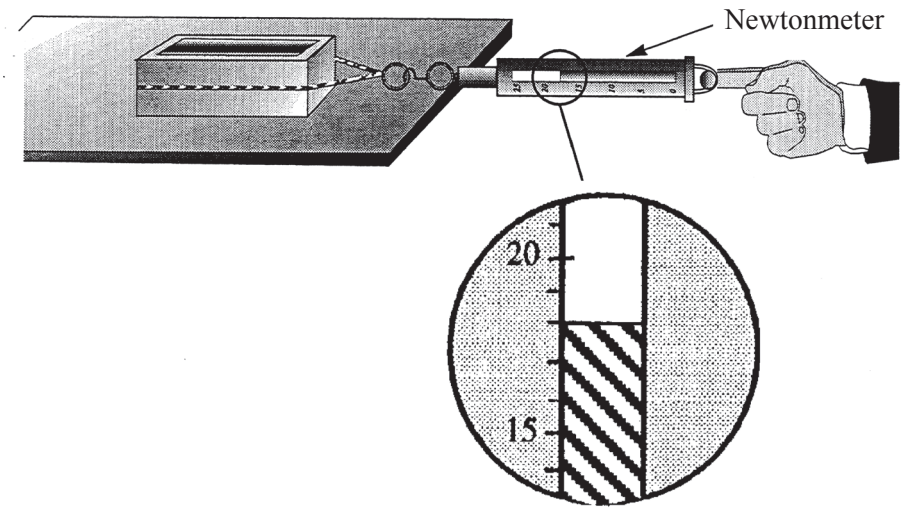
_____ [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

2 George is investigating friction. He uses a newtonmeter to measure the force needed to pull the brick across different floor surfaces.



(a) What is the reading on the newtonmeter?

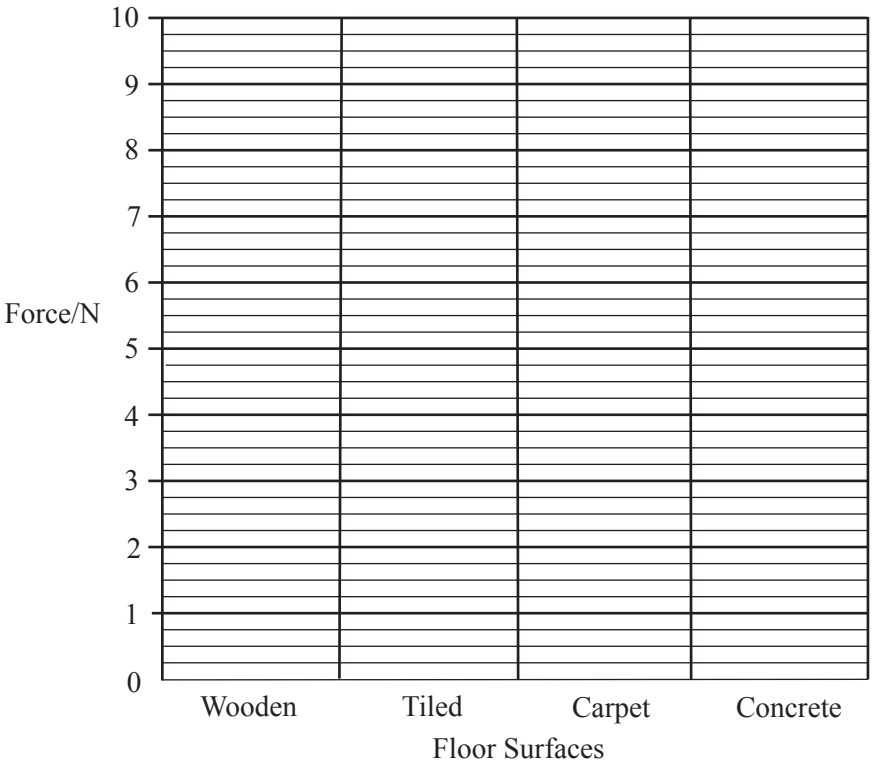
_____ N [1]

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(b) The results of the investigation are given below.

Floor surfaces	Force/N
Wooden	4
Tiled	3
Carpet	7
Concrete	9

(i) Draw a **bar chart** below using the results given in the table.



