

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

Unit 1 Modules B1 C1 P1

FOUNDATION TIER

THURSDAY 14 JUNE 2007

F A211/01

Afternoon

Time: 40 minutes

Calculators may be used.

Additional materials: Pencil
Ruler (cm/mm)



* OCR / T 4 1 1 7 9 *

Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

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

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	5	
2	5	
3	4	
4	5	
5	6	
6	3	
7	5	
8	5	
9	4	
TOTAL	42	

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

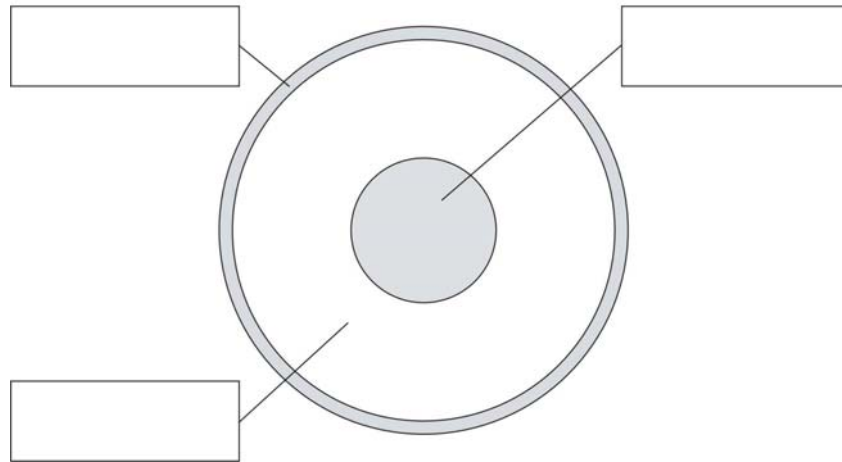
PLEASE DO NOT WRITE ON THIS PAGE

Q.2 © Space Telescope Science Institute / Hubble Heritage Team (AURA/STScI/NASA), <http://heritage.stsci.edu>
Q.7 © Charlie Drewes, EEOB Dept, Iowa State University

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Answer **all** the questions.

- 1 Look at the diagram showing parts of the Earth.



- (a) Label the diagram showing the internal structure of the Earth.

Choose **three** words from the list below and write them in the correct boxes above.

centre **core** **crust** **land** **mantle** **sea**

[3]

- (b) The outer layer of the Earth is made up of several large slabs of rock called **tectonic plates**.

Which of the following occur at the edges of tectonic plates?

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

hurricanes

earthquakes

volcanoes

drought

rivers

[2]

[Total: 5]

2



© AURA/STScI/NASA

This picture shows a star called Proxima Centauri.

Astronomers have measured the distance to Proxima Centauri.

They found that Proxima Centauri is 4.2 light years from the Earth.

(a) Proxima Centauri is 4.2 light years from the Earth.

What is a **light year**?

Put a tick (✓) in the correct box.

The distance that light travels in one year.

The time taken for the Earth to orbit the Sun.

The time it takes for light to go from the Sun to the Earth.

[1]

(b) Which of the following methods could be used to measure the distance to Proxima Centauri?

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

Send a rocket to measure the distance.

Measure the parallax movement from June to December.

Time how long it takes for light to reach the Earth from the star.

[1]

(c) The lists show sayings and statements.

Draw a straight line from each **saying** to its correct **statement**.

saying

'We are all made from stars.'

'We are not alone.'

'Looking at the stars is like looking back in time.'

statement

Scientists are searching for alien life.

It takes a long time for light to reach us from a distant star.

Any element larger than helium was made in a star.

The Universe began with a 'big bang'.

[3]

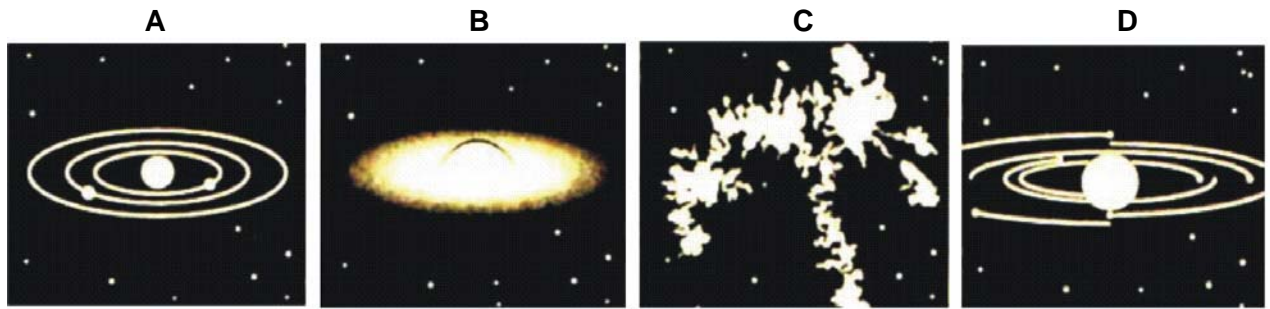
[Total: 5]

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3 The diagram below shows stages **A**, **B**, **C** and **D** in the formation of our solar system.

