

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

Unit 1 Modules P1 P2 P3 (Foundation Tier)

**MONDAY 21 JANUARY 2008**

Afternoon  
 Time: 40 minutes

Candidates answer on the question paper.

**Additional materials (enclosed):**  
 None

Calculators may be used.

**Additional materials:** Pencil  
 Ruler (cm/mm)



\* C O P / T 4 8 6 9 1 \*

Candidate Forename

Candidate Surname

Centre Number

Candidate Number

**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

**INFORMATION FOR CANDIDATES**

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

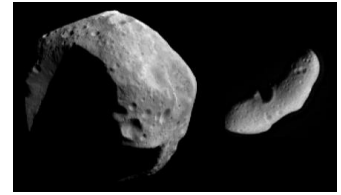
FOR EXAMINER'S USE		
Qu.	Max	Mark
1	4	
2	6	
3	4	
4	7	
5	5	
6	4	
7	6	
8	6	
<b>TOTAL</b>	<b>42</b>	

This document consists of **15** printed pages and **1** blank page.

Answer **all** the questions.

1 The Solar System consists of many different objects.

The Earth, Moon, Sun and asteroids are some of these objects.



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(a) Put the following objects in order of size. Start with the smallest first.

The first one has been done for you.

Earth	Moon	asteroid	Sun
smallest	asteroid		
↓			
↓			
largest			

[2]

(b) Here are some statements about the Earth.

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

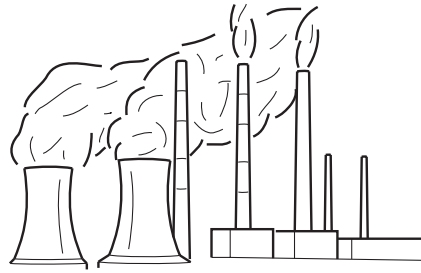
- The Earth is much older than the Sun.
- The Earth is younger than the Universe.
- The Earth orbits the Moon every 28 days.
- The Earth orbits the Sun once a year.
- The Earth is the largest planet in the Solar System.

[2]

[Total: 4]

2 This question is about generating electricity.

You need a primary energy source to generate electricity.



(a) Draw a straight line from each **primary energy source** to its **main waste product**.

primary energy source	main waste product
nuclear fuel	produces little or no waste
fossil fuel	produces radioactive waste
solar	produces carbon dioxide

[2]

(b) Finish the sentences. Choose words from this list.

Each word may be used once, more than once or not at all.

- dangerous                  long                  low                  oil**  
**wind                  primary                  secondary                  top**

Fossil fuels are the most common primary energy source in this country for generating electricity.

This means that electricity is a ..... energy source.

Electricity is convenient because it can be transmitted over ..... distances and used in many ways.

Energy from sources such as solar and ..... are classed as renewable.

Radioactive waste can be classed as either high level, intermediate level or ..... level.

[4]

[Total: 6]

4  
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3 Here is the electromagnetic spectrum.

<b>radio waves</b>	<b>microwaves</b>	<b>infrared</b>	<b>visible light</b>	<b>ultraviolet</b>	<b>X-rays</b>	<b>gamma rays</b>
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(a) What is a photon?

Put a ring around the best answer.

**a parcel of colour**

**a stream of energy**

**a packet of energy**

[1]

(b) Some types of radiation are classed as 'ionising'.

On the diagram below, put a tick (✓) in **each** box that contains an ionising type of radiation.

<b>radio waves</b>	<b>microwaves</b>	<b>infrared</b>	<b>visible light</b>	<b>ultraviolet</b>	<b>X-rays</b>	<b>gamma rays</b>
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[2]

(c) Ionising radiation can damage living cells.

What effect does **non-ionising** radiation have on living cells?

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

It can warm them up.

It can cool them down.

It can make them radioactive.

[1]

[Total: 4]

## No phones for kids?

A mobile phone designed for young children has been withdrawn from sale by the company that makes it.

A study found that people who regularly use a mobile phone for over 10 years are four times more likely to develop cancer of the ear. The study involved 750 people.

A spokesman for the mobile phone company said: 'The decision to withdraw the product is taken because of this new evidence. It suggests that long term exposure to microwave radiation from mobile phones can damage health, especially in very young children.'