[2]

(ii) Which surface has the highest friction?

_____ [1]

(iii) Give **one** way George could reduce the friction of the tiled floor.

_____ [1]

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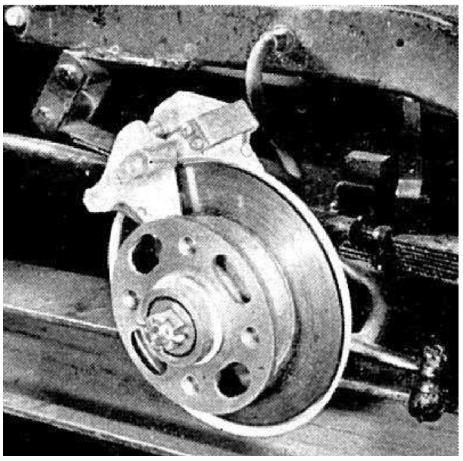
Marks	Remark

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(c) If the brick were heavier what effect, if any, would it have on the amount of friction?

_____ [1]

(d) The picture below shows the brakes on a car.



crosleyautoclub.com/Images/Misc/DiscBrakes.JPG

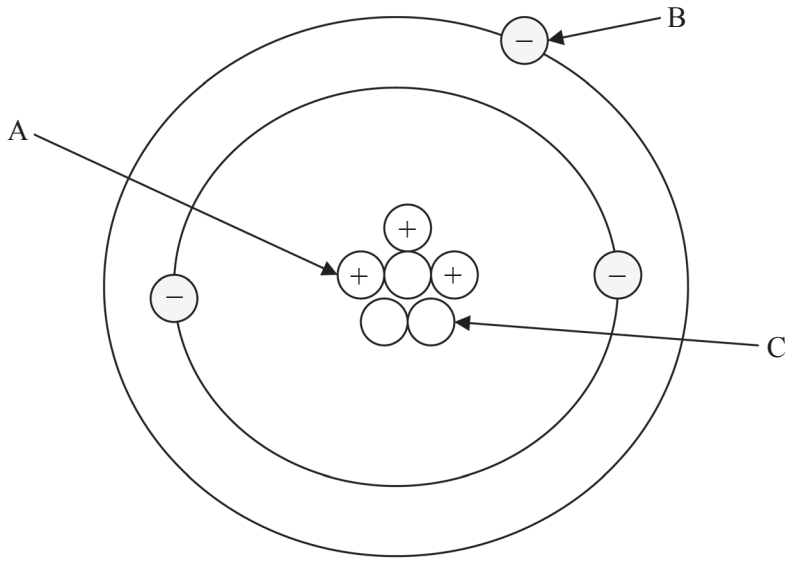
The brakes stop the car using friction. What type of energy is produced by friction?

_____ [1]

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Marks	Remark

3 The diagram below shows the structure of an atom.



(a) Name the particles labelled A, B and C.

Choose from:

electron : nucleus : proton : neutron

A _____

B _____

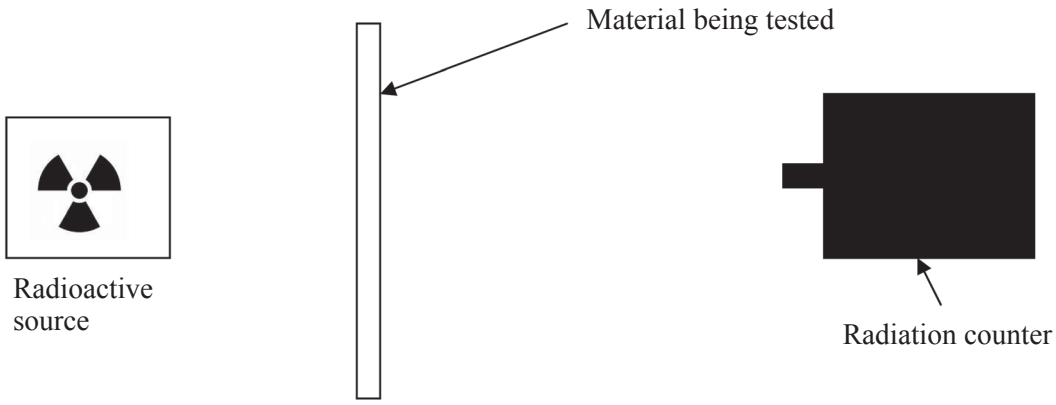
C _____ [3]

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Marks	Remark

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(b) The following apparatus was set up to test how materials stop radiation.