They are not in the correct order.



The planets orbit the Sun. Some debris remains.

The cloud begins to form a denser centre, which heats up as it contracts.

A cloud of dust and gases.

Remaining dust swirling round begins to form planets.

(a) Fill in the boxes to show the correct order.

The first one has been done for you.

C			
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[2]

(b) Which element is the main source of the Sun's energy?

Put a tick (✓) in the correct box.

carbon	<input type="checkbox"/>
helium	<input type="checkbox"/>
hydrogen	<input type="checkbox"/>
oxygen	<input type="checkbox"/>
uranium	<input type="checkbox"/>

[1]

(c) Name the **process** that provides the Sun's energy.

answer

[1]

[Total: 4]

4 This question is about Susan's car.

It uses petrol as a fuel. Petrol is a mixture of **hydrocarbons**.

An image has been removed due to copyright restrictions.

Details:
black and white clipart-style illustration of a car

(a) Finish the sentences by choosing the correct words from this list.

hydrogen

nitrogen

oxygen

soot

Hydrocarbons are compounds made up of atoms of carbon and

When the carbon atoms are burned, they react with in the air. [2]

(b) Susan's car breaks down and she has to travel by bus.

Which **two** of the following sentences describe benefits **to the environment** of travelling by bus?

Put a tick (✓) in the **two** correct boxes.

Her journey takes longer.

People using buses will mean less traffic on the roads.

There is less noise as there are fewer vehicles on the road.

She will have to carry her supermarket bags.

You can make new friends on the bus.

[2]

- (c) If more people travel by bus, instead of by car, there is less pollution from traffic exhaust fumes.

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

Buses are bigger than cars.

A bus uses less fuel than a car.

A bus doesn't make polluting gases.

Energy used per person on a bus is less than in a car.

[1]

[Total: 5]

5 In December 2005, there was an explosion at Buncefield oil depot.

Large quantities of petrol and diesel oil caught fire.

The fire lasted several days, and a large cloud of black smoke drifted southwards.



Here is what five local people said about the smoke on the day of the explosion.

Ahmed
We must stay inside and close all windows and doors.

Kate
The black cloud is rising, so it will stay in the air.

Barry
It will be worse if it rains and the pollutants are washed down on us.

Roshi
It will cover the fields and houses with soot.

Tom
If the wind changes it will blow away from us.

(a) Which **two** people have identified factors that might **change** the amount of local pollution?

..... [2]

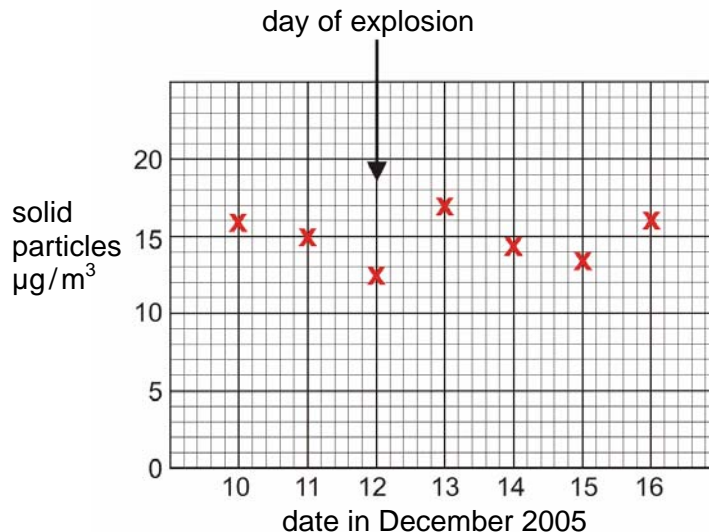
(b) Which **one** person is referring to a **correlation** between a risk factor and an outcome?

..... [1]

(c) The wind continued to blow towards the south.

Measurements of solid particles in the air were taken at a monitoring station 20 miles south of Buncefield.

The daily mean values are shown in the graph below.



(i) What was the measurement of solid particles on 13th December?

..... µg/m³ [1]

(ii) What was the date of the lowest measurement?