'Any risk to our children is unacceptable.'

(a) What type of radiation do mobile phones use to make a call?

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

**radio waves**

**sound waves**

**microwaves**

[1]

(b) The article describes a correlation between using mobile phones and ear cancer.

Which of the following describes this **correlation**?

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

Using a mobile phone causes ear cancer.

Greater use of a mobile phone increases the risk of ear cancer.

Using a mobile phone does not increase the risk of ear cancer.

[1]

(c) A group of students are discussing their views on mobile phones.

**Paul**  
Like all my friends I have a phone. I worry about using it, but I love new gadgets.

**David**  
I decided not to have a mobile phone. I am not prepared to take any chances with my health.

**Roger**  
I only use it in an emergency. It costs too much to use all the time.

**Tom**  
I am always calling my friends. I don't know what I would do without my phone.

**Greg**  
I had my old phone stolen when I was waiting for a bus. Now that's a real risk if you ask me!

(i) The article suggests there is a risk to using a mobile phone.

Which **two** students seem unaware of any risks?

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

(ii) Which **two** students have done things that lead to a lower risk?

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

(iii) How could you **explain** the decision that Paul has made?

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

He is aware of a risk, but it doesn't bother him.

He believes the benefit outweighs the risk.

He is aware of a risk and decides not to go ahead.

He believes that there is more risk than benefit.

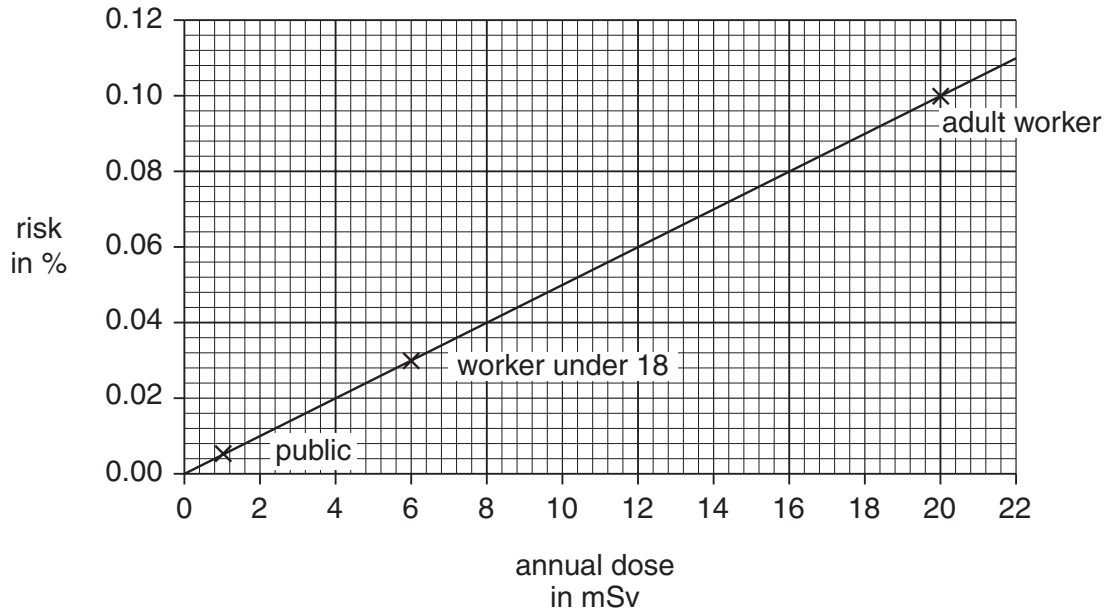
[1]

[Total: 7]

5 Workers in a nuclear power station have their radiation dose carefully monitored.

This chart shows how risk is related to radiation dose.

The **annual dose limits** for different categories of people are marked with a cross.



(a) Use the chart to answer the following questions.

(i) What is the annual dose limit for an adult worker?

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

**1 mSv**      **0.10%**      **6 mSv**      **0.06%**      **20 mSv**      **zero**      [1]

(ii) What dose produces a risk of 0.07%?

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

**10 mSv**      **12 mSv**      **14 mSv**      **16 mSv**      [1]



(b) The annual dose limit for a worker in a nuclear power station is much higher than for a member of the public.

