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Monday 30 January 2012 – Afternoon

**GCSE TWENTY FIRST CENTURY SCIENCE
PHYSICS A**

A331/01 Unit 1: Modules P1 P2 P3 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

Duration: 40 minutes

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, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- 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 This question is about the different energy sources used to generate electricity.

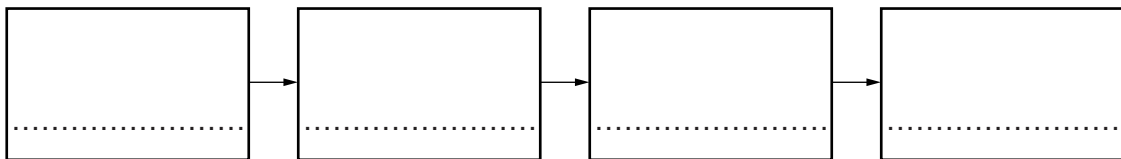
The picture shows a coal-burning power station.



(a) (i) Complete the block diagram for a coal-burning power station.

Use words from this list.

- furnace generator reactor solar panel transformer turbine



[3]

(ii) The coal used in a power station is a non-renewable energy source.

Which two of the following are **renewable** energy sources?

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

- gas
- hydroelectric
- nuclear
- solar
- oil

[2]

(iii) What is the main waste gas produced by a coal-burning power station?

..... [1]

(b) Nuclear power stations produce nuclear waste.

There are three types of nuclear waste. These are high level, intermediate level and low level. The level depends on the activity of the waste.

Draw straight lines between each **type of waste** and the **method of disposal**.

type of waste	method of disposal
high level	buried in landfill sites
intermediate level	mixed with concrete and stored in large containers
low level	stored carefully under water in a secure site

[2]

(c) Radioactive materials are produced for use in hospitals.

(i) Which statement about the use of radioactive materials in hospitals is correct?

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

- Cancer can **not** be treated using radioactive materials because they damage living cells.
- Only doctors have anything to do with radioactive sources.
- Radiation is used to contaminate food.
- Radiation is used to sterilise surgical instruments.

[1]

(ii) Complete the sentence about why radioactive sources in hospitals have to be replaced after a short time.

Use words from this list.

background half-life ionising radioactivity risk time

Radioactive sources in hospitals must be replaced often because they have a short and their activity soon drops to the radiation level.

[2]

[Total: 11]

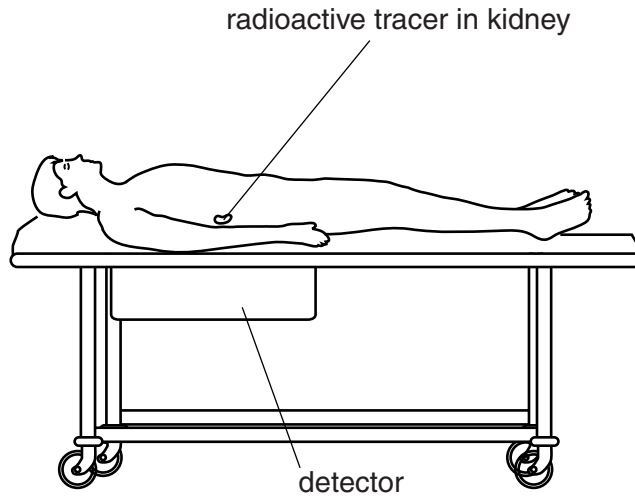
Turn over

2 A radioactive tracer can be used to test how well a patient's kidneys are working.

The tracer is a chemical which contains radioactive atoms.

The tracer is injected into the patient.

The radioactive tracer emits ionising radiation which is detected outside the body.



The best type of ionising radiation to use is gamma radiation.

Explain why gamma radiation is better to use than alpha or beta radiation.

.....

.....

.....

.....

.....

