

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

**A331/02**

Unit 1: Modules P1 P2 P3 (Higher Tier)

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)

**Friday 24 June 2011  
Afternoon**

**Duration: 40 minutes**



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**MODIFIED LANGUAGE**

**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 Read this news report.

**Youths warned over radiation risk**

Teenagers have been putting themselves in danger. They broke into a recently closed cancer treatment hospital which still contains radioactive material.

What are the risks from the radioactive materials and what factors affect these risks?

Your answer should include

- effects of the radiation
- factors that affect the risks.

.....

.....

.....

.....

.....

.....

..... [4]

**[Total: 4]**

2 Here is information about some atoms.

atom	number of protons	number of neutrons	number of electrons
<b>A</b>	6	6	6
<b>B</b>	92	143	92
<b>C</b>	38	52	38
<b>D</b>	6	6	5
<b>E</b>	52	78	52
<b>F</b>	92	146	92

(a) Which two atoms are different isotopes of the same element?

atoms ..... and ..... [1]

(b) Which atom has formed an ion by losing an electron?

atom ..... [1]

(c) Uranium-235 has a total of 235 protons and neutrons in its nucleus.  
Which two atoms are likely products of the fission of uranium-235 in a nuclear reactor?

atoms ..... and ..... [1]

(d) An alpha particle is made up of 2 protons and 2 neutrons.  
When xenon-134 emits an alpha particle, which atom is produced?

atom ..... [1]

**[Total: 4]**

3 (a) Describe how fission in a nuclear reactor is controlled.

You should include in your answer the terms

- chain reaction
- fuel rod
- control rod
- coolant.

.....

.....

.....

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.....

.....

.....

.....

..... [3]

(b) The radioactive isotope of uranium used in a nuclear reactor has a half-life of about 700 million years.

How long will it take for the activity of the isotope of uranium to drop to an eighth of its activity?

time = ..... years [1]

(c) Put **alpha**, **beta** and **gamma** radiation in order of penetrating power.

most penetrating 

--	--	--

 least penetrating [1]

[Total: 5]

- 4 (a) Most scientists think carbon dioxide produced by human activity is the main cause of global warming.

Other people agree that carbon dioxide is produced by human activity but think that global warming has very little to do with human activity.

So both groups can agree that human activity is producing more carbon dioxide and that global warming is happening. But they still disagree overall. Explain how.

You should use the words **correlation** and **cause** in your answer.

.....  
.....  
.....  
..... [2]

- (b) Global warming could have many effects on our planet.

Which effects of global warming are we likely to see in the next ten years?

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

- |                                      |                          |
|--------------------------------------|--------------------------|
| expansion of water in the oceans     | <input type="checkbox"/> |
| volcanoes erupting                   | <input type="checkbox"/> |
| some places getting colder winters   | <input type="checkbox"/> |
| oceans shrinking as water evaporates | <input type="checkbox"/> |
| melting of the icecaps               | <input type="checkbox"/> |

[2]

[Total: 4]

5 Read the news articles.

**Ultraviolet causes skin cancer!**  
 Evidence shows ultraviolet light can cause skin cancers. Ultraviolet is an ionising radiation.

**Boy gets badly burnt by sunbed**  
 A boy was burnt by the ultraviolet radiation used for producing a tan in a sunbed. The boy did not follow the instructions in the unmanned tanning salon.

(a) Ultraviolet radiation can be harmful because it can ionise atoms in cells.

Which other types of **electromagnetic** radiation cause damage to cells by ionisation?

..... and ..... [2]

(b) Ultraviolet radiation is emitted by the Sun.

(i) Explain why the intensity of ultraviolet radiation changes with the distance from the Sun.

You should use ideas about photons in your answer.

.....  
 .....  
 .....  
 .....  
 ..... [3]

(ii) Complete the statements about ultraviolet radiation photons.

Put a **ring** around the correct words.

Ultraviolet radiation photons have **more** / **the same** / **less** energy compared to X-ray photons.

