OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
SCIENCE A

A212/01

Unit 2 Modules B2 C2 P2
(Foundation Tier)

Candidates answer on the question paper
A calculator may be used

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Thursday 15 January 2009
Afternoon

Duration: 40 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use 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.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

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 **16** pages. Any blank pages are indicated.

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

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Answer **all** the questions.

1 **(a)** Some materials are made from living things.
Other materials are synthetic.

For each material in the table put a tick (✓) in the box to show if it is **synthetic** or **made from living things**.

material	synthetic	made from living things
cotton		
paper		
poly(ethene)		
PVC		
silk		

[3]

(b) The sentences below describe how synthetic materials can be made.

Draw a straight line from the **beginning** of each sentence to the correct **ending**.

One has been done for you.

beginning	ending
Synthetic materials can be made from …	… hydrocarbons.
The molecules in crude oil are a mixture of …	… polymers.
Crude oil is refined to make …	… crude oil.
Small molecules can be joined together to make …	… fuels and lubricants.

[2]

(c) The table below shows some of the properties of three synthetic materials.

material	strength	flexibility	hardness	melting point in °C
A	strong	not flexible	very hard	130
B	weak	very flexible	soft	75
C	strong	not flexible	scratches easily	95

Use this table to answer the following questions.

(i) Material **A** is used to make a jug to hold boiling water.

Which property makes it most suitable for this use?

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

strength ☐

flexibility ☐

hardness ☐

melting point ☐

[1]

(ii) Material **B** is used to make plastic bags.

Which property makes it most suitable for this use?

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

strength ☐

flexibility ☐

hardness ☐

melting point ☐

[1]

(iii) Materials **A**, **B** and **C** are transparent.

Which material is most suitable for the windshield of a motorbike?

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

A **B** **C**

[1]

(iv) Why do you think this material has replaced glass in windshields?

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

It is made from crude oil. ☐

It can be recycled. ☐

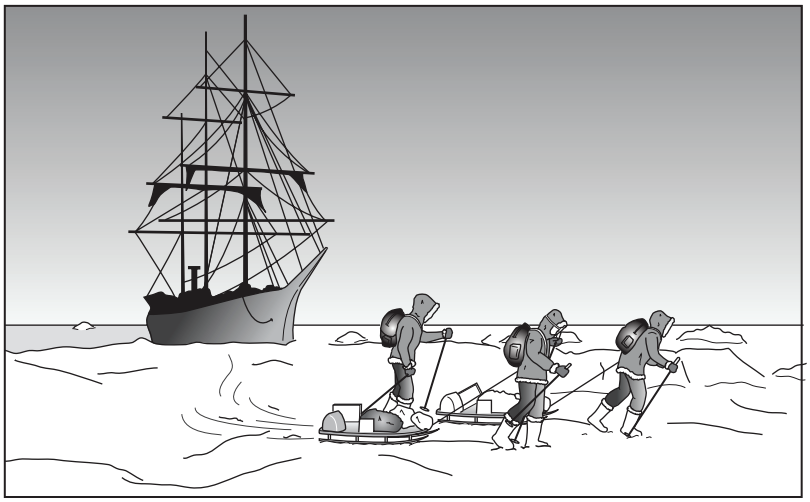
It is transparent. ☐

It does not break easily. ☐

[1]

[Total: 9]

2 Many explorers travelling to the North and South Poles had problems keeping warm.
They wore woollen clothing.



Modern synthetic materials like **fleece** have better insulating properties.

Anna and Ben test the insulating properties of fleece.
They cover a beaker with fleece.
They fill the beaker with hot water and time how long it takes the temperature of the water to fall by 20°C.
They repeat the test six times.
Here are their results.

test	1	2	3	4	5	6
time in min	7	18	31	47	10	18

(a) Anna says that these results vary widely.

What is the most likely reason for this?

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

All the results are outliers. ☐

The starting temperatures were different. ☐

The beaker was left in different places on the table. ☐

They need to measure the time more accurately. ☐

[1]

(b) Anna and Ben change their experiment to make the results more reliable.
Here are the new results.

test	1	2	3	4	5	6
time in min	35	34	37	38	32	34

(i) What is the range of these new results? ..... to ..... **[1]**

(ii) Ben says they must find the mean of these results.
Work out the mean of these new results. .....min **[1]**

(iii) Why does Ben work out the mean?
Put a tick (✓) in the box next to the **best** answer.

The measurements are not accurate. ☐

The mean gives only one result. ☐

The mean gives the best estimate of the true value. ☐

The mean makes sure that the test is a fair one. ☐

[1]

(c) Anna and Ben now test wool.
They know they must control all the factors that might affect the outcome.
Which of the following factors **must** be controlled?
Put ticks (✓) in the boxes next to the **two best** answers.

