

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**A331/01**

**TWENTY FIRST CENTURY SCIENCE**

**PHYSICS A**

**UNIT 1: Modules P1 P2 P3  
(Foundation Tier)**

**MONDAY 22 JUNE 2009: Morning**

**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 clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **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.**
- **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.**

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**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 below.**

**older than 4000 million years**

**4000 million years old**

**younger than 4000 million years**

**[1]**

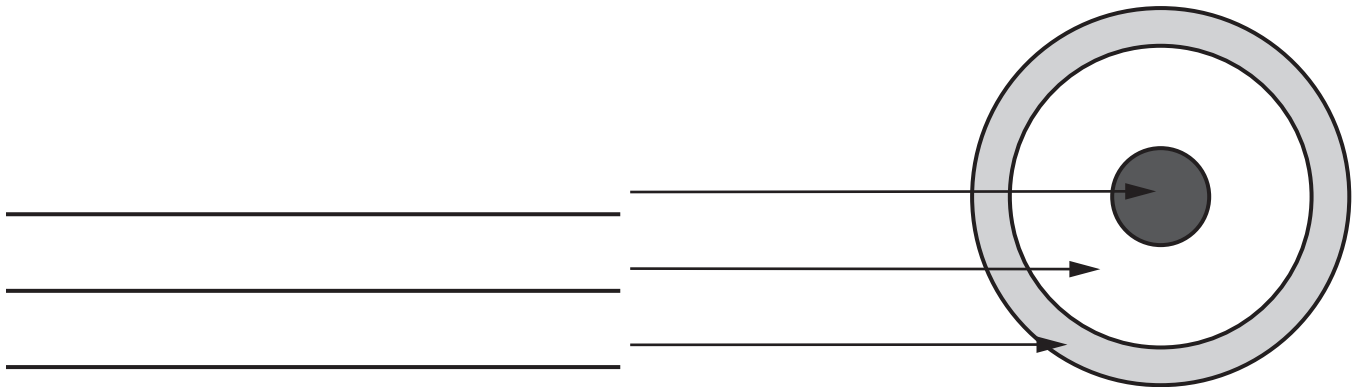
(b) The Earth is made up of three main layers.

Label the diagram below. Choose words from the list below.

MANTLE

CRUST

CORE



[2]

(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.

Look at the list below.

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

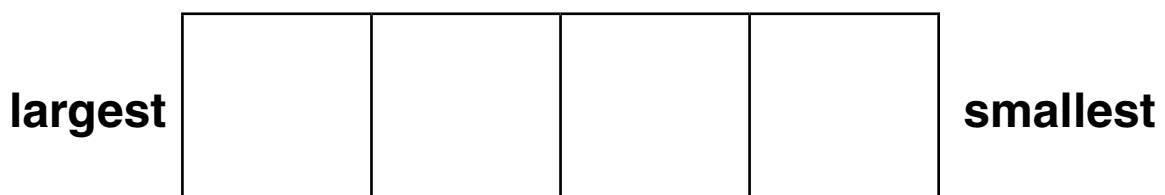
A the Moon

B the Sun

C planets

D asteroids

Fill in the boxes to show the right order.



[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 below.**

**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.**

**Look at the statements opposite.**

**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 below.**

**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 in the list below.

**HUNDREDS**

**THOUSANDS**

**MILLIONS**

**THOUSANDS OF MILLIONS** [1]

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

Put a **ring** around the correct answer in the list below.

**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 in the list below.

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 in the list below.

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 the statements below would reduce the risk to THE PATIENT?**

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

<b>Patients are recommended only to have a certain number of X-ray images taken each year.</b>	
<b>X-ray machines are only used in large hospitals.</b>	
<b>Usually only small areas of the body are exposed to X-rays.</b>	
<b>Patients must not leave the hospital for 2 hours after having an X-ray.</b>	

**[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 below.

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

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

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

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

[1]

**(b) The article mentions high-power lamps.**

**Finish the following sentences by choosing the BEST words from this list below.**

**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 in the list below.

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 following sentences by choosing the BEST words from the list below.

ALPHA

BETA

GAMMA

The MOST penetrating ionising radiation is

\_\_\_\_\_ .

The LEAST penetrating ionising radiation is

\_\_\_\_\_ .

[2]

**(b) Look at the table below.**

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

**Each row may have one, two or three ticks.**

<b><u>RADIATIONS</u></b>	<b><u>MATERIALS</u></b>		
	<b><u>PAPER</u></b>	<b><u>ALUMINIUM</u></b>	<b><u>LEAD</u></b>
<b>most penetrating</b>			
<b>least penetrating</b>			

**[2]**

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

**(i) Finish the sentence below 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 in the list below 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’.**

**The definitions are listed below.**

**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.

Look at the list below.

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.**

**Look at the list below.**

**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.

	<u>FOR</u> <u>NUCLEAR</u> <u>POWER</u>	<u>AGAINST</u> <u>NUCLEAR</u> <u>POWER</u>	<u>NEITHER</u> <u>FOR NOR</u> <u>AGAINST</u>
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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