Ultraviolet radiation photons have **more** / **the same** / **less** energy compared to microwave photons. [1]

(iii) Complete the sentences about ultraviolet radiation and the ozone layer.

The ozone layer is found in the .....

Some ultraviolet radiation is ..... by the ozone layer.

The ultraviolet causes ..... chemical changes in the ozone layer.

This protects ..... from ultraviolet radiation. [4]

- (c) In the last few years a number of teenagers have been badly burnt by using unsupervised sunbeds. Ultraviolet radiation, which sunbeds emit, also has long-term risks of vision problems and cancer.

Some newspapers have said that the Government should ban unsupervised sunbeds. The owners say that sunbeds have clear signs warning about the risk of overuse and the teenagers who were burnt knew it was dangerous.

The Government wants to write new regulations for unsupervised sunbeds.

Suggest **two** factors the Government should consider before writing the new regulations.

.....

.....

.....

..... [2]

[Total: 12]

6 There are many different types of object in the solar system.

Use a straight line to connect each **object in the solar system** to its correct **description**.

**object in the solar system**

**description**

asteroids

can be large or small, but always orbit planets

comets

are usually made of rocks and ice, spend most of their time outside the orbit of Neptune, some visit the inner solar system

moons

are large and orbit the Sun

planets

are very large and produce their own light

are usually made of rock, most of them are found between the orbits of Mars and Jupiter

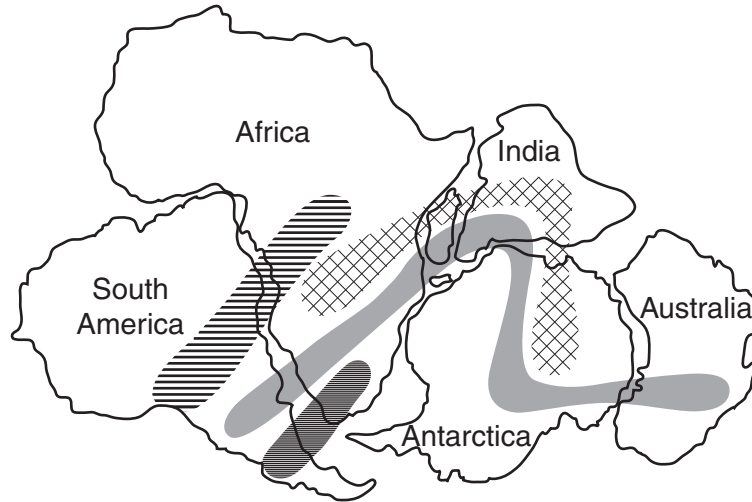
[4]

[Total: 4]



7 Alfred Wegener proposed the idea that the continents drift on the Earth's surface.

(a) The map shows how Wegener thought the continents were arranged in the past.



The map shows how Wegener presented some of his evidence for continental drift.

(i) The labels for the shaded areas have been left off.

What types of thing might the shaded areas be?

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

- different times in the past
- types of plant and animal fossils
- where modern day rivers are
- mountain chains
- human settlements
- rock types

[2]

(ii) What other piece of evidence, shown on the map, supports Wegener's theory?

..... [1]

(b) When Wegener first presented his evidence geologists rejected it.

They did not agree with the theory of continental drift.

Why were Wegener's ideas rejected?

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

Wegener could not explain how mountains formed.

Wegener could not measure the movement of the continents.

Wegener had no evidence of land bridges between continents.

Wegener's idea was too big from limited evidence.

Wegener's explanation of magnetic patterns on the sea floor was wrong.

Wegener was not a geologist.

[2]

[Total: 5]

8 Our understanding of the Universe has grown a lot in the last 100 years.

Complete the following sentences about the Universe.

Everything we know about the Universe outside our solar system comes from

..... detected by telescopes.

Edwin Hubble showed there is a correlation between the .....

and the ..... of galaxies.

This is evidence that the Universe is .....

We think the Universe began with the big bang approximately 14 .....  
years ago.

[4]

[Total: 4]

**END OF QUESTION PAPER**

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