The same thermometer is used. ☐

The beaker is put in the same place on the table. ☐

The starting temperature is the same. ☐

The time taken is the same. ☐

The amounts of wool and fleece are the same. ☐

[2]

[Total: 6]

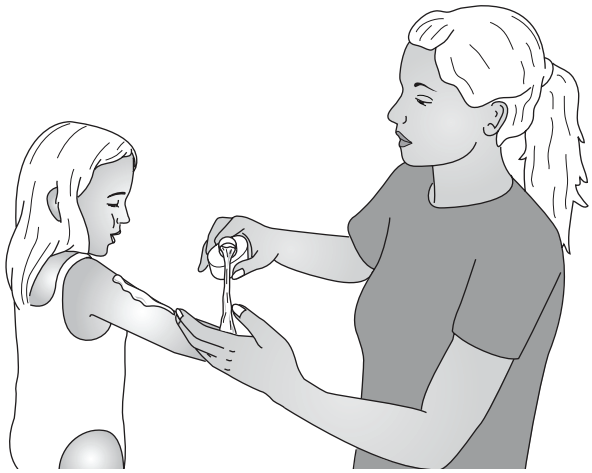
3 Read this article on sunscreens.

Sunscreens' weakness brought to light

Sunscreens might not protect you as well as you think.

People expect sunscreens to prevent skin damage from the sun's harmful ultraviolet (UV) radiation.

Sunscreens contain chemicals that act as UV filters.



Most sunscreens contain two filters. One absorbs lower-energy UVA photons and the other absorbs higher-energy UVB photons. Sunscreens also contain a white powder such as titanium dioxide which reflects UV.

Two of the most widely-used UV filters in sunscreens break down in sunlight. They no longer absorb UV to give you the protection you expect.

(a) Find the words in the article which have the following meanings.

Write each one in the space next to its meaning.

(i) Packets of electromagnetic radiation .....

(ii) Something which absorbs part of the radiation .....

(iii) Bounces away radiation .....

[3]

(b) After you have read this article what advice would you give to your friends?
Put ticks (✓) in the boxes next to the **two** correct answers.

Put fresh sunscreen on more often.	☐
Don't go out into the Sun at all in the summer.	☐
Don't stay out too long in the Sun.	☐
Don't bother with sunscreen as it does not work.	☐

[2]

(c) Ultraviolet radiation can cause skin cancer.
What is the explanation for this?
Put a tick (✓) in the box next to the **one** correct answer.

Ultraviolet radiation is ionising.	☐
Ultraviolet radiation is invisible.	☐
Ultraviolet radiation is electromagnetic.	☐
Ultraviolet radiation is given out by the Sun.	☐

[1]

[Total: 6]

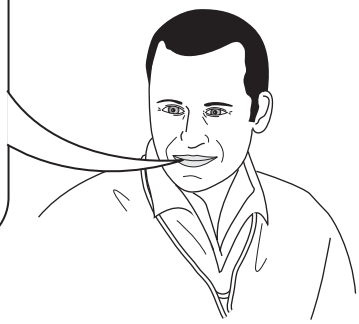
4 Two scientists are discussing global warming.

Dr Round

The Earth's atmosphere warmed up until 1940. Since 1940 it has been cooling down.

I think that people who say the atmosphere has warmed up since 1940 have not interpreted the data correctly.

I think the data from satellites show cooling.



Professor Price

The temperature of the Earth's atmosphere is increasing.

There is significant scientific evidence that greenhouse gas emissions, particularly carbon dioxide, are making the temperature rise.

I don't think early satellite data are reliable.

(a) Which scientist made which of these statements?
Put a tick (✓) in the **one** correct box next to each statement.

statement	only Dr Round	only Prof Price	neither scientist	both scientists
Carbon dioxide is a greenhouse gas.				
Some data show the Earth is getting cooler.				
The Earth's temperature has never gone up at all.				
The Earth's temperature has gone up at some time.				

[4]

(b) This scientist agrees that the Earth's atmosphere is getting hotter, but he's not sure if it's due to carbon dioxide.

Dr Legrande

The amount of carbon dioxide in the atmosphere is increasing. Burning fuels makes this carbon dioxide.

I am not sure how carbon dioxide affects climate.

Other factors such as industrial and agricultural dust in the atmosphere have also increased as the Earth's atmosphere has warmed. These may be more important than carbon dioxide.

