

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
PHYSICS**

A331/01

Unit 1: Modules P1 P2 P3 (Foundation Tier)

**Wednesday 26 January 2011
Afternoon**

Duration: 40 minutes

Candidates answer on the question paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

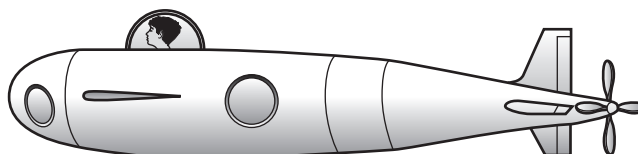
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **42**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 A scientist has suggested using very small nuclear reactors to power a new design of mini-submarine.



- (a) How is energy released from a nuclear fuel?

Put a tick (✓) in the box next to the correct answer.

Sunlight energy is captured.

The fuel is burnt.

Changes happen in a nucleus.

The nucleus produces light.

[1]

- (b) Some people think that problems with nuclear reactors make them unsafe to use.

- (i) One of the problems with nuclear reactors is that they produce radioactive waste.

Complete the following sentences about radioactive waste.

Use words from the list.

active
half-life
protons
radiation
safe
water
useful

Radioactive waste emits ionising

Over time radioactive waste becomes less

One thing that affects how long it takes radioactive waste to become safe is

.....

[3]

(ii) Solid radioactive waste can be high level, intermediate level or low level.

Draw a straight line from each **type of solid radioactive waste** to its **method of disposal**.

type of solid radioactive waste	method of disposal
high level	bury in sealed containers in deep mines
intermediate level	store in sealed containers in deep water tanks in a protected site
low level	wash down the sink
	bury in landfill sites in sealed containers

[3]

(c) Suggest another hazard, other than radioactive waste, of the **nuclear reactor** in the mini-submarine.

Describe how the risk might be reduced.

Your answer should include

- the source of the risk
- a description of the risk
- how the risk could be reduced.

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..... [3]

[Total: 10]

2 Some medical research was carried out on a large sample of people working in different jobs. The research compared how many people in each type of job developed cancer.

type of job	number of people	number of people who developed cancer	percentage of people developing cancer
dental	42 194	746
medical	67 650	1430	2.1
industrial	59 544	997	1.7
nuclear power	21 945	564	2.6

(a) (i) Complete the table by filling in the missing percentage. [1]

(ii) Use the table to suggest which of these types of job has the greatest risk of people developing cancer.

answer [1]

(b) Some people choose to work in jobs with the higher risks of cancer.

Explain why.

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..... [2]

[Total: 4]

3 This diagram of the electromagnetic spectrum shows the types of electromagnetic radiation.

The diagram has some mistakes.

gamma rays	microwaves	infrared	sound	visible light	ultraviolet	X-rays	radio waves
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(a) (i) Which one of these should not be in the diagram, because it is not a type of electromagnetic radiation?

answer [1]

(ii) Ultraviolet and visible light are in the correct places.

Which **two** types of radiation are in the wrong places in the diagram?

answer and [1]

(iii) Write down one type of electromagnetic radiation which is ionising.

answer [1]

(iv) Which type of radiation has photons with the most energy?

answer [1]

(b) How can electromagnetic radiation damage living cells?

Put ticks (✓) in the boxes next to the **two** correct answers.

heat the cells up

provide energy for photosynthesis

poison the cells

make ions in the cells

split the cells open

[2]

[Total: 6]

4 Carbon dioxide is one of the causes of global warming.

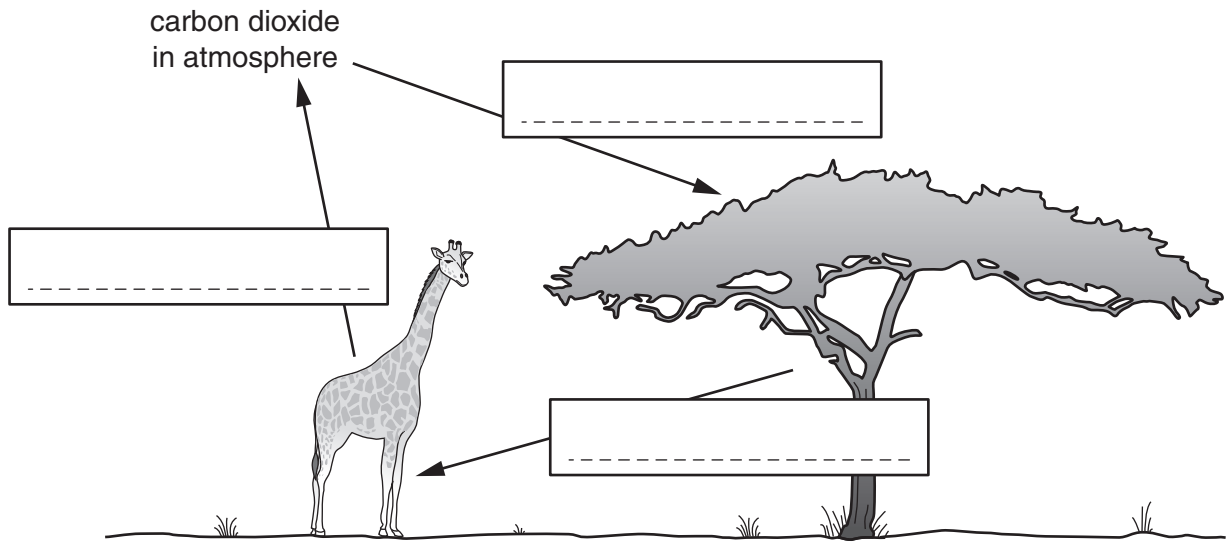
(a) The diagram shows a part of the carbon cycle.

