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Friday 22 June 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 In 2000 some astronomers announced the discovery of a planet around the star Epsilon Eridani. Variations in the light from the star allowed the astronomers to detect the planet. The light took 10.5 years to reach the Earth.

The planet is about 380 times more massive than the Earth and takes 7 years to complete one orbit around Epsilon Eridani.

- (a) (i) How far away from us is the planet?

..... [2]

- (ii) How could the distance from the Earth to the star Epsilon Eridani have been measured?

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

- using parallax
- sending a spaceship
- comparing its relative brightness
- using the orbit time of the planet
- using a laser

[2]

- (b) Put these distances, **A**, **B**, **C**, **D** and **E**, in the correct order from smallest to largest.

- A** The diameter of the Earth's orbit
- B** The diameter of the Solar System
- C** The diameter of the Earth
- D** The distance from the Earth to Epsilon Eridani
- E** The diameter of the Sun

One has been done for you.

smallest

C				
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 largest

[2]

- (c) In 2010 astronomers discovered a new solar system with a star and at least **three** large planets.

Paul works in a planetarium. His job is to draw a labelled diagram of the new solar system showing the planets' orbits.

He decides that the new solar system must have other things in it that the astronomers cannot detect at such a large distance.

Paul adds some asteroids and comets, with their orbits, to his drawing.

Draw a labelled diagram of the new solar system, including the objects that Paul added to his diagram.

[4]

- (d) The initial report by the astronomers was published in a peer reviewed scientific journal. Why is this important for the acceptance of the astronomers' findings?

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

It allows other astronomers to try and repeat the findings.

The astronomers' friends will be able to see their results.

It increases the accuracy of the astronomers' study.

The findings can be evaluated by other astronomers.

Only astronomers are allowed to write articles for the journal.

[2]

(e) Put ticks (✓) in the boxes next to the **two** correct statements about galaxies.

Distant galaxies are moving away from us.

Galaxies contain a maximum of 100 000 stars.

The distances to galaxies are known very accurately.

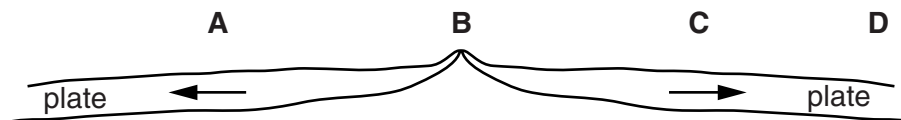
The most distant galaxies move away from the Earth the slowest.

What we know about galaxies comes from the radiation from them.

[2]

[Total: 14]

2 The diagram shows seafloor spreading at the boundary between two tectonic plates. The arrows show the direction the plates are moving.



(a) Where are the youngest rocks, at **A**, **B**, **C** or **D**?

answer [1]

(b) When Wegener presented his theory of continental drift it was not accepted by other scientists. Which statements give reasons for the **rejection**?

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

There was a geometric fit between continents.

The movement of continents could not be detected.

The same type of fossil could be found on different continents.

Mountains are only found in the middle of continents.

There were simpler explanations for the same evidence.

[2]

[Total: 3]

3 This question is about electromagnetic radiation.

Here is a list of some types of radiation.

beta

infrared

microwave

ultraviolet

X-ray

Use the types of radiation from the list to answer the following questions.

You may use each type of radiation once, more than once or not at all.

(a) Which type of radiation is **not** in the electromagnetic spectrum?

..... [1]

(b) Which type of radiation has photons with the lowest energy?

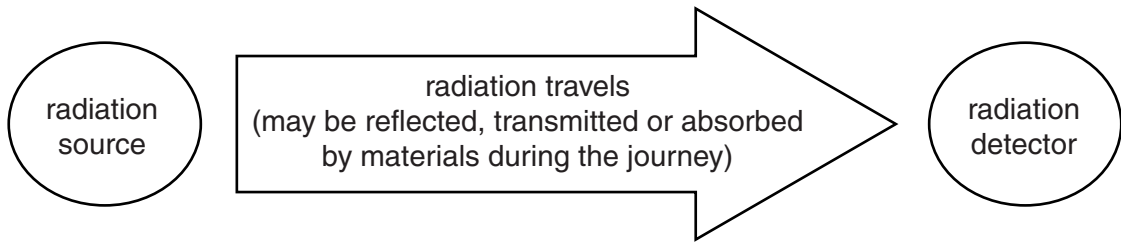
..... [1]

(c) Which type of radiation is absorbed by the ozone layer in the atmosphere?

..... [1]

[Total: 3]

4 The diagram shows a general model for radiation.



Prinul lives in the countryside. It is very dark at night.
He can see the Moon very clearly, even though the Moon does not produce visible light.

Describe how the general model for radiation can explain how Prinul sees the Moon.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 4]

- 5 (a) Sometimes people get confused over what the **greenhouse effect** is.

Which three statements are part of a description of the greenhouse effect?

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

Carbon dioxide absorbs some radiation in the Earth's atmosphere.

The ozone layer is in the Earth's atmosphere.

The atmosphere reflects radiation from the Sun.

The Earth absorbs some radiation and then emits radiation.

The Earth is warmer than it would otherwise be.

The north and south poles are colder than the equator.

Ultraviolet radiation comes from the Moon.

[3]

- (b) What will happen to the Earth's temperature if the energy reaching the Earth from the Sun is greater than the energy being radiated away from the Earth?

