

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

Unit 2 Modules B2 C2 P2
HIGHER TIER
MONDAY 18 JUNE 2007

H A212/02

Morning

Time: 40 minutes

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)



* C U P / T 4 3 3 3 7 *

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

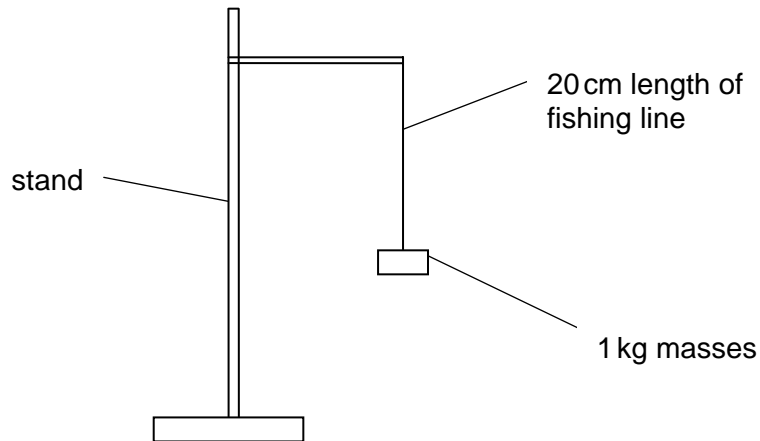
- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	4	
2	6	
3	4	
4	6	
5	3	
6	5	
7	3	
8	11	
TOTAL	42	

This document consists of **18** printed pages and **2** blank pages.

Answer **all** the questions.

- 1 A company makes fishing lines. The fishing lines are tested to find out how strong they are. Masses are added to the lines until they break. Six samples from each line are tested.



- (a) Which of the statements, **A**, **B**, **C** or **D**, is the **best** reason for repeating the test six times?

A	to make sure it is a fair test
B	six is the right number of times to test anything
C	to make sure that the results are reliable
D	fish have different masses

answer [1]

(b) The results for one fishing line are shown below.

mass needed to break line (kg)
12
5
12
11
9
11

The second result, 5 kg, is an outlier.
Here are **four** suggestions why this outlier happened.

A	The line could have been thinner than usual.
B	The line could have been thicker than usual.
C	Too few masses had been put onto the line.
D	There was a mistake in counting the number of masses.

Write down the letters of the **two** best suggestions.

1

2

[2]

(c) Take out the outlier and calculate the mean value of the other five readings.

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

9 kg 10 kg 11 kg 12 kg

[1]

[Total: 4]

2 This question is about sustainable development.

(a) Five people are asked to say what they think sustainable development is about.

Hannah
We continue everything we do now.

David
We don't use up resources.

Ahmed
We make just enough for everyone.

Jon
We make less than we do now.

Rosie
We protect the environment for the future.

Which **three** people show some understanding of sustainable development?

- 1
- 2
- 3

[2]

- (b) Read the information about polymers from plants.

POLYMERS FROM PLANTS

For many centuries, fermentation has been used in the brewing of beers and wines. A company has developed a new polymer which uses a molecule produced by the fermentation of starch from corn.

Sorona[®] is a polymer of this molecule. The structure of the molecule makes softer fibres than either polyester or nylon and allows them to be dyed at a lower temperature.

Sorona[®] can be recycled too.

- (i) Why is the development of this fibre sustainable?

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

Corn is a renewable resource.

The fibres can be dyed at a lower temperature.

The molecules are polymerised.

The polymer can be recycled.

[2]

- (ii) Here are **four** statements about where energy is used in the life cycle of a polymer.