The following results were obtained.

Material being tested	Radiation count/minute
paper	400
aluminium	392
lead	40

(i) Give **one** thing which must be done to make sure this is a fair test.

_____ [1]

(ii) Using the results, suggest what type of radiation is given from the source.

Circle the correct answer.

alpha : gamma : beta [1]

(iii) Even when the radioactive source was removed, the radiation counter still gave a reading.

What name is given to this type of radiation which is found all around us.

_____ [1]

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Marks	Remark

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4 **(a)** Shown below are pictures of new and worn tyres of the same make.

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Marks	Remark

Image of new tyre removed due to copyright issues

new tyre

Image of worn tyre removed due to copyright issues

worn tyre

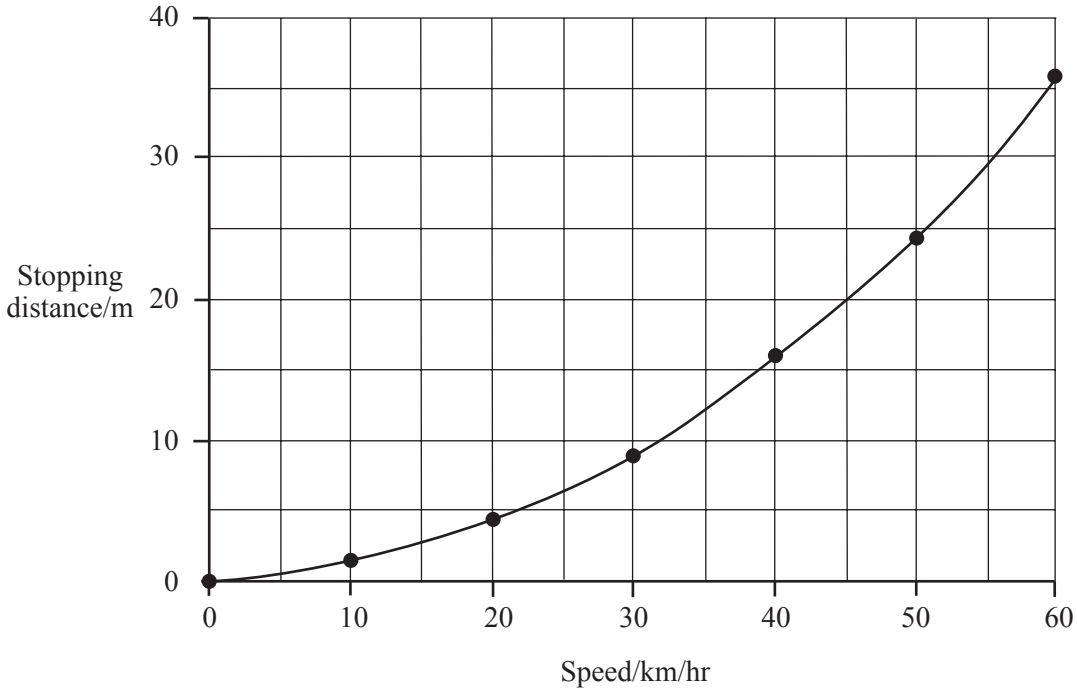
The new tyre has a tread depth of 8 mm and by law there must be at least 1.6 mm. The worn tyre shown has only 0.6 mm.
Complete the table below with a tick (✓) to show how using the **worn** tyre will affect the following in **wet** conditions.

	Decreases	**Stays the same**	**Increases**
Braking distance			
Thinking distance			
Stopping distance			

[3]

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The graph below shows the stopping distances at different speeds. The test was carried out on a dry day.



(b) Describe how the stopping distance changes as the speeds increase.

_____ [1]

(c) Explain fully why stopping distance is increased by alcohol consumption.

