Rewarding Learning

General Certificate of Secondary Education 2010-2011

## Science: Single Award (Modular) Road Safety, Radioactivity and Earth in Space Module 6 <br> Foundation Tier <br> [GSC61]

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

(i) Complete the sentence.

The Sun and its planets are called the $\qquad$
(ii) On the diagram above label the Earth with the letter E .
(iii) Name the planet marked $\mathbf{X}$.
$\qquad$
(iv) What is the name given to the rocks shown in the diagram above?

Tick $(\checkmark)$ the correct answer.

(b) Complete the following sentences.

Choose from:
planet : star : galaxy : moon : universe
(i) A $\qquad$ is a large body which makes its own energy. [1]
(ii) A $\qquad$ is a body which orbits a star.
(iii) A $\qquad$ is a body which orbits a planet.
(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?
$\qquad$
(ii) Suggest why each telescope is facing a slightly different direction.

$\qquad$

2 (a) Most of the electricity in Northern Ireland is produced from fossil fuels.
Tick $(\mathcal{\checkmark})$ two correct statements below about fossil fuels.

They take less than a hundred years to make. $\square$

They will last forever. $\square$

They will run out. $\square$

They are made from dead plants and animals. $\square$
(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
(i) Suggest one advantage and one disadvantage of lignite mining for people who live in the local community.

Advantage
$\qquad$
$\qquad$
Disadvantage
$\qquad$
$\qquad$
(ii) Name two other fossil fuels.

1. $\qquad$
2. $\qquad$
(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.
$\qquad$
$\qquad$
$\qquad$

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


Thinking distance

## Braking distance

(i) Calculate the stopping distance for this car.
stopping distance $\qquad$ 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?
2. the size of the force of friction between the tyres and the road?
$\qquad$
3. the thinking distance?
$\qquad$
$\qquad$
(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.
$\qquad$
(ii) Using this apparatus how would you get a more reliable reaction time for John?
$\qquad$
(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.
$\qquad$
$\qquad$
$\qquad$

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 $\qquad$
$\qquad$
(ii) State one way in which speed limits can be enforced.
(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 $\qquad$ \% [2]
(c) State two ways in which pedestrians can reduce the risk of being

1. $\qquad$
2. 

## knocked down by cars.

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 |
| :---: | :---: |
|  |  |
|  |  |
|  |  |

(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?

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

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

| Thickness of <br> aluminium $/ \mathrm{mm}$ | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Radiation count/ <br> cpm | 310 | 190 | 130 | 90 | 70 | 70 |

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

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

Answer $\qquad$ cpm [1]
(iii) Suggest two sources of background radiation.

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

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