(i) Why might it be acceptable for workers in the power station to receive a higher dose than the public?

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

Members of the public are not exposed to as much radiation.

Nuclear power provides us with energy. This is worth the small risk to the workers.

Workers in a nuclear power station are used to the effects of an increased dose.

[1]

(ii) Why might the workers put themselves at additional risk?

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

They get well paid to work in the power station.

They are provided with protective clothing.

They are trained to deal with emergencies.

[1]

(c) What precautions could be taken to sensibly reduce the **risk to workers** in a nuclear power station?

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

not allowing them to bring any visitors to work

wearing a badge to monitor radiation dose

using shielding to reduce the level of radiation

[1]

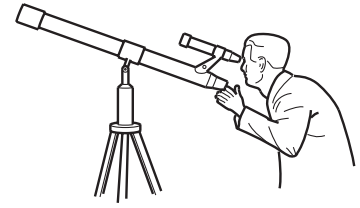
[Total: 5]

Heather takes part in an astronomy club at her school in London.

Heather has a friend called Stella.

Stella takes part in an astronomy club at her school in the Welsh countryside.

Both girls use the same type of telescope to observe the night sky.



- (a) Heather does not see as much detail through the telescope as Stella.

Choose the best explanation for this from the list below.

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

Stella knows more about astronomy than Heather.

Light pollution is interfering with Heather's observations.

It rains more in the Welsh countryside.

Stella's telescope is on top of a hill.

[1]

- (b) Heather's teacher tells her that looking at distant stars is like looking back in time.

What did Heather's teacher mean by this statement?

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

Stars have been around for a long time.

Stars do not ever change their appearance.

It takes time for light to reach us from the stars.

New stars are being formed all the time.

[1]

(c) Heather's teacher then tells her that the star she is looking at is about 4 light-years away.

(i) What is a light-year?

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

the distance that light travels in one year

the time it takes for the Earth to orbit the Sun

the time it takes for light from a star to reach the Earth

[1]

(ii) Heather then moves the telescope to look at a star that is further away.

Complete the sentence below. Choose from this list.

**less**

**more**

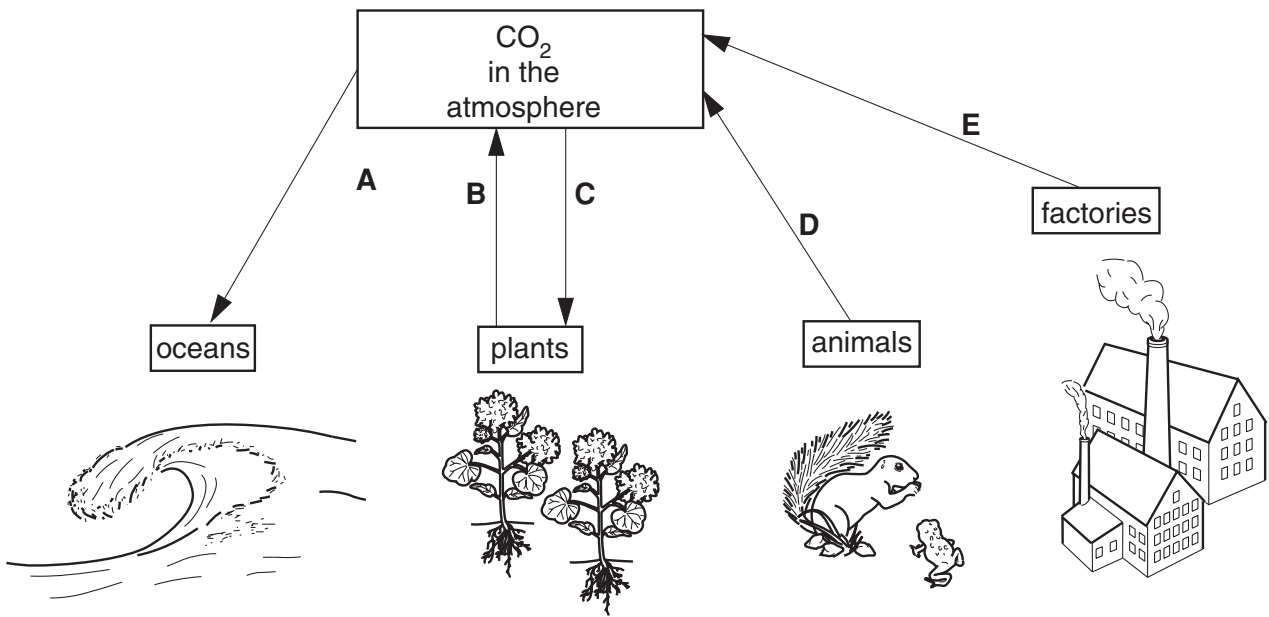
**the same**

Light from the more distant star takes ..... time to reach Heather.

