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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

A331/02

**TWENTY FIRST CENTURY SCIENCE
PHYSICS A**

Unit 1: Modules P1 P2 P3 (Higher Tier)

FRIDAY 24 JUNE 2011: Afternoon

DURATION: 40 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**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)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. 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.**

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.**

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Answer ALL the questions.

1 Read this news report.

YOUTHS WARNED OVER RADIATION RISK

Teenagers have been putting themselves at risk by breaking 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
A	6	6	6
B	92	143	92
C	38	52	38
D	6	6	5
E	52	78	52
F	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.
Which atom will be the product of xenon-134 emitting an alpha particle?**

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.**

[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 factor contributing to 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.

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

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

volcanoes erupting

some places getting colder winters

oceans shrinking as water evaporates

melting of the icecaps

[2]

[Total: 4]

5 Read the news articles.

ULTRAVIOLET CAUSES SKIN CANCER!

Evidence shows ultraviolet light can lead to 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 ignored 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 point out that sunbeds have clear signs warning about the risk of overuse and the teenagers who were burnt knew it was hazardous.

The Government wants to write new regulations for unsupervised sunbeds.

Suggest TWO factors the Government should take into account 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]

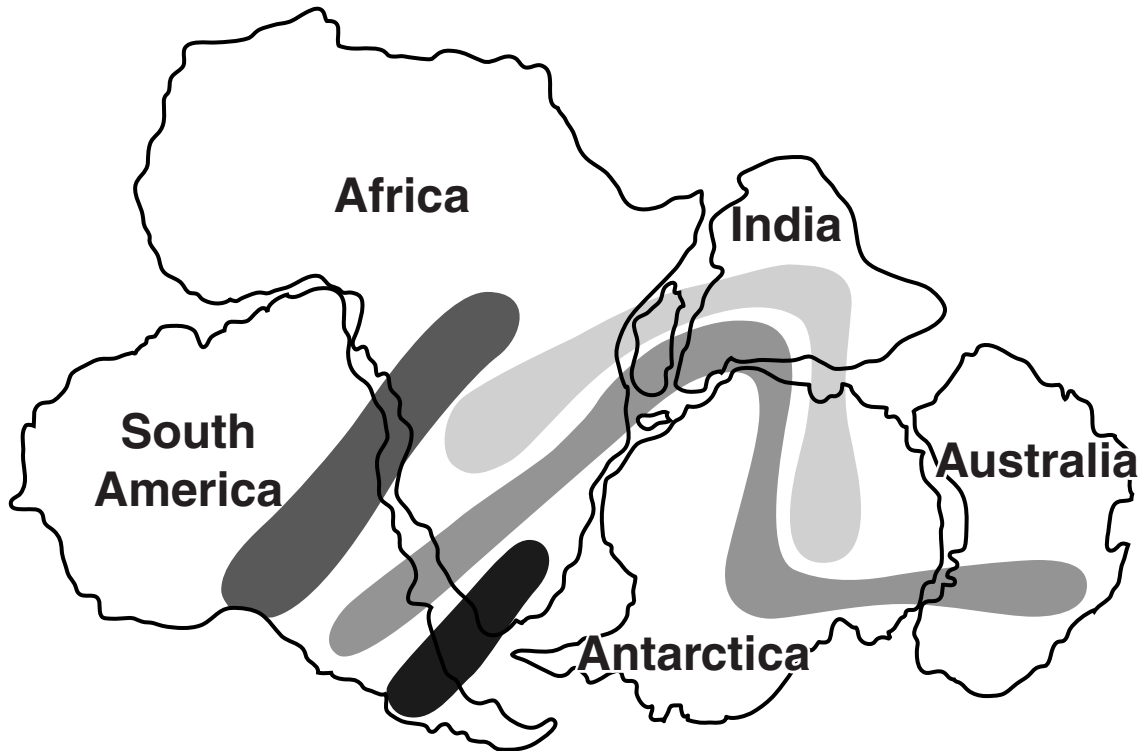
[Total: 4]

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TURN OVER FOR QUESTION 7.

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 it was rejected by geologists.

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 immensely 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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