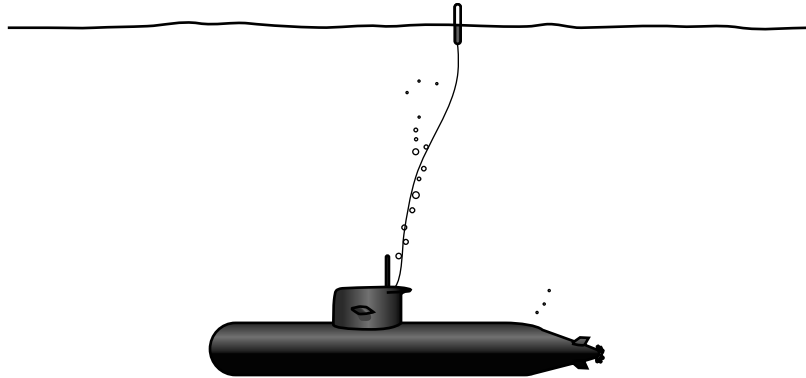
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..... [4]

[Total: 4]

- 3 (a) Submarines cannot use radio waves to communicate if they are underwater.

They must come to the surface or use a floating aerial.



- (i) The submarine sends a message to a distant receiver.

Complete the sentences below to describe how a message is sent by radio waves.

Use words from this list.

Each word may be used **once** only.

absorbs

emits

improves

reflects

transmits

The floating aerial the radio waves.

The air the radio waves.

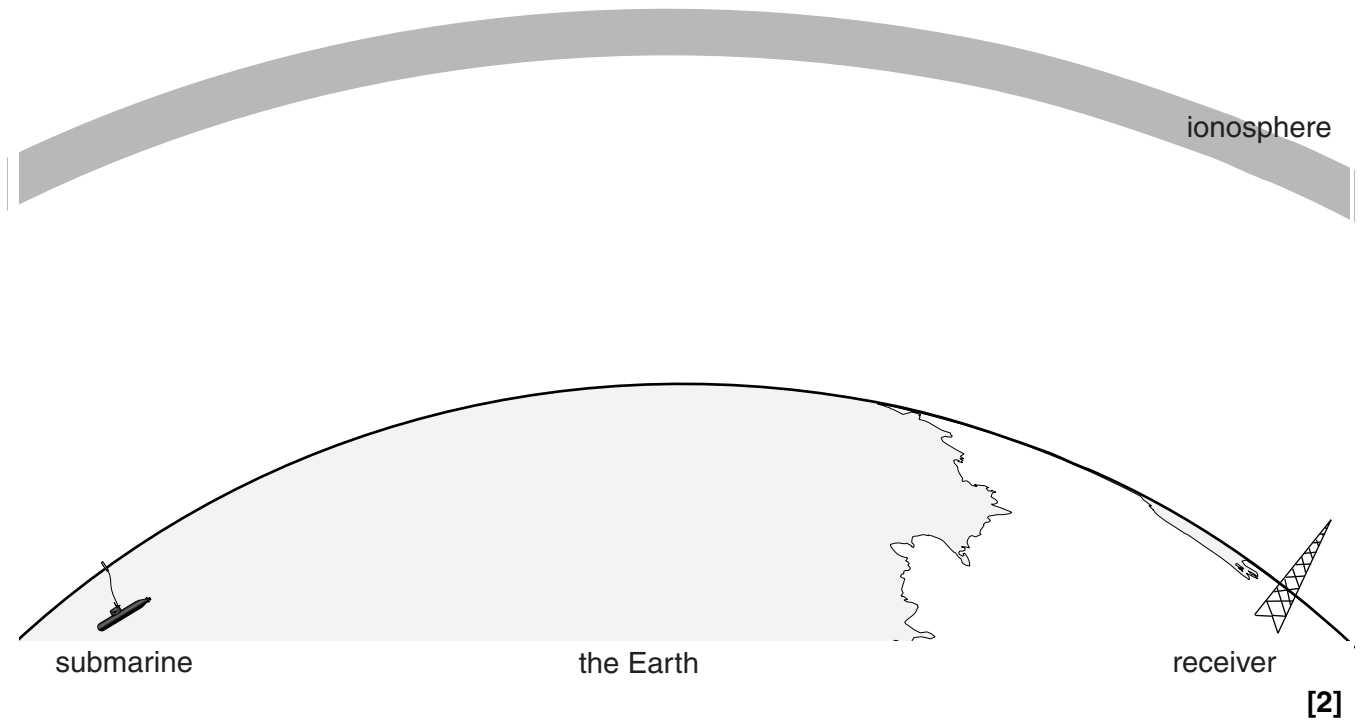
The receiver the radio waves.