[1]

[Total: 4]

7 This diagram shows part of the Carbon Cycle.



(a) Which process is shown by arrow C?

Put a ring around the correct answer.

**decomposition**

**photosynthesis**

**radiation**

[1]

(b) Which **two** arrows, **A**, **B**, **C**, **D** or **E**, show respiration?

answer ..... and ..... [1]

(c) Which arrow, **A**, **B**, **C**, **D** or **E**, shows combustion?

answer ..... [1]

(d) There is concern over changes to the amount of carbon dioxide in the atmosphere.

(i) Before 1800 the amount of carbon dioxide was steady for thousands of years.

Which of the following statements explains why it was steady?

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

The carbon dioxide going into the atmosphere was taken out again by plants and the oceans.

There was no carbon dioxide produced before people built factories.

The atmosphere was already full of carbon dioxide, so no more could fit in.

Carbon dioxide was absorbed by forest fires.

[1]

(ii) In the last 200 years the amount of carbon dioxide in the atmosphere has risen.

Which of the following statements best explain the **rise** of carbon dioxide?

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

There are more factories now than in the past, as more countries have become developed.

Scientists have developed a way of storing carbon dioxide underground.

Environmental groups have been working to get more trees planted around the world.

Forests have been burnt down to clear land for farming and new buildings.

Scientists do not agree that the amount of carbon dioxide has risen over the last 200 years.

[2]

[Total: 6]

Around 100 years ago many scientists believed that mountains on the Earth were caused by the surface of the Earth shrinking as it cooled down.

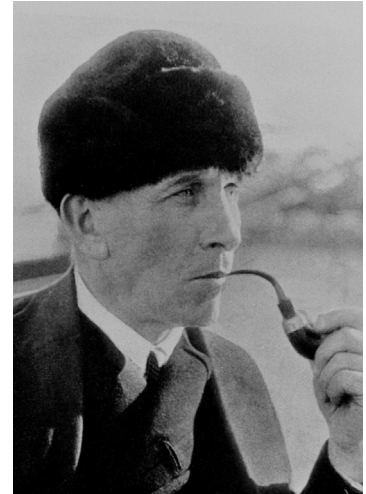
Alfred Wegener came up with a different idea to explain how mountains formed.

In 1912 Wegener presented his big idea to a meeting of geologists in Germany.

Wegener's big idea became known as continental drift.

He published a book that described his ideas in 1922.

After 'peer review' of his work his ideas were rejected by most geologists at the time.



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(a) What is 'peer review'?

Make the best description you can by drawing **one** straight line from a box on the left to a box on the right.

The public look at your work ...

... and they give their opinion.

Scientists look at your work ...

... to see if it is interesting.

Your friends look at your work ...

... and repeat the experiments.

[1]

(b) Read the following statements about continental drift. Some statements are data, others are explanations.

Choose which statements are **data** about continental drift and mark them with a **D**.

The continents could have once been joined together.

The outlines of the continents appear to fit like a jigsaw.

Fossils found in Africa match those found in South America.

A land bridge may once have joined Africa to South America.

[2]

(c) What reasons did the geologists of Wegener's time have to reject his ideas?

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

He was an outsider to their group.

The evidence he provided was clearly wrong.

They did not know how the continents could be moved.

They agreed that similar fossils were found in Africa and South America.

[2]

(d) How does the theory of continental drift account for mountain building?

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

Land is pushed upwards when continents collide.

Weathering wears away softer rock to leave a hard lump behind.

The surface of the Earth becomes wrinkled as it cools down.

[1]

[Total: 6]

**END OF QUESTION PAPER**

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