Put a tick (✓) in the box next to **each** statement that would apply equally to the life cycle of Sorona[®] **and** polyester.

refining crude oil

making the polymer from small molecules

melting and shaping the polymer to make fibre

transporting the fibre

[2]

[Total: 6]

[Turn over]

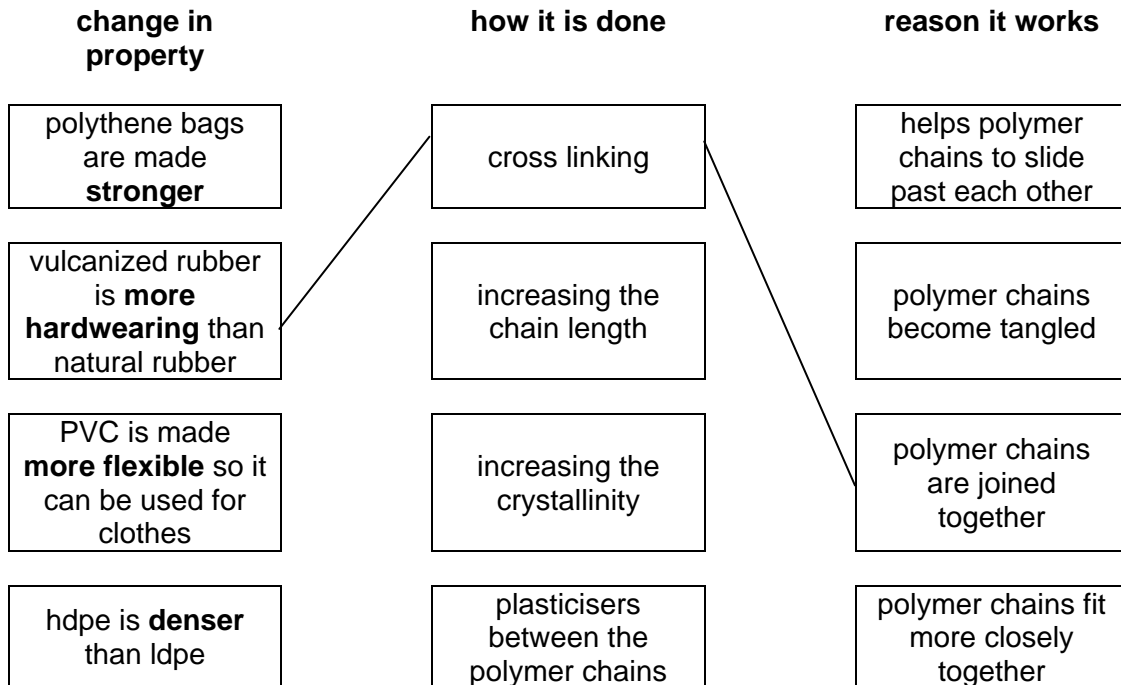
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- 3 This question is about changing the properties of a polymer by changing its molecules.

Draw straight lines to link each **change in property** to **how it is done** and then to the **reason it works**.

One has been done for you.



[4]

[Total: 4]

4 A group of pupils are discussing their views on global warming.

Andrew
The amount of carbon dioxide in the atmosphere has decreased in the past 200 years.

Gemma
There will be more flooding in the future.

Kate
The climate is changing as a result of global warming.

Tom
Burning down forests increases the amount of carbon dioxide in the atmosphere.

Mike
How can there be global warming? My dad told me that 1976 was the hottest summer he remembers.

(a) Which **two** people are talking about possible consequences of global warming?

answer and [2]

(b) Which **one** person has identified a **correlation**?

answer [1]

(c) Carbon dioxide is a greenhouse gas found in the atmosphere.

Choose **two** other greenhouse gases that can also be found in the atmosphere.

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

oxygen	<input type="checkbox"/>
water vapour	<input type="checkbox"/>
nitrogen	<input type="checkbox"/>
methane	<input type="checkbox"/>
hydrogen	<input type="checkbox"/>

[2]

(d) Why should **Mike** get more evidence before making up his mind?

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

His dad is wrong.

There may have been hotter summers
before his dad was born.

You cannot make accurate assumptions
based on a single case.

Some scientists say that global warming
is definitely happening.

[1]

[Total: 6]

- 5 Sun beds give off ultraviolet rays.
They are used to get a suntan.

An image has been removed due to copyright restrictions

Details:
a clipart-style illustration
of a sun bed

Below are some opinions about using sun beds.

Sara

I know I shouldn't really use them, but I'm going on holiday soon and I don't want to be the only one on the beach without a tan.

Tony

I look good with a tan. That makes me feel more confident.