_____

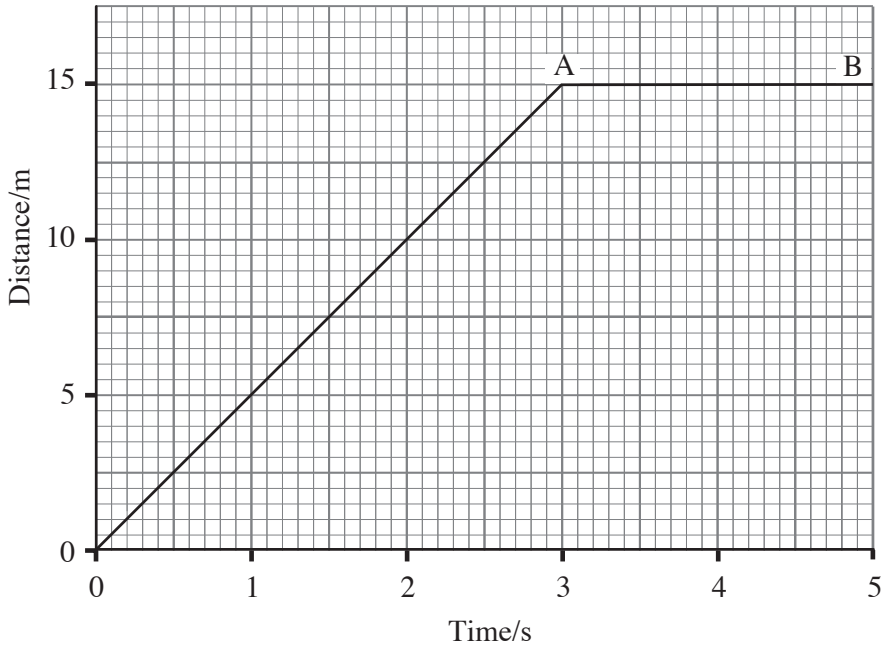
_____

_____ [2]

Examiner Only

Marks	Remark

(d) The graph shows how the distance travelled by a car changed with time.



(i) Describe the motion of the car from A to B.

Choose from:

stopped : steady speed : accelerating

_____ [1]

(ii) Use the graph to find the distance the car travels in the first 3 seconds.

Distance = _____ m [1]

(iii) Use the following formula to calculate the speed of the car in the first 3 seconds.

$$\textbf{speed} = \frac{\textbf{distance}}{\textbf{time}}$$

Speed = _____ m/s [1]

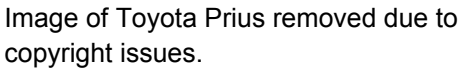
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Marks	Remark

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Examiner Only	
Marks	Remark

5 **(a)** The photograph below shows a Toyota Prius which is a hybrid car.



(i) What two types of energy source are used by the Toyota Prius?

1. _____

2. _____ [2]

(ii) Explain fully why the manufacturer claims that this is an environmentally friendly car.

_____

_____

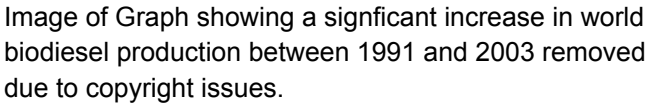
_____

_____ [3]

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(b) The graph below shows the change in world biodiesel production.

Examiner Only	
Marks	Remark



Suggest **two** reasons why there has been such an increase in production of biodiesel.

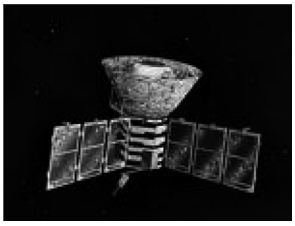
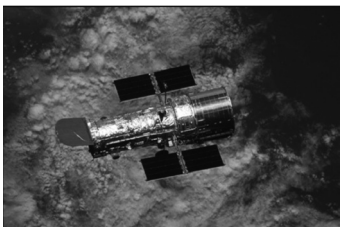
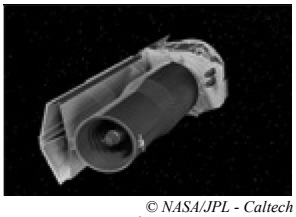
_____

_____

_____ [2]

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6 **(a)** Given below are the names of some telescopes and the type of radiation they detect.