The arrows show processes in the carbon cycle.

Complete the labels for the three processes.

Use words from the list.

- burning decomposing feeding photosynthesis respiration**



[3]

(b) Which one of the following would **not** be caused by global warming?

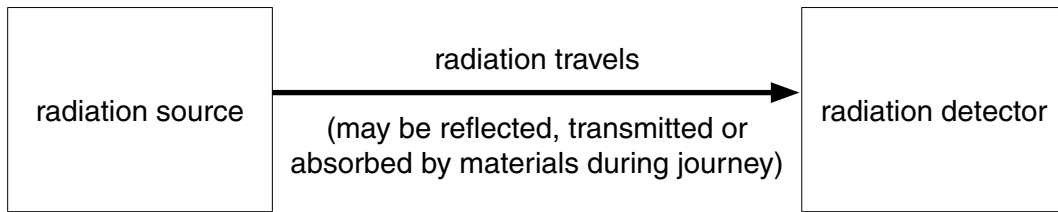
Put a tick (✓) in the box next to the correct answer.

- climate change
- icecaps melting
- rising sea levels
- skin cancer

[1]

[Total: 4]

5 A general model for electromagnetic radiation is shown in the diagram.



Use the model to explain how people can see this exam paper.

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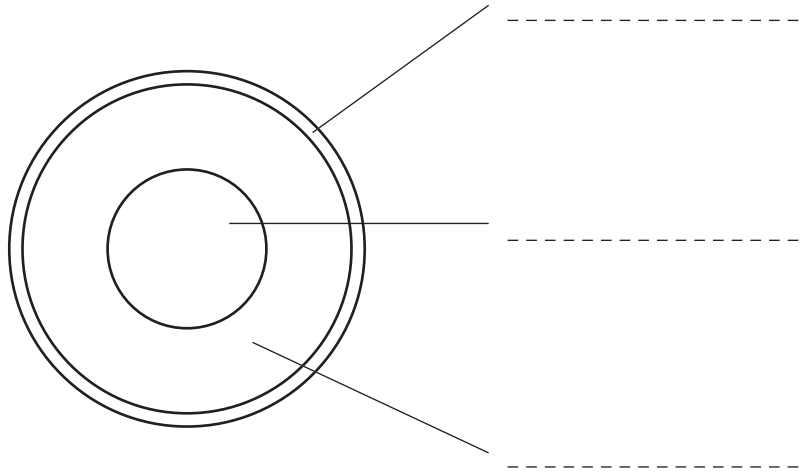
..... [4]

[Total: 4]

6 Complete the labels on the diagram of the Earth.

Use words from the list.

core crust mantle nucleus tectonic



[3]

[Total: 3]

7 (a) Here are some comments about stars.

Draw a line to connect the **one** correct **statement** to its correct **explanation**.

statement	explanation
All stars are equally bright.	Space is empty.
All stars look younger than they are.	Stars look very small.
All stars orbit the Sun.	Light travels at 300 000 km/s.

[2]

(b) It is sometimes very difficult to make accurate measurements.

Which of the following are the most difficult to measure?

Put ticks (✓) in the boxes next to the **two** best answers.

age of the Universe	<input type="checkbox"/>
diameter of the Earth	<input type="checkbox"/>
distances to far galaxies	<input type="checkbox"/>
distance to the Moon	<input type="checkbox"/>
time for the Earth to orbit the Sun	<input type="checkbox"/>

[2]

- (c) Recent research has suggested that many people are confused about **stars, galaxies** and **the Universe**.

Briefly explain what each of these three things are.

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..... [3]

[Total: 7]

8 (a) Where do most earthquakes, volcanoes and mountain building take place?

Put a tick (✓) in the box next to the **best** answer.

on the seafloor

at the edge of tectonic plates

on the continents

around the poles

[1]

(b) Which of the following is the best explanation of why seafloor spreading happens?

Put a tick (✓) in the box next to the correct answer.

Matching fossils are found on different continents.

The Earth's mantle moves.

The shapes of continents fit together.

The oldest rocks are about 4000 million years old.

[1]

(c) Changes in the Earth can cause major disasters.

Suggest something a government could do to reduce the damage or harm from an earthquake.

Your answer should include

- the government action
- an explanation of how it will reduce the damage or harm.

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..... [2]

[Total: 4]

END OF QUESTION PAPER

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