[3]

- (ii) The radio waves reflect off the ionosphere.

The ionosphere is a layer in the Earth's atmosphere.

Draw on the diagram the path of a radio wave showing how it can go from the submarine to the receiver.



- (b) Other parts of the atmosphere can affect other types of electromagnetic radiation.

- (i) Which type of electromagnetic radiation does the ozone layer absorb?

..... [1]

- (ii) Why is this important to living organisms?

.....
..... [1]

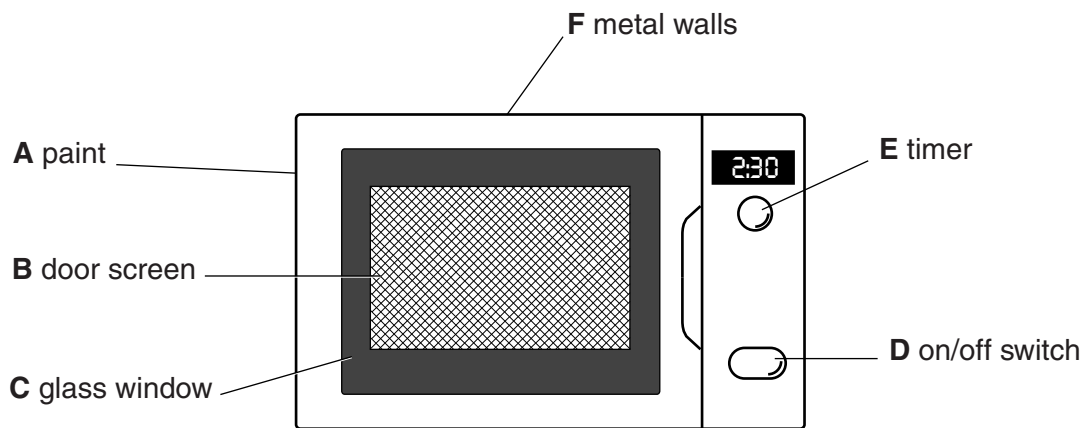
- (c) Infrared radiation from the Earth is absorbed by carbon dioxide in the atmosphere.

What effect does this have on the atmosphere?

.....
..... [1]

[Total: 8]

4 Molly uses a microwave oven.



Which two of the features (A, B, C, D, E or F) prevent Molly from being harmed by the microwaves when the microwave oven is on?

..... and

[2]

[Total: 2]

- 5 (a) John does voluntary work in a local hospital.

He visits patients in the cancer ward.

He has heard that using a mobile phone can cause cancer.

He asks the patients who have cancer if they use a mobile phone.

These are his results.

position of cancer	number of patients	number who use mobile phones
head	6	5
body	15	14
arms or legs	1	1

John thinks his data show that mobile phones do cause cancer.

Is John correct? Explain your answer.

.....

.....

.....

.....

.....

..... [3]

- (b) Mobile phones send signals using microwave radiation.

Mobile phones are unlikely to cause cancer.

All of the following statements are true, but only one explains why mobile phones are **unlikely** to cause cancer.

Put a tick (✓) in the box next to the **best** explanation.

Microwaves are absorbed by water.

Microwaves are not ionising radiation.