..... December [1]

(iii) What correlation, if any, does the graph show between the number of solid particles in the air and the time after the explosion?

Put a tick (✓) in the correct box.

The number of solid particles decreased with time.

The number of solid particles increased with time.

There is no correlation.

[1]

[Total: 6]

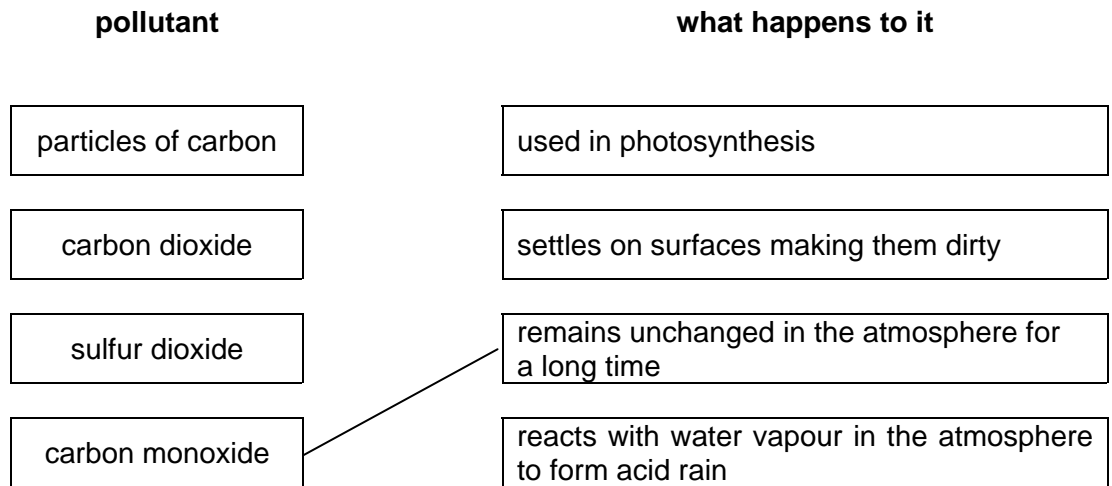
6 Fuels are burnt in power stations.

This is a major source of air pollution.

(a) The lists show pollutants and what happens to them.

Draw a straight line from each **pollutant** to **what happens to it**.

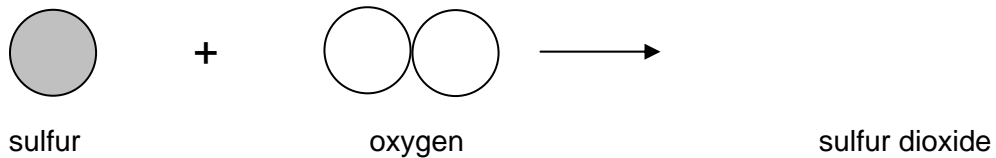
One has been done for you.



[2]

(b) The diagram shows the reaction of sulfur and oxygen to make sulfur dioxide.

Complete the diagram to show what is formed.

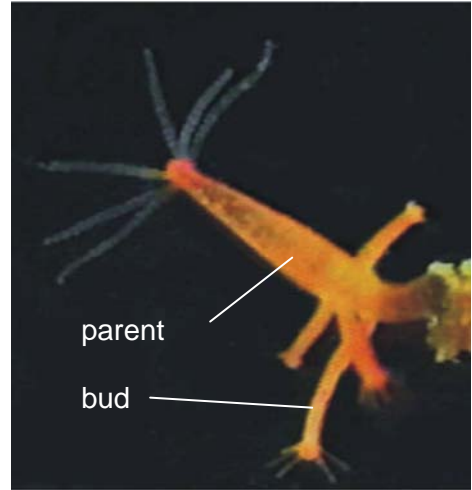


[1]

[Total: 3]

- 7 Toby's mum and dad buy him a fish tank.
Toby puts **one** *Hydra* in the tank.
A *Hydra* is a small animal that lives in water.

A few weeks later he notices several *Hydra* in the tank.



© Charlie Drewe

Choose from this list to complete the sentences below.

asexual

sexual

environmental

brothers

clones

X

Y

Z

- (a) (i) The new *Hydra* were produced by reproduction. [1]
- (ii) All the *Hydra* are genetically identical. They are
- (iii) All the *Hydra* do **not** look exactly the same because of factors. [1]
- (b) (i) Toby was produced by reproduction. [1]
- (ii) Toby is male because he inherited a chromosome from his mother and a chromosome from his father. [1]

[Total: 5]

8 Read the following newspaper article.

Breast cancer is the most common cancer for women in the UK.

Breast cancer can run in families.

