

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

A331/01

Unit 1: Modules P1 P2 P3
(Foundation Tier)

**Monday 22 June 2009
Morning**

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 clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

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 John's class is discussing how the Earth was formed. They are using rocks as evidence to support their ideas.

(a) Some rocks found on Earth are 4000 million years old.

How old must the Earth be?

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

older than 4000 million years

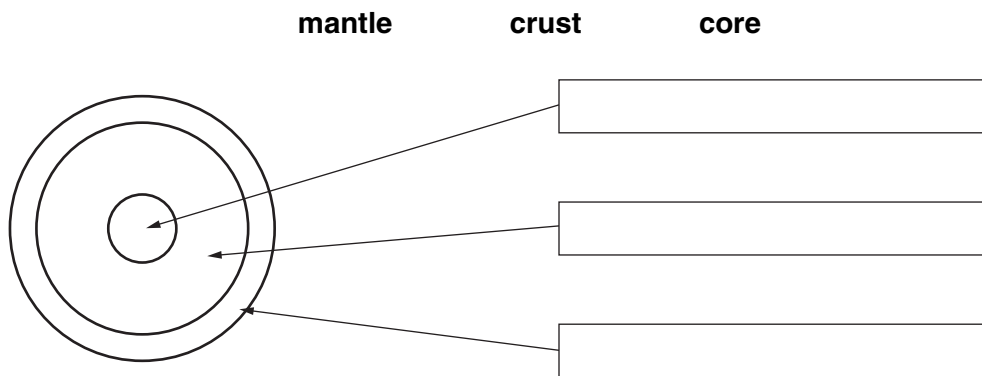
4000 million years old

younger than 4000 million years

[1]

(b) The Earth is made up of three main layers.

Label the diagram. Choose words from this list.



(c) The teacher explains that we live in a solar system, made up from the Sun, planets and other bodies such as moons and asteroids.

Put the objects in order of size, from largest to smallest.

Fill in the boxes to show the right order.

- A** the Moon
- B** the Sun
- C** planets
- D** asteroids

largest smallest

[2]

(d) The teacher says the Sun is a star because of the way it generates its energy.

Put **one** tick (✓) in the correct box to complete the sentence.

All stars generate their energy by ...

... the fusion of hydrogen.

... the burning of hydrogen.

... the fusion of coal.

... the burning of coal.

[1]

(e) During the discussion, the teacher makes statements about what the Sun is made of.

Some statements only contain data and some contain an explanation of the data.

Put a **D** in the boxes next to the statements that only contain **data**.

Put an **E** in the boxes next to the statements that are **explanations**.

The Sun is 98% hydrogen and helium.

The nuclear reactions in the Sun are only making helium.

The Sun contains elements which could only have been made in earlier stars.

2% of the Sun is made from elements heavier than helium.

[3]

[Total: 9]

2 This question is about stars.

(a) How do scientists know so much about very distant stars?

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

They have sent probes to these stars.

They have visited these stars.

They have studied the radiation from these stars.

All of the three statements above are correct.

[1]

(b) The Universe contains galaxies. Each galaxy contains stars.

(i) How many galaxies are there in the Universe?

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

hundreds

thousands

millions

thousands of millions

[1]

(ii) How many stars are there in one galaxy?

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

hundreds

thousands

millions

thousands of millions

[1]

(c) The Sun is a star in one of these galaxies.

What is the name of the galaxy that contains the Sun?

answer [1]

[Total: 4]

3 Visible light is part of a family of radiations.

(a) What is this family called?

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

nuclear radiation **electromagnetic spectrum** **hazardous radiation** [1]

(b) This family is made up of different types of radiation.

(i) Which type of radiation carries the **least** energy in one of its photons?

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

gamma **infrared** **microwaves** **radio waves** **ultraviolet** [1]

(ii) Write down **two** types of ionising radiation from the list above.

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

(c) X-rays are another type of ionising radiation.

Ionising radiation can damage living cells.

X-rays are used to take photographs of broken bones in hospitals.

Which of these statements would reduce the risk to **the patient**?

Put a tick (✓) in the boxes next to the **two** correct statements.

Patients are recommended only to have a certain number of X-ray images taken each year.

X-ray machines are only used in large hospitals.

