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| 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**

Unit 1: Modules P1 P2 P3 (Foundation Tier)

WEDNESDAY 26 JANUARY 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

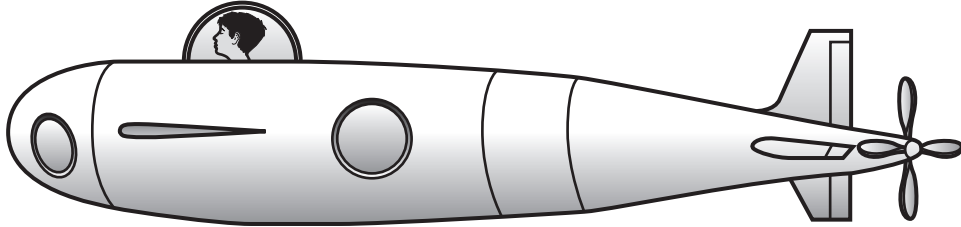
- **The number of marks is given in brackets [] at the end of each question or part question.**
- **The total number of marks for this paper is 42.**

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QUESTION 1 STARTS ON PAGE 4

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.

Fill in the gaps in the following sentences using words from the list below.

**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.**

[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.

[2]

[Total: 4]

3 The diagram, opposite, of the electromagnetic spectrum shows the types of electromagnetic radiation.

The diagram has some mistakes.

(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]

| | | | | | | | |
|-----------------------|-------------------|-----------------|--------------|--------------------------|--------------------|---------------|------------------------|
| gamma rays | microwaves | infrared | sound | visible light | ultraviolet | X-rays | radio waves |
|-----------------------|-------------------|-----------------|--------------|--------------------------|--------------------|---------------|------------------------|

(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]

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QUESTION 4 STARTS ON PAGE 14

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

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

The arrows show processes in the carbon cycle.

Complete the labels A–C for the three processes.

Use words from the list.

BURNING

DECOMPOSING

FEEDING

PHOTOSYNTHESIS

RESPIRATION

(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]

carbon dioxide
in atmosphere

A _____

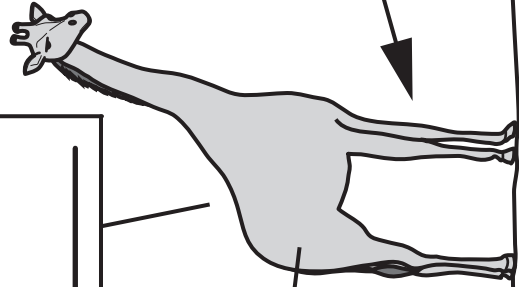
tree



C _____

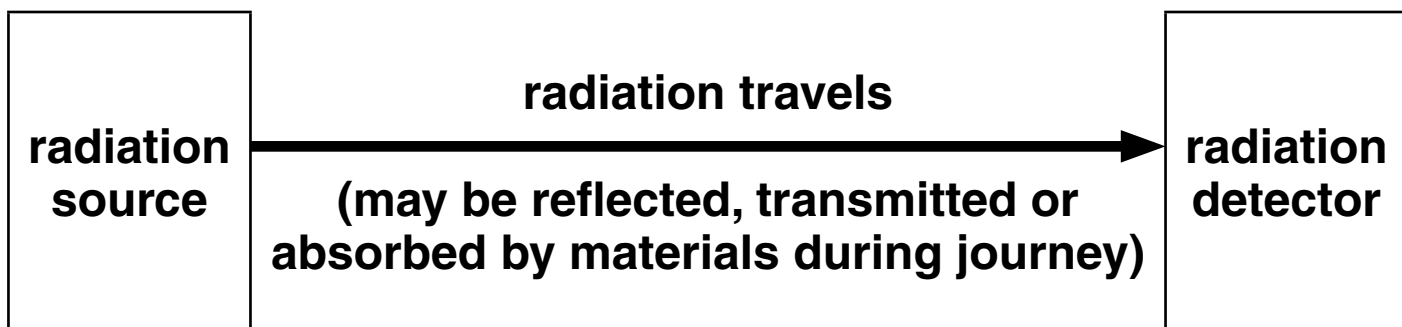
B _____

giraffe



[3]

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



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

[4]

[Total: 4]

6 Complete the labels A–C on the diagram of the Earth.

Use words from the list.