Aran

In this country it's so gloomy all the time. Sun beds make it so much easier to get a tan.

Julie

Looking good is not worth the possibility of getting skin cancer.

- (a) How could you **explain** Sara's decision?

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

She is aware of a risk but decides to go ahead.

She believes the benefit outweighs the risk.

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

She believes the risk outweighs the benefit.

[1]

- (b) The ALARA (As Low As Reasonably Achievable) principle can be applied to the use of sun beds.

Draw a straight line to link the **one** correct **recommendation** to its **explanation**.

recommendation	explanation
You should use sun beds whenever you want to.	There is no risk in using them.
You should only use sun beds once a month.	There is a risk, but you need to use them.
You should never use sun beds.	There is a risk, and there is no need to use them.
You should only use sun beds once a week.	They cost a lot to use.
You should only use sun beds when you plan to go on holiday.	

[2]

[Total: 3]

- 6 Emma has a new microwave oven.

**An image has been removed
due to copyright restrictions**

Details:
a clipart-style illustration
of a girl putting food into a
microwave oven

- (a) The oven has three settings, **high**, **medium** and **low**.
These settings affect the power output of the oven when in operation.

Emma heats a ready meal on the medium setting for 3 minutes.
It reaches a temperature of 75°C in the centre of the food.

How could she get the food to reach the **same** temperature using a different power setting?

Put a tick (✓) in the box next to **each** answer that could give the desired outcome.

cook on high power for a longer time

cook on low power for a longer time

cook on high power for 3 minutes

cook on low power for a shorter time

cook on high power for a shorter time

[2]

- (b) The door of the microwave oven has a screen mesh.

Put a tick (✓) in the box next to the **best** reason for this.

to stop splashes

to keep the food hot

to stop the glass cracking

to reflect microwaves

[1]

- (c) Microwaves are also used in mobile phones. If you are a long way from the mobile phone transmitter, the signal strength is weak.

Put a tick (✓) in the box next to **each** statement which correctly describes microwaves.

The power output from the microwave transmitter depends on the number of photons given off each second.

The power output from the microwave transmitter depends on the total number of photons given off.

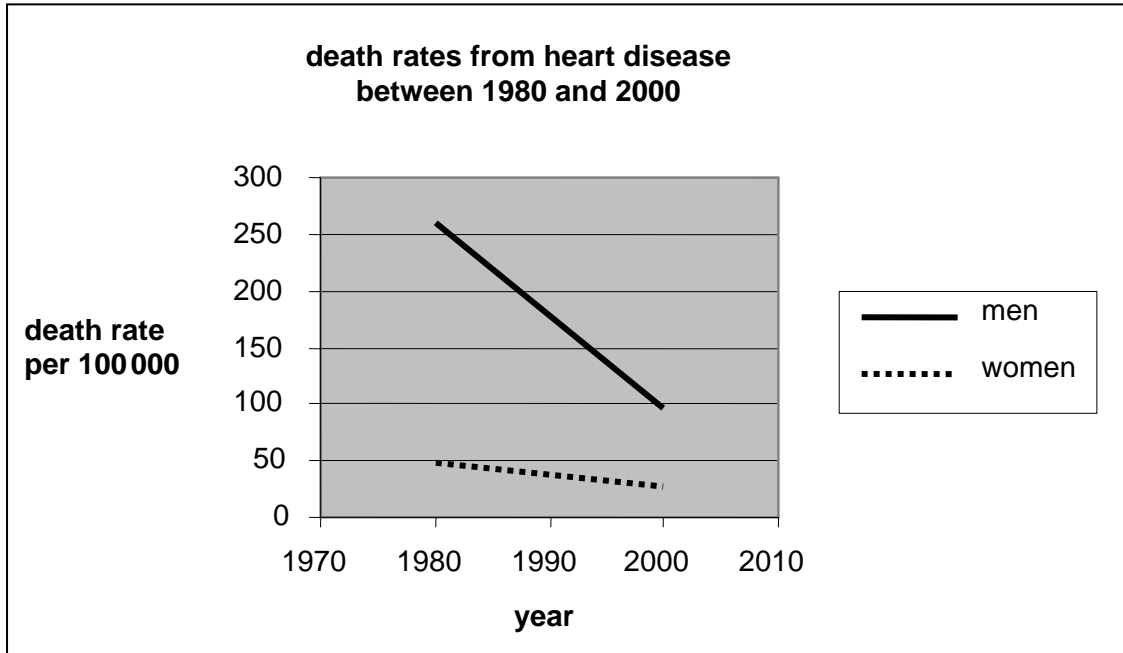
The intensity received decreases with distance because the power is spread over a wider area.