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

increase

stay the same

decrease

[1]

- (c) (i) Which of the following would not be **directly** caused by global warming?

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

climate change

rising sea levels

more skin cancer

icecaps melting

[1]

- (ii) During this century global temperatures have increased. The number of people with mobile phones has also increased.

Which word best describes the relationship between global temperatures and the number of people with mobile phones?

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

cause

correlation

evidence

variable

[1]

[Total: 6]

6 (a) Electricity is a very convenient form of energy.

Give two reasons why.

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

It is radioactive.

It is easily transmitted.

It can be used in power stations to make energy sources.

It can be seen clearly.

It can be used by many different devices.

[2]

(b) Why is electricity called a secondary source?

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

It is produced by motors.

It was the second energy source discovered.

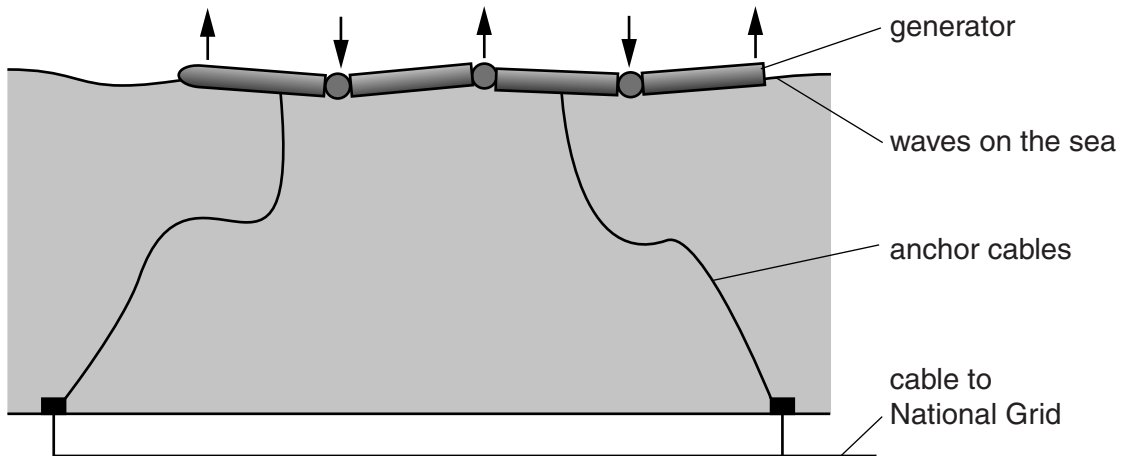
It is used to power secondary schools.

It is produced using another energy source.

[1]

[Total: 3]

7 A type of wave power generator is being tested in the North Sea.



As the waves pass the generator they make it bend. This bending movement is used to produce electricity.

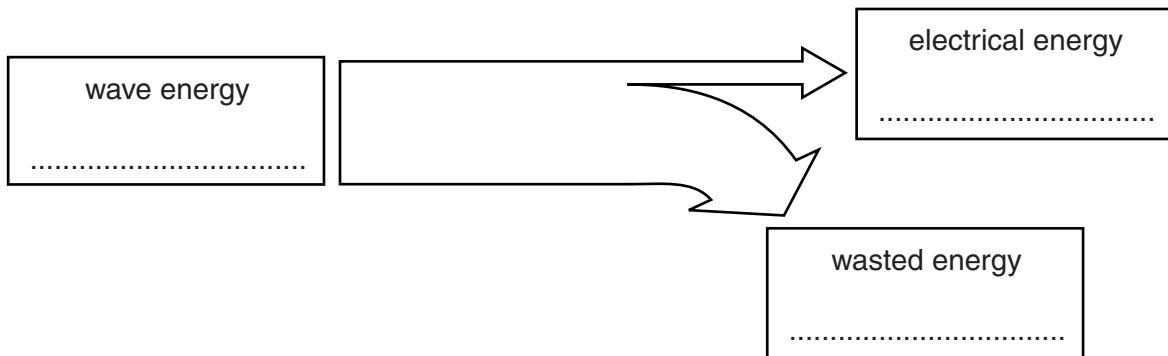
(a) Waves are a **renewable** energy source.

What is meant by renewable energy source?

.....
 [1]

(b) The 150m long wave generator produces 750kJ of electrical energy from a wave energy input of 8250 kJ each second.

Complete the Sankey diagram for the generator.



[2]

10

(c) This use of wave energy has been praised as a **sustainable development**.

What is meant by sustainable development?

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

It can keep being developed.

It can be used without damaging the environment for the future.

It is made from materials that are sustainable.

It will work in the developing world.

[1]

[Total: 4]

8 Nuclear power stations produce electrical energy.

(a) How is the energy produced in a nuclear power station?

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

- by burning the fuel
- by re-using low level radioactive waste
- by changes in the nucleus
- by using electricity

[1]

(b) Radioactive materials are used as fuel in nuclear power stations.

Which of these statements are **true** for atoms of radioactive materials?

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

- They produce ionising radiation.
- Their activity increases over time.
- They produce carbon dioxide.
- They contain electrons, protons and neutrons.
- They all have the same half-life.

[2]

(c) People who work with radioactive materials have a higher risk of exposure to radiation than people with other jobs.

Why do some people choose to do a job with this higher risk?

.....

.....

.....

..... [2]

[Total: 5]

END OF QUESTION PAPER

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