OCR
RECOGNISING ACHIEVEMENT

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A212/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
SCIENCE A
Unit 2 Modules B2 C2 P2 (Foundation Tier)

FRIDAY 18 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)

CUP/T44366

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	9	
2	6	
3	7	
4	6	
5	10	
6	4	
TOTAL	42	

This document consists of **17** printed pages and **3** blank pages.

Answer **all** the 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) Which of the statements about the properties of the two types of poly(ethene) are **true** and which are **false**?

Put a tick (✓) in the correct box for each statement.

	true	**false**
LDPE is more easily bent, stronger and stretches more than HDPE.	☐	☐
HDPE is less easily bent, withstands high temperature better than LDPE but costs more to buy.	☐	☐
LDPE is several times denser than HDPE and stretches twice as much.	☐	☐
HDPE stretches less than LDPE but is stronger.	☐	☐

[2]

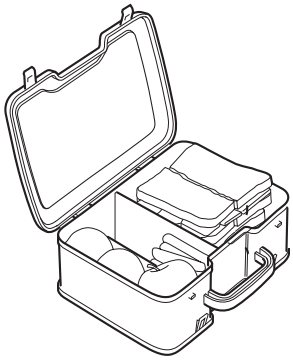
(b) The information cards show some uses for **LDPE** and **HDPE** and the most important **advantages** and **disadvantages** of each type of poly(ethene).

Use information from the table to complete the cards.

The first one has been done for you.

information card **A**

HDPE is better than LDPE for making plastic boxes for storing food.

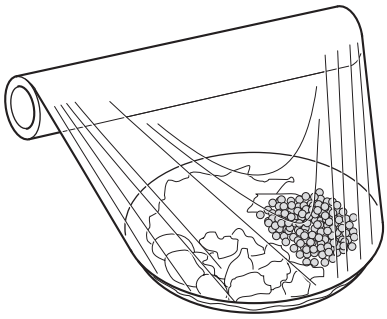


The most important **advantage** of using HDPE is property ....1..... .

The most important **disadvantage** of using HDPE is property ....6..... .

information card **B**

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

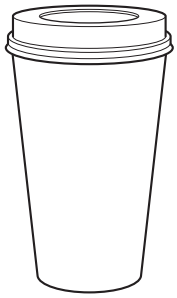


The most important **advantages** of using LDPE are properties ....., ... and ..... .

The most important **disadvantage** of using LDPE rather than HDPE is property ..... .

information card **C**

HDPE is better than LDPE for making plastic coffee cups for vending machines.



The most important **advantages** of using HDPE are properties ..... and ..... .

The most important **disadvantage** of using HDPE is property ..... .

[3]

(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]

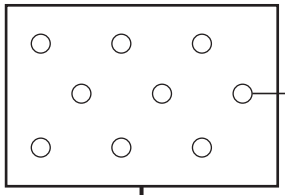
(b) This diagram shows the process for making car tyre rubber from hydrocarbon molecules.