Some factors and outcomes are linked by **correlation**.
Some factors **cause** an outcome.
What does Dr Legrande say about the following factors and outcomes?
Put a tick (✓) in **each** correct box.
Each row may have one tick, two ticks or no ticks at all.

factor	outcome	there is a correlation	the outcome is caused by the factor
burning fuel	carbon dioxide increase in the atmosphere		
carbon dioxide increase in the atmosphere	global warming		
industrial and agricultural dust in the atmosphere	global warming		

[3]

[Total: 7]

5 This question is about how our body defends itself against microorganisms.

(a) Use the words from the list to complete the sentences.

circulatory

digestive

immune

platelets

red blood cells

white blood cells

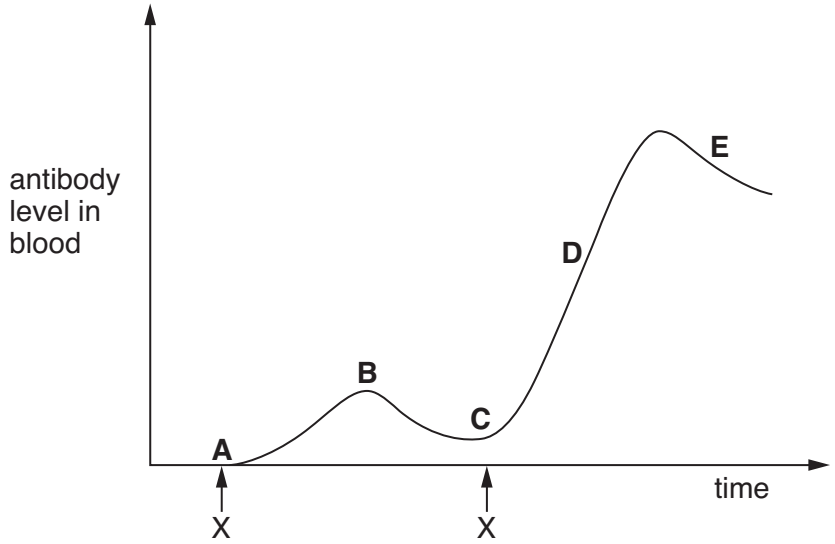
(i) Antibodies are part of the body's defence system.

It is called the ..... system.

(ii) Some microorganisms are engulfed and digested by ..... .

[2]

(b) The graph shows the changes in the levels of an antibody in Jon's blood.
He is infected twice by the same disease-causing microorganism.



X = time of infection

(i) Which letter, **A**, **B**, **C**, **D** or **E**, shows that the body makes antibodies very quickly when it has learned to recognise a particular microorganism?

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

(ii) Jon is infected by a different disease-causing microorganism.
Use straight lines to join the boxes to make a sentence to describe what happens.

	the microorganism is recognised quickly	and antibodies are produced quickly	
When Jon is infected by a **different** microorganism,	the microorganism is recognised slowly	and antibodies are produced slowly	so Jon suffers symptoms of disease and then gets better.
	the microorganism is not recognised	and antibodies are not produced	

[2]

[Total: 5]

6 Read the article about treatment of TB.

> **Hope for speedier TB treatment**
>
> About one third of the population of the world is infected by a microorganism causing tuberculosis (TB).
> A four year trial using two antibiotics has been started in Africa.
> Doctors hope to reduce the time it takes to treat TB patients.

(a) Put a tick (✓) in the box next to each of the **two** types of microorganisms that can be killed using antibiotics.

microorganism	
bacteria	☐
fungi	☐
viruses	☐

[1]

(b) Here are five statements about testing drugs. They are in the wrong order.

A give drug to healthy volunteers to check there are no serious side effects

B look at the effect of drug on human cells grown in the laboratory

C look at the effect of giving drug to animals

D give drug to a large number of people with the illness

E give drug to a small number of people with the illness

Fill in the boxes to show the correct order.
The first one has been done for you.

B				

[3]

[Total: 4]

7 A new study about heart disease has been published in a scientific journal. A study on 260 women claims that hormone replacement therapy (HRT) can reduce the risk of heart disease.

(a) A peer review has been done on these new scientific findings.

Put ticks (✓) in the **two** boxes next to the answers which **best** describe the process of peer review.

Other scientists …

… evaluate the methods used. ☐

… repeat results to confirm findings. ☐

… evaluate the analysis of the results. ☐

… put questions to scientists who wrote the report. ☐

… find out about hormone replacement therapy. ☐

[2]

(b) Other factors can increase or decrease the risk of heart disease.

Complete the table by putting ticks (✓) in the correct boxes.

factor	increase risk	decrease risk
cigarette smoking		
regular moderate exercise		
poor diet		
stress		
excessive alcohol drinking		

[3]

[Total: 5]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE