

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

Unit 2 Modules B2 C2 P2 (Foundation Tier)

SAMPLE ASSESSMENT MATERIAL

(from 2010 onwards)

Time: 40 minutes

Candidates answer on the question paper

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)

Candidate
 Forename

Candidate
 Surname

Centre
 Number

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Candidate
 Number

--	--	--	--

INSTRUCTIONS TO CANDIDATES

- Write your name 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 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	9	
2	6	
3	7	
4	7	
5	9	
6	4	
TOTAL	42	

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

Answer **all** questions.

1 Poly(ethene) is a plastic material.

There are two types of poly(ethene), Low Density Poly(ethene) (LDPE) and High Density Poly(ethene) (HDPE).

The table shows some information about the properties of the two types.

property		LDPE	HDPE
1	stiffness	flexible	stiff
2	density in g/cm ³	0.92	0.96
3	strength when pulled in MN/m ²	15	29
4	stretch before breaking	6 times normal length	3 times normal length
5	effect of heat	softens at 90 °C	softens at 200 °C
6	comparative price	cheaper	more expensive

(a) HDPE is better for making plastic boxes for storing food.



Why is HDPE better than LDPE for this use?

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

HDPE is more expensive than LDPE.

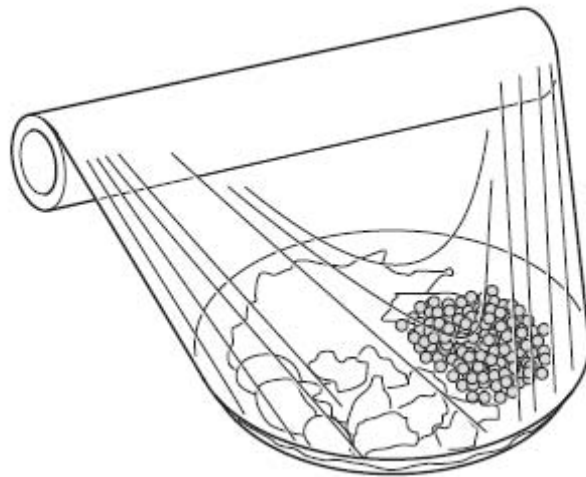
HDPE stretches more than LDPE.

HDPE is stiffer than LDPE.

HDPE has almost the same density as LDPE.

[1]

(b) LDPE is better than HDPE for making thin plastic film for wrapping food.



What are the advantages and disadvantages of using LDPE for wrapping food?

.....

.....

.....

.....

..... [4]

- (c) Joe works in a factory that makes carrier bags from LDPE.
His job is to check the strength of the bags.
He cuts strips from the bags and finds out the force needed to break them.



Here are Joe's results for a batch of carrier bags.

strip number	force needed to break the sample in Newtons
1	710
2	715
3	705
4	710
5	751

(i) Put a ring around the result in the table that is an outlier. [1]

(ii) Calculate the best estimate of the force needed to break the sample.

answer Newtons [1]

(iii) Why does Joe repeat his test several times?

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

Repeating the test makes it a fair test.

The more often he repeats the test, the closer the results will get.

The more results Joe collects, the better estimate he can make.

Repeating the test makes sure the right range is being tested.

Repeating the test helps Joe to check for reliability.

[2]

[Total: 9]

2 Rubber for making car tyres is a synthetic material made from molecules in crude oil.

(a) The molecules used to make synthetic rubber are **hydrocarbons**.

How many **different types** of atom are there in hydrocarbon molecules?

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

1

2

3

about 10

over 100

[1]

(b) This diagram shows the process for making car tyre rubber from hydrocarbon molecules.

Label the diagram by writing the correct word in each box.

