

Centre Number	
71	

General Certificate of Secondary Education 2011–2012

Science: Single Award (Modular)

Road Safety, Radioactivity
and Earth in Space
Module 6
Higher Tier
[GSC62]
MONDAY 14 NOVEMBER 2011
2.30 pm-3.15 pm



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 Exa	
Question Number	Marks
1	
2	
3	
4	
5	
6	

I Total I	
lotai	
Morko	
Marks	



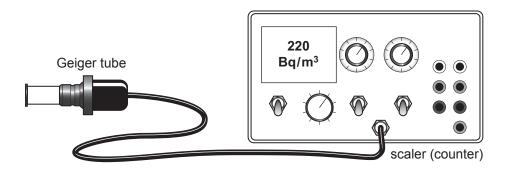
- 1 (a) Below are some statements about radon gas.
 - Radon is a radioactive gas that comes mainly from the ground

Examiner Only

[2]

- Radon can enter houses and build up to dangerous levels
- The average radon level in Northern Ireland is 20 Bg/m³
- 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.

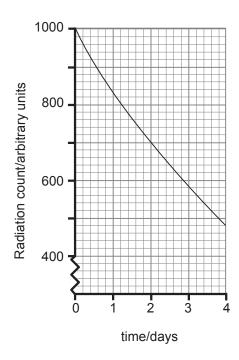


(i)	Use the information provided to explain fully why this householder should be concerned with this reading.
	[2]
(ii)	Explain fully how breathing in radon gas can be harmful to health

2

(b)	The graph below shows how the count rate of radioactive rador
	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?

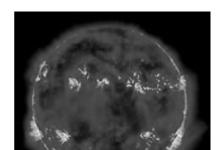
_____ days [1]

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

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

_ [2]

2 The Sun is the nearest star to Earth.



© NASA

Examiner Only

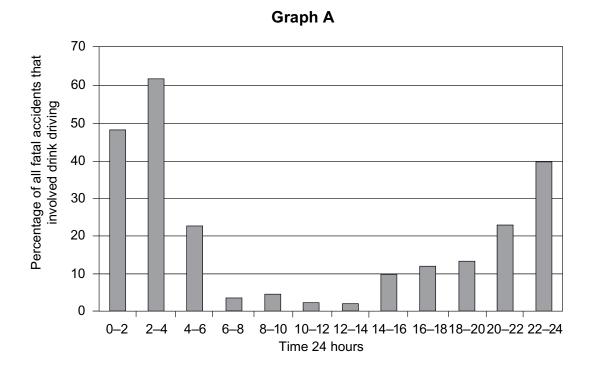
(a)	Describe fully how the Sun was formed.
	[3
(b)	The Sun is about 25 000 light years from the centre of our galaxy. Explain fully what is meant by the term light year.
	[2
(c)	Scientists have discovered new planets many light years from Earth. Suggest how scientists search for extra-terrestrial life on these new planets.
	[1

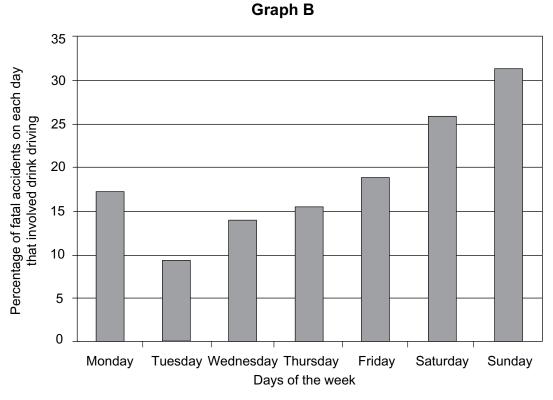
BLANK PAGE

(Questions continue overleaf)

3 The graphs below show the percentage of all fatal accidents which involved drink driving at different times of the day and different days of the week.







© Crown Copyright - Road Safety Research Report 75 Fatal Vehicle Occupancy Collision Dept of Transport HMSO Feb 2007

The legal limit for a driver's Blood Alcohol Content (BAC) is 80 mg/100 ml. Explain fully why an increased BAC will increase the chance of a driver having a crash. [2]			Marks
The legal limit for a driver's Blood Alcohol Content (BAC) is 80 mg/100 ml. Explain fully why an increased BAC will increase the chance of a driver having a crash.			
The legal limit for a driver's Blood Alcohol Content (BAC) is 80 mg/100 ml. Explain fully why an increased BAC will increase the chance of a driver having a crash.			
The legal limit for a driver's Blood Alcohol Content (BAC) is 80 mg/100 ml. Explain fully why an increased BAC will increase the chance of a driver having a crash.			
80 mg/100 ml. Explain fully why an increased BAC will increase the chance of a driver having a crash.			
80 mg/100 ml. Explain fully why an increased BAC will increase the chance of a driver having a crash.	he legal limit for a driver's Blood Alcohol Content (BAC) is		
driver having a crash.	0 mg/100 ml.		
		а	
		[2]	

(c) The table below shows the change in price for a litre of diesel in Northern Ireland.