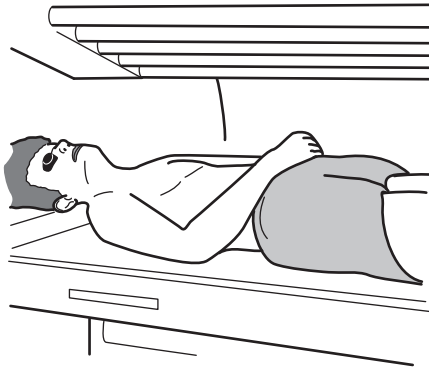
Usually only small areas of the body are exposed to X-rays.

Patients must not leave the hospital for 2 hours after having an X-ray.

[2]

[Total: 6]

- 4 In 2007 there was a proposed new law to stop young people from using sunbeds.



Should you use a sunbed?

Exposure to sunlight gives an increase in vitamin D in the skin. But the World Health Organization says young people who get sunburn have a greater risk of skin cancer than adults.

Research has made a direct link between the use of sunbeds and cancer. There are 132 000 cases of one type of skin cancer globally each year and 66 000 people die from it worldwide.

In the UK, there are around 9500 cases of this skin cancer diagnosed each year and around 1800 deaths.

A rise in the use of sunbeds with high-powered lamps, due to the fashion for a tan, is the main reason for the increase in skin cancers.

- (a) From the information in the article, the percentage of people **in the UK** with this skin cancer who die from it can be calculated.

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

$$\frac{132\,000}{66\,000} \times 100$$

$$\frac{9500}{1800} \times 100$$

$$\frac{66\,000}{132\,000} \times 100$$

$$\frac{1800}{9500} \times 100$$

[1]

(b) The article mentions high-power lamps.

Finish the sentences by choosing the **best** words from this list.

- distance**
- energy**
- number**
- photon**
- second**

Each word may be used only once.

The intensity of the ultraviolet light hitting the skin, is the energy arriving
each

The intensity decreases as the from the source increases.

Two factors about photons that affect the energy arriving at the skin are the
..... and of photons. [4]

(c) What are some of the benefits of sunbathing?

Put a **ring** around the **two** correct answers.

decreases the risk of skin cancer

gives you a tan

helps to generate vitamin D

reduces fat

sunburn [2]

[Total: 7]

5 Paul is researching nuclear radiation.

(a) He finds there are three types of ionising radiation, each with different penetration properties.

Finish the sentences by choosing the **best** words from this list.

alpha beta gamma

The **most** penetrating ionising radiation is

The **least** penetrating ionising radiation is

[2]

(b) Put ticks (✓) in the correct boxes to show which materials stop each kind of radiation.

Each row may have one, two or three ticks.

radiations	materials		
	paper	aluminium	lead
most penetrating			
least penetrating			

[2]

(c) Paul also found information about the half-life of a radioactive material.

(i) Finish this sentence by putting a tick (✓) in the box next to the correct ending.

Half-life is ...

... half the time it takes for the material to stop being radioactive.

... the time it takes for the activity of the material to fall by a half.

... the time it takes for the material to become safe.

... half the amount of the radioactive material.

[1]

(ii) Which of the following will change the half-life of a radioactive material?

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

heating up the material

passing electricity through the material

chemically reacting the material with oxygen

none of the above

[1]

(d) Paul finds three definitions of 'radioactive'.

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

dangerous rays that come from your radio

elements that emit ionising radiation

elements that glow in the dark

[1]

(e) He also finds that some radioactive elements are used to help people.

Put a (ring) around the **two** helpful uses of radioactive elements.

treat cancer

bleach hair

in solar cells

sterilise food

to make LED lights work

to detect forged bank notes

[2]

[Total: 9]

6 This question is about different ways of generating electricity.

(a) Some ways of generating electricity use renewable sources.

Put a **ring** around each of the **two** renewable sources.

coal

natural gas

oil

wave

wind

[2]

(b) Some power stations use carbon-based fuels to generate electricity.

Which gas produced by these power stations contributes to global warming?

answer [1]

(c) Some people suggest that nuclear power is the best way to generate more electricity in the UK.

There are arguments **for** and **against** the use of nuclear power stations to generate electricity.

Put a tick (✓) in the correct box for each statement.

	for nuclear power	against nuclear power	neither for nor against
Nuclear power stations are very expensive to build and run.			
Nuclear power stations use concrete that does not need painting.			
Nuclear power stations produce very few polluting gases.			
Nuclear power stations produce nuclear waste which is hazardous.			

[4]

[Total: 7]

END OF QUESTION PAPER

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