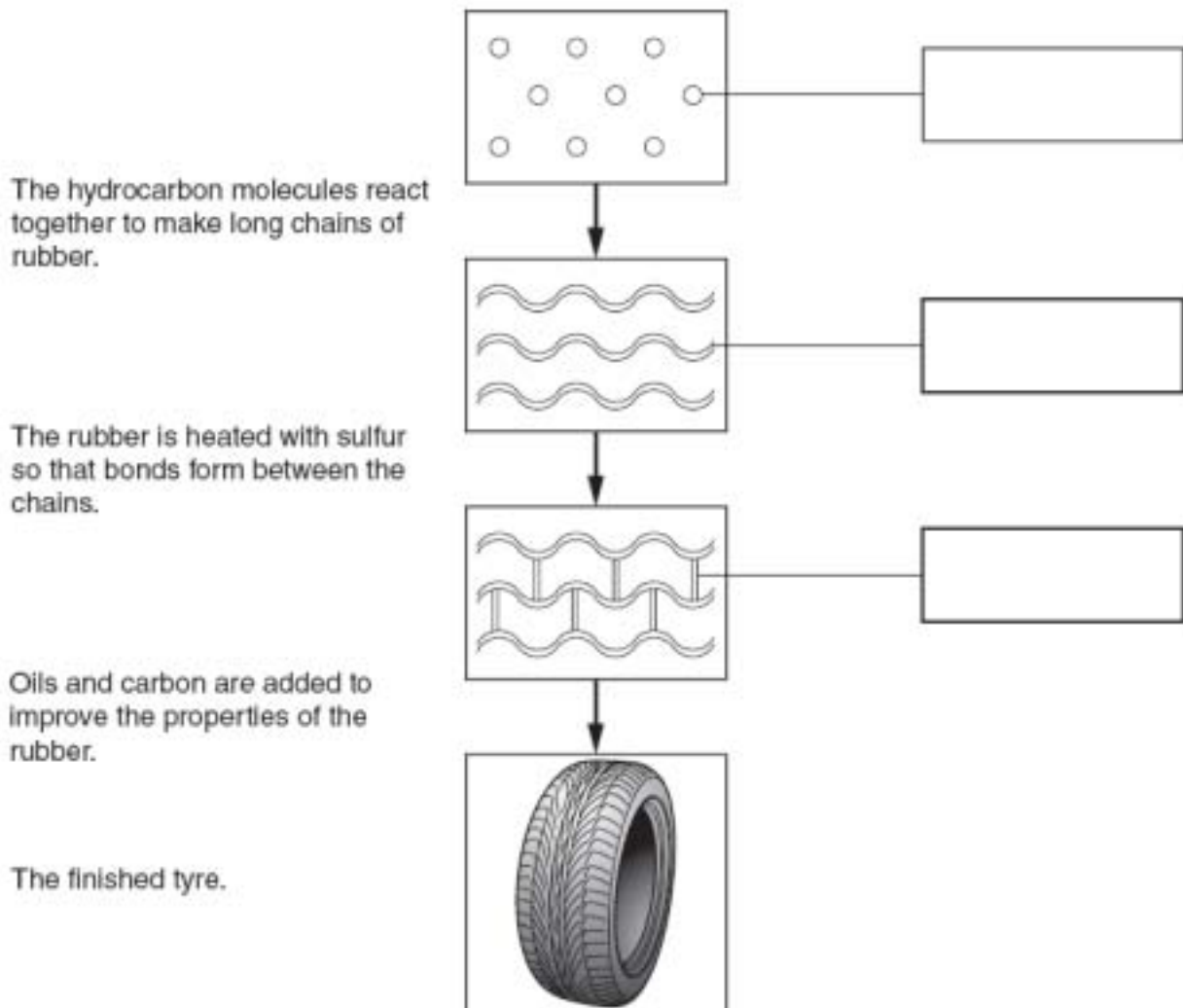
Choose words from this list.

cross-link

small molecule

plasticizer

polymer



[3]

(c) Complete the sentences about car tyre rubber.

Put a **ring** around the correct words in each sentence.

When bonds form between the chains, the rubber becomes more **flexible / less flexible**.

It will soften at a **higher temperature / lower temperature**.

The finished car tyre contains a **pure chemical / a mixture of chemicals**.

[2]

[Total: 6]

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

3 (a) Finish the sentences.