Examiner Only	
Marks	Remark

Year	Price per litre/p
2010	123.6
2009	110.8
2008	109.1
2007	105.8
2006	92.6

(i) The Government take 62% of the cost of a litre of fuel in tax. Give two advantages and two disadvantages of the Government's decision to raise money through these taxes.

Advantages:
1
2
Disadvantages:
1
2
[4]
Apart from tax what has been the major cause for the rise in the cost of diesel since 2006?

7482.05**R** 8

(ii)

4 Nuclear medicine uses radioactive tracers which emit gamma rays, for example, iodine to study the thyroid gland. The table below shows three forms of radioactive iodine.

Examiner Only	
Marks	Remark

Form of iodine	Half-life	Radiation emitted	
iodine-123	13 hours	gamma	
iodine-128	25 minutes	beta	
iodine-129	15700000 years	beta and gamma	

Explain fully why iodine-123 is the most suitable radioactive trace study the thyroid gland.	er to

5 (a) The photograph below shows part of our moon.



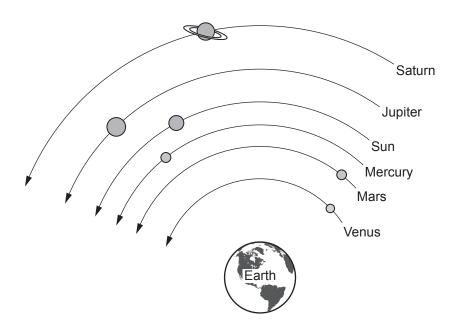
© NASA/Johnson

Examiner Only

(i)	Name the object which caused the feature on the moon labelled	1 A [1]
(ii)	If a similar object was to hit the Earth, describe fully how this could affect life on Earth.	
		L3.

(b) The diagram below shows the Geocentric model of our Solar System.

Examiner Only				
Marks	Remark			
	1			

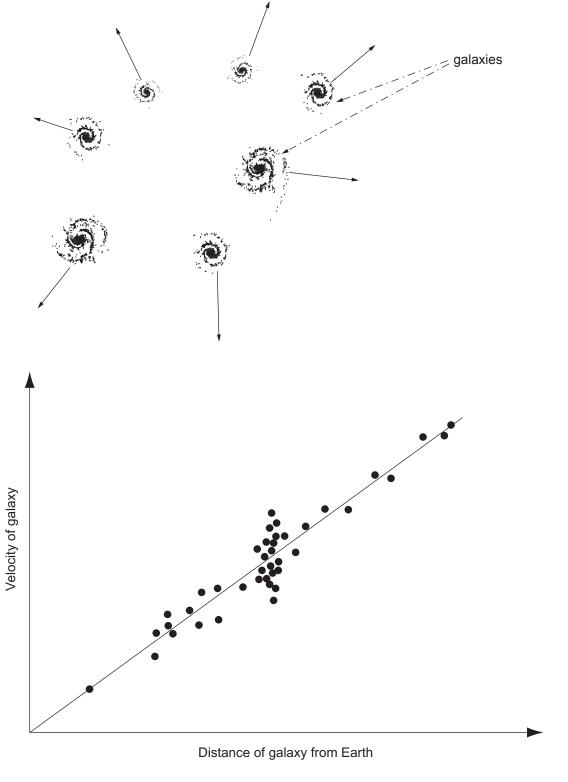


When this model was proposed only six of the eight planets were known. State **two** other differences between this model and the model we know today.

_ [2]

The diagrams below show some of the observations made on moving galaxies.





© NASA - Imagine

supports the idea			
		[3]	

6	A truck of mass 12 kg is placed on a very slight slope as shown in the diagram below. The truck does not move.

12 kg

Examiner Only			
Marks	Remark		
Marks	Remarl		

(a)	(i)	State, in terms of forces, why the truck does not move.	
			_ [1]
	(ii)	The slope is now increased and the truck begins to accelerate. Explain fully, in terms of forces, why it accelerates.	
			_
			_ [3]

(b) At the bottom of the slope this truck has a momentum of 62.4 kgm/s.

Use the following equation:

 $momentum = mass \times velocity$

to calculate its velocity at this point.

Velocity _____m/s [2]

THIS IS THE END OF THE QUESTION PAPER

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