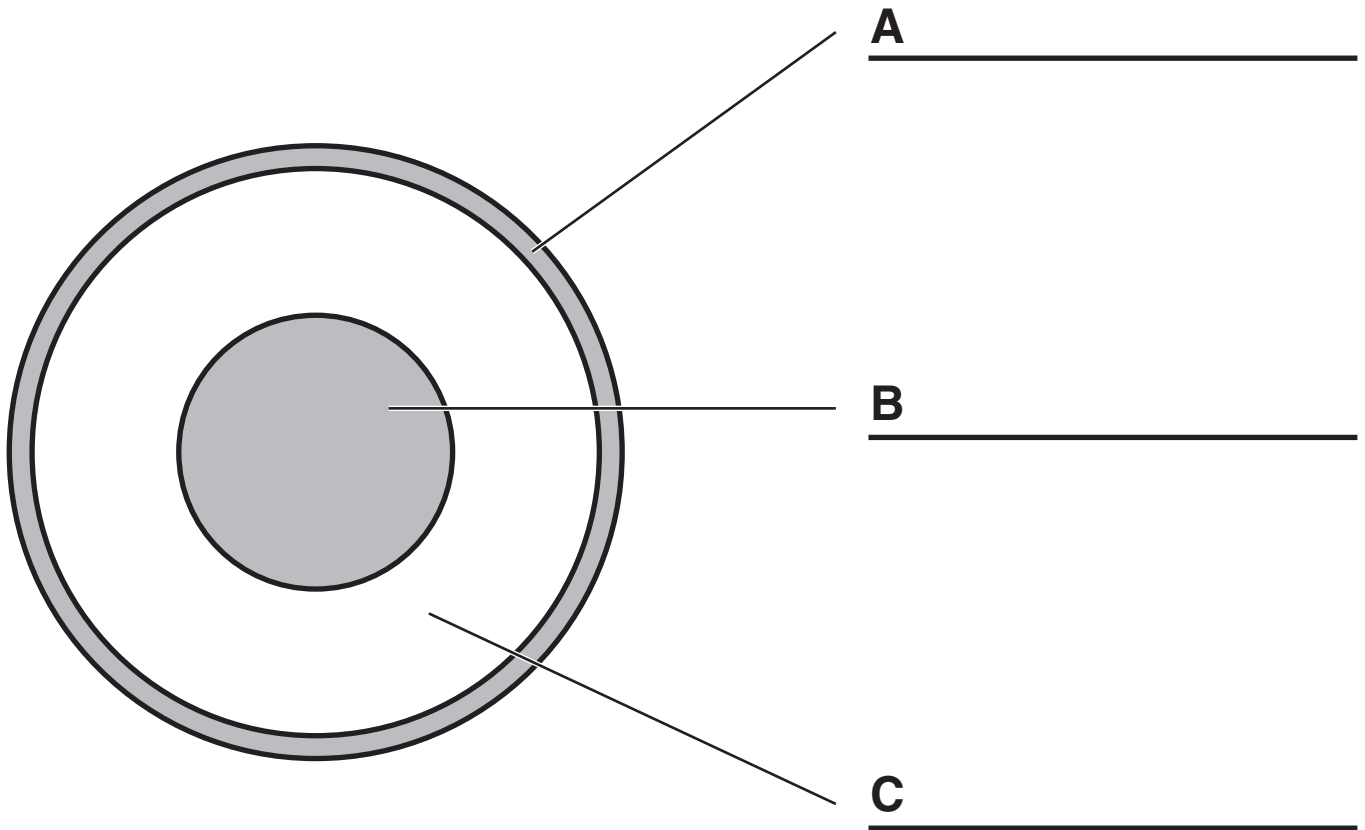
CORE

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

diameter of the Earth

distances to far galaxies

distance to the Moon

time for the Earth to orbit the Sun

[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.

[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.**

[2]

[Total: 4]

END OF QUESTION PAPER

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