Choose words from this list.

atmosphere
cooler
infrared
induction
photosynthesis
sound
vacuum
warmer

The Sun gives out electromagnetic radiation such as

Light passes through the Earth's atmosphere. It heats the Earth's surface and provides the energy for

The warm Earth also gives out electromagnetic radiation, but some of this is absorbed by the.....

This keeps the Earth than it would otherwise be.

[4]

- (b) The hot, dry summer in 2006 meant that crops like peas and beans did not grow well in Britain.

Four people in one farming village were talking about this.



(i) Who talks about a possible **consequence** of global warming?

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

Melanie

Sunil

Peter

Mary

[2]

(ii) Who talks about a possible **cause** of global warming?

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

Melanie

Sunil

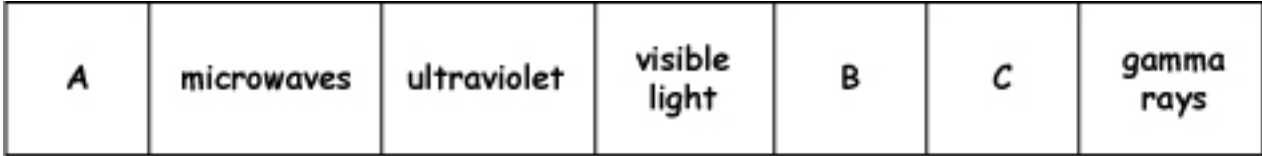
Peter

Mary

[1]

[Total: 7]

4 The diagram shows the different parts of the electromagnetic spectrum.



low energy

high energy

(a) Write the letter, **A**, **B** or **C** of the part of the spectrum in the box next to its correct name.

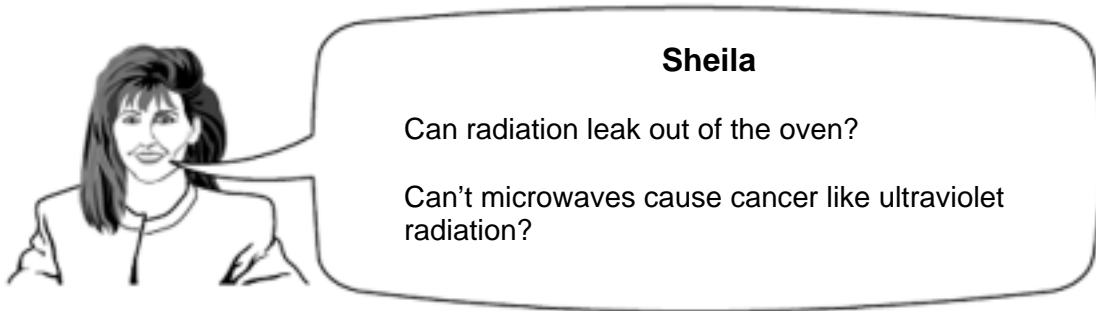
infrared

radio waves

X-rays

[2]

(b) Sheila is thinking about buying a microwave oven, but she is afraid they may be dangerous.



(i) Explain to Sheila why microwave radiation can't leak out of the oven.

.....

.....

.....

[2]

(ii) Explain to Sheila why microwaves do not cause cancer.

In your answer, you should explain how radiation can **cause** cancer.

.....

.....

.....

.....

[3]

[Total: 7]

5 Philip is reading an NHS leaflet on Tuberculosis. He reads the following information.

Tuberculosis (TB) is an infectious disease.

TB is not easily caught – you have to be in close and lengthy contact with someone with TB, for example living in the same house.

To make us ill the microorganism that causes TB has to enter our body. We have evolved barriers to stop harmful microorganisms entering our body.

(a) (i) Draw a straight line from each barrier to the best description of how it stops microorganisms entering the body.

barrier	how it stops microorganisms
stomach lining	It produces acid that destroys microorganisms.
skin	It contains chemicals that destroy microorganisms.
sweat and tears	It is a physical barrier to microorganisms.

[2]

(ii) Explain what happens when microorganisms get past these barriers.

You should describe

- what happens to the microorganisms
- how this affects the body.

.....

.....

.....

.....

.....

[3]

(b) The leaflet continues with some information about how death rates from TB have changed.