The intensity received decreases with distance because the power output from the transmitter decreases.

[2]

[Total: 5]

- 7 The graph below shows death rates due to heart disease between 1980 and 2000.



- (a) Read the suggestions about why there has been **a fall in the death rates of men** between 1980 and 2000.

Put a tick (✓) in the box next to **each** suggestion which could explain why the death rate has fallen.

There is more genetic testing.

Fewer men are smoking.

Better drugs are used after heart attacks.

The average body mass of men has increased.

[2]

- (b) In non-industrialised countries, the death rates from heart disease are lower than they are in the United Kingdom.

Here are four statements about people who live in non-industrialised countries.

Put a tick (✓) in the box next to the **best** reason for their lower death rate from heart disease.

They mainly live outdoors.

They earn less money.

They have less fat in their diet.

They do not have as many medicines.

[1]

[Total: 3]

8 Read this newspaper article.

Vaccine for cervical cancer

Cervical cancer kills more than 1500 women a year in the UK.

Cervical cancer can be caused by infection with a virus which damages cells in the cervix.

A trial of a vaccine has been carried out on 12 000 women aged 16-23. Half were given the vaccine and half a dummy injection which contained no vaccine.

None of the women given the vaccine developed cell changes that lead to cancer. 22 women given the dummy injections did. None of the women had the virus at the start of the trial.

- (a) The article claims that the vaccine is 100% effective in preventing cervical cancer. The treatment is still not available but undergoing further trials.

Put ticks (✓) in the boxes next to the **three** statements which **best** explain the need for further trials.

Half the women in the trial were given dummy injections.

Only changes to cells, not actual cancers, were observed.

The women were all aged 16-23.

There may be undetected side effects.

The vaccine has not been tested on animals.

None of the women had the virus before the trial.

[3]

- (b) Half the women in the trial were given a dummy injection.

- (i) What name is given to this kind of treatment which looks like the drug but actually contains no drug?

..... [1]

(ii) Dummy treatments are not normally used in human drug trials.

Put ticks (✓) in the boxes next to the **two** statements that **best** explain why dummy treatments were used in this case.

The vaccine may bring other risks.

There is no alternative treatment to the vaccine.

The dummy treatment will not change the chance of getting cervical cancer.

Both groups of women benefit from the medical checks that take place during the trial.

[1]

(iii) Dummy treatments can be used in open, blind or double-blind trials.

Put ticks (✓) in the table below to show who knows which patient is receiving the real treatment.

type of trial	who knows which patient is receiving the real treatment			
	doctor only	patient only	both	neither
open				
blind				
double-blind				

[3]

- (c) The virus can be transmitted during sexual intercourse. Some think that if the vaccine is to be used it should be given between the ages of nine and eleven.

Eight doctors are discussing the risks and benefits of this vaccination.

Polly
Only women can get cervical cancer.

Trevor
There are other methods of preventing transmission of the virus.

Alan
This vaccination is not a cure for cervical cancer.

Sarah
All vaccinations carry a risk of some sort.

Marcus
Only people at risk of disease should have the vaccine.

Sorrel
This vaccination will encourage unprotected sex.

Sharon
This vaccination may cause more unwanted pregnancies.

Thomas
Other diseases such as syphilis and gonorrhoea are transmitted by sexual intercourse.

- (i) Which **two** doctors suggest there is a risk that this vaccination will cause **more** disease than it prevents?

..... and [2]

- (ii) Which **three** doctors' comments taken together might persuade the parents of a ten year old boy **not** to have their child vaccinated against the virus?

..... and and [1]

[Total: 11]

END OF QUESTION PAPER

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