Microwaves heat up cells.

Microwaves are electromagnetic radiation.

[1]

[Total: 4]

6 (a) The Sun is at the centre of the Solar System.

(i) How did the Sun form?

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

- from an exploding asteroid
- from a cloud of dust and gas
- from a collision between planets
- from a collision between continents

[1]

(ii) Where does the Sun get the energy to produce all its light?

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

- burning hydrogen
- fusion of hydrogen
- burning coal
- solar energy

[1]

(iii) Apart from the Sun, which of these astronomical objects are found in the Solar System?

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

- comets
- stars
- galaxies
- moons
- universes

[2]

(iv) The Solar System started forming about 5000 million years ago.

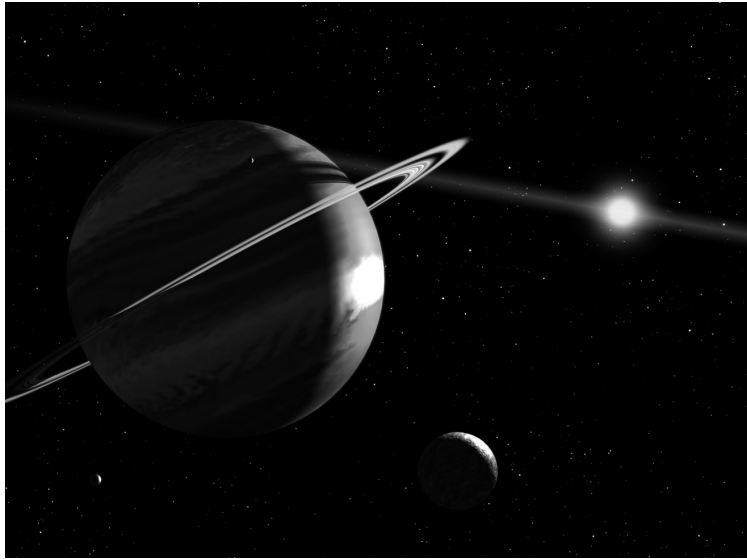
It took about 500 million years to form the planets.

Estimate the age of the Earth.

..... [1]

(b) 12 years ago astronomers discovered a nearby solar system.

The nearby solar system is about 10.5 light years away.



(i) How long would it take for a radio signal to reach the Earth from this nearby solar system?

Put a ring around the correct answer.

300 000 seconds

1.5 years

10.5 years

12 years

[1]

(ii) Which **two** methods could have been used to measure the distance to the nearby solar system?

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

radar

parallax

relative brightness of its star

a laser measurer

send a space probe

[2]

(iii) How many planets outside our Solar System do we **know** have life on them?

..... [1]

[Total: 9]

- 7 In 2010 a conference of scientists looked at all the evidence about the extinction of the dinosaurs. They said that, overall, the evidence supported the theory that an asteroid impact had caused the extinction of the dinosaurs.

(a) Which statement best describes asteroids?

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

They are large and orbit the Sun.

They are usually made of rocks and ice. They spend most of their time outside the orbit of Neptune, but some visit the inner Solar System.

They are usually made of rock and most of them are found between Mars and Jupiter.

They can be large or small, but they always orbit planets.

[1]

(b) The following statements are all **true**.

Which three statements, when taken together, support the idea that an asteroid impact could have led to the extinction of the dinosaurs?

Put ticks (✓) in the boxes next to these **three** statements.

A layer of material found in asteroids is found all over the world in rocks formed about the time the dinosaurs disappeared.

Fossils suggest the dinosaur numbers were decreasing for hundreds of thousands of years.

There are the remains of a very large crater in the Gulf of Mexico.

Fossils of the same type of dinosaur are found on different continents.

A large amount of dust thrown into the atmosphere could have caused the whole world to have a winter that lasted for hundreds of years.

There have been many other extinctions during the history of the world.

[3]

[Total: 4]

END OF QUESTION PAPER

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