100 years ago, TB caused about 150 deaths in every thousand deaths in the UK.

Nowadays, TB can be prevented using vaccinations, and is curable by using antibiotics. The death rate is now much lower.

(i) 100 years ago, what percentage of deaths in the UK were due to TB?

Put a (ring) around the correct answer.

150%

15%

1.5%

0.15%

[1]

(ii) Antibiotics can be used to treat some infectious diseases.

Put a (ring) around the harmful microorganisms that can be killed using antibiotics.

antibodies

bacteria

enzymes

proteins

viruses

[1]

(c) In 1953, a vaccination programme against TB was introduced.

All school children were vaccinated.

Recently, it was decided to **stop** vaccinating school children against TB.

Read the statements below.

Which statements help explain why vaccination was stopped?

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

The vaccine prevents the most serious forms of TB.

The vaccine has no serious side effects.

In the UK, TB in children is rare and does not spread easily.

Across the world, TB kills around 2 million people a year.

Most people living in the UK will never encounter a case of TB.

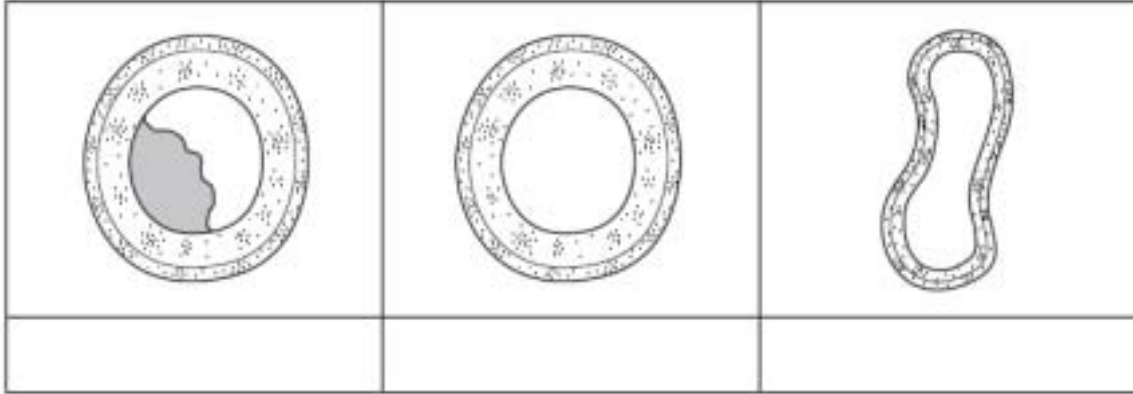
[2]

[Total: 9]

6 (a) The diagrams show three blood vessels.

- A a normal artery
- B an artery with fat build-up
- C a normal vein

Name each type of blood vessel by writing **A**, **B** or **C** in the correct box below each diagram.



[2]

(b) Some friends are discussing heart attacks.



(i) Which friend is describing a correlation?

answer [1]

(ii) Which friend is describing an individual piece of evidence that disagrees with the correlation?

answer [1]

[Total: 4]

END OF QUESTION PAPER

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GCSE Unit

SAMPLE ASSESSMENT MATERIAL
(from 2010 onwards)

MARK SCHEME

Science A (J630)
Modules B2, C2 and P2
Foundation Tier

A212/01

Maximum Mark: 42

Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	= alternative and acceptable answers for the same marking point
(1)	= separates marking points
not/reject	= answers which are not worthy of credit
ignore	= statements which are irrelevant - applies to neutral answers
allow/accept	= answers that can be accepted
(words)	= words which are not essential to gain credit
<u>words</u>	= underlined words must be present in answer to score a mark
ecf	= error carried forward
AW/owtte	= alternative wording
ORA	= or reverse argument

E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

work done = 0 marks

work done lifting = 1 mark

change in potential energy = 0 marks

gravitational potential energy = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.
7. The list principle:
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