Changes in two genes, BRCA1 and BRCA2, are known to cause about 5% of breast cancer cases.

British scientists are developing screening technology to identify these genes.

(a) The article states that breast cancer can run in families.

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

Children of mothers with breast cancer may be at a higher risk of developing the disease.

Children of mothers with breast cancer will also develop the disease.

Breast cancer can be caught by children whose mother has the disease.

[1]

(b) BRCA1 and BRCA2 are **genes**.

Put a tick (✓) in the box next to the correct description of a gene.

a section of a protein

a section of an enzyme

a collection of enzymes

a section of DNA in the nucleus of a cell

[1]

(c) Some people are discussing genetic screening for the genes BRCA1 and BRCA2.

Selina
 Screening for BRCA genes may be OK, but where will such genetic screening stop?

Jacob
 We should just accept the genes we inherit.

Cathy
 Just having the screening may affect my insurance premiums.

Gerry
 Screening may help thousands of people at risk from breast cancer.

These people have different views about genetic screening.

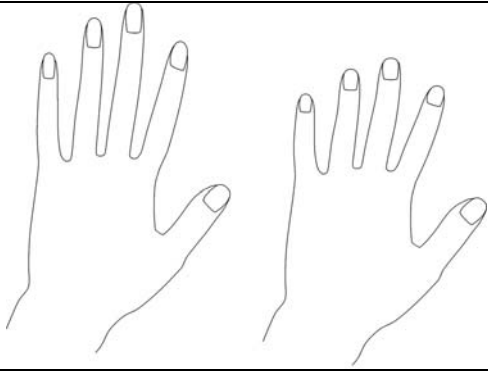
Write their names in the correct boxes.

people in favour of genetic screening	people worried about genetic screening	people neither worried nor in favour of genetic screening

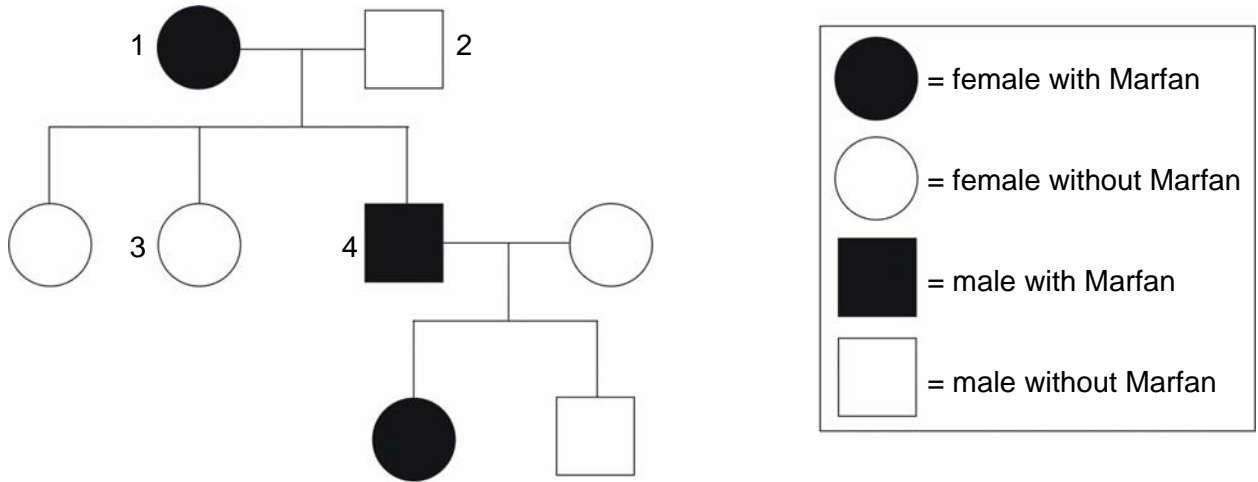
[3]

[Total: 5]

9 Look at the information on Marfan syndrome.

<p>Marfan syndrome is an inherited disorder.</p> <p>People with Marfan syndrome are usually tall and slim with long fingers and loose joints.</p> <p>A single gene causes the disorder.</p> <p>Marfan syndrome is caused by a dominant allele.</p>	
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The diagram below shows a family tree.



Body cells have two copies of the gene responsible for Marfan syndrome.

(a) Complete the table showing the alleles present for each person.

Use **A** to represent a dominant allele for Marfan syndrome
a to represent a recessive allele for normal

The first one has been done for you.

individual	alleles
1	Aa
2	
3	
4	

[3]

(b) Complete the following sentence by filling in the gap.

Chromosomes are very long molecules made from

[1]

[Total: 4]

END OF QUESTION PAPER