Name of telescope	Type of radiation detected
 *© Jodrell Bank Centre for Astrophysics, University of Manchester* Lovell	Radio
 *© Max Planck Institute for Extraterrestrial Physics* XMM Newton	X-rays
 COBE *© NASA*	Microwaves
 *© NASA/STSci* Hubble	Visible light
 *© NASA/JPL - Caltech* Spitzer	Infrared

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Marks	Remark

Each telescope is useful in detecting different events because each event produces different radiation as shown in the table below.

Event	Main radiation produced
Nebulae	Infrared
Pulsars	Radio
Stars	Visible light
Big Bang	Microwaves
Neutron stars	X-rays

Use the information given to name a telescope that could be used to:

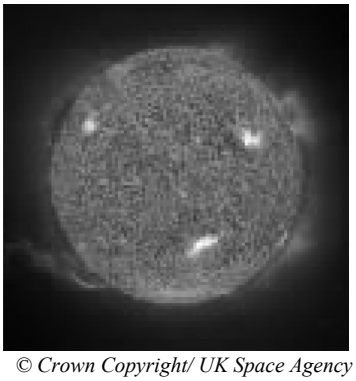
(i) analyse the radiation from the "Big Bang".

_____ [1]

(ii) look at Pulsars.

_____ [1]

(b) The picture below shows our Sun, an example of a star.



© Crown Copyright/ UK Space Agency

Explain fully how our Sun was formed.

_____

_____

_____

_____ [3]

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Marks	Remark

(c) (i) Proxima Centauri, the nearest star to the Sun is 4.2 light years away. Explain fully what is meant by the term **light year**.

_____

_____

_____ [2]

(ii) Why would a manned space mission to a star 4.2 light years away be impossible? Explain your answer.

_____

_____ [2]

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Marks	Remark

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GCSE

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Mark Schemes

Issued: May 2010

Rewarding Learning

General Certificate of Secondary Education
2009 – 2010

Science: Single Award (Modular)

Road Safety, Forces, Radioactivity and Earth in Space
Module 6

Foundation Tier

[GSC61]

FRIDAY 26 FEBRUARY 2010, MORNING

MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	**(i)**	3rd planet in from Sun	[1]	
		(ii)	Saturn	[1]	
		(iii)	Furthest away from the Sun (not far away 7)	[1]	
		(iv)	Solar System	[1]	
	(b)	**(i)**	Universe	[1]	
		(ii)	Milky way	[1]	
	(c)		Life on **other planets** in space	[1]	7
2	**(a)**		18N	[1]	
	(b)	**(i)**	4 bars correct [2]; 3 bars correct [1]; Max [2] Must have a top	[2]	
		(ii)	Concrete floor	[1]	
		(iii)	Oil/grease or similar Polish/wax/water	[1]	
	(c)		More friction implied	[1]	
	(d)		Thermal / heat only	[1]	7
3	**(a)**		A = proton B = electron C = neutron	[3]	
	(b)	**(i)**	Make sure radiation source is the same distance from the material / radiation counter is the same distance from the material / same source used / thickness (not size) Material in same position	[1]	
		(ii)	Gamma	[1]	
		(iii)	Background	[1]	6

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			AVAILABLE MARKS
4	**(a)**		

	Decreases	Stays the same	Increases
Braking distance			3
Thinking distance		3	
Stopping distance			3

1 mark each max [3] [3]

(b) Gets bigger / increases [1]

(c) Increases reaction time [1]
Thinking distance increased [1] or implied [2]

(d) **(i)** Stopped [1]

(ii) 15m [1]

(iii) 5 m/s [1] 9

5 **(a)** **(i)** 1 Electricity (battery)
2 Petrol / diesel (not biodiesel) [2]

(ii) less fossil fuel **used**; **less** carbon dioxide CO_2 / greenhouse gases produced;
less global warming
or implied [3]

(b) to conserve fossil fuels; more demand (implied)
cheaper (7) [2] 7

6 **(a)** **(i)** COBE [1]

(ii) Lovell [1]

(b) clouds of dust / gas / hydrogen; held / **pulled** together by gravity;
fusion begins
helium forms [3]

(c) **(i)** The distance [1] light travels in one year [1] [2]

(ii) Too far away [1] or implied
would not live long enough [1] [2] 9

Total **45**

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