A212/01

8. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

E.g. If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Expected Answers	Marks	Rationale											
1	a	<table border="1"> <tr> <td>more expensive</td> <td></td> </tr> <tr> <td>stretches more</td> <td></td> </tr> <tr> <td>stiffer</td> <td>✓</td> </tr> <tr> <td>same density</td> <td></td> </tr> </table>	more expensive		stretches more		stiffer	✓	same density		1				
more expensive															
stretches more															
stiffer	✓														
same density															
	b	<p><i>advantages</i> – more flexible/less stiff (1) stretches more (1) cheaper (1)</p> <p><i>disadvantage</i> – not as strong (1) softens more easily (1)</p>	4	IF only advantages (or disadvantages) given, max 2 marks.											
	c	i	751 (1)	1											
		ii	710 (1)	1	IF wrong outlier identified in I, allow ecf as below										
					<table border="1"> <thead> <tr> <th>Outlier chosen</th> <th>Acceptable response</th> </tr> </thead> <tbody> <tr> <td>705</td> <td>721.5 / 722 / 721</td> </tr> <tr> <td>710</td> <td>720.25 / 720</td> </tr> <tr> <td>715</td> <td>719</td> </tr> </tbody> </table>	Outlier chosen	Acceptable response	705	721.5 / 722 / 721	710	720.25 / 720	715	719		
Outlier chosen	Acceptable response														
705	721.5 / 722 / 721														
710	720.25 / 720														
715	719														
		iii	<p>more results, better estimate <table border="1"><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr></table> (1)</p> <p>repeating to check for reliability <table border="1"><tr><td></td></tr><tr><td>✓</td></tr><tr><td></td></tr><tr><td></td></tr><tr><td></td></tr></table> (1)</p>		✓					✓				2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used. All 5 boxes ticked gets no marks.
✓															
✓															
		Total		9											

Question		Expected Answers	Marks	Rationale
2	a	2 (1)	1	Allow any indication of choice
	b	small molecule (1) polymer (1) cross-link (1)	3	
	c	less flexible higher temperature a mixture of chemicals	2	Allow any clear indication of choice 3 correct (2) 1 or 2 correct (1)
		Total	6	

Question		Expected Answers	Marks	Rationale	
3	a	infrared (1) photosynthesis (1) atmosphere (1) warmer (1)	4	Allow incorrect spelling	
	b	i	Melanie <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> Mary <input checked="" type="checkbox"/> (1)	2	one mark for each correct tick deduct one mark for each incorrect tick if more than two ticks used.
		ii	Sunil <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	1	no extra ticks allowed
		Total	7		

Question		Expected Answers	Marks	Rationale				
4	a	infrared ultraviolet X-rays	<table border="1"> <tr><td>B</td></tr> <tr><td>A</td></tr> <tr><td>C</td></tr> </table>	B	A	C	2	3 correct (2) 1 or 2 correct (1)
B								
A								
C								
	b	i	metal (in oven) (1) stops microwaves getting out/absorbs microwaves (1)	2				
		ii	microwaves aren't ionising radiation (1) only ionising radiation causes cancer /break molecules into bits(1) ultraviolet radiation is ionising (1)	3				
		Total		7				

Question			Expected Answers	Marks	Rationale										
5	a	i	<pre> graph LR A[stomach lining] --- B[produces acid] C[skin] --- D[contains chemicals] E[sweat and tears] --- D E --- F[physical barrier] </pre>	2	3 correct (2) 1 or 2 correct (1)										
		ii	microorganisms reproduce (1) microorganisms produce poisons (1) which give you symptoms (1)	3											
	b	i	15% (1)	1	Allow any indication of choice										
		ii	bacteria (1)	1											
	c		in UK, TB in children is rare <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1) most never encounter a case <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr></table> (1)			✓					✓			2	One mark for each correct tick. Deduct one mark for each incorrect tick if more than two ticks used. All 5 boxes ticked gets no marks.
✓															
✓															
			Total	9											

Question			Expected Answers	Marks	Rationale
6	a		<input type="text" value="B"/> <input type="text" value="A"/> <input type="text" value="C"/>	2	3 correct (2) 1 or 2 correct (1) allow the names
	b	i	Sean (1)	1	Ignore spelling.
		ii	Jayne (1)	1	Ignore spelling.
			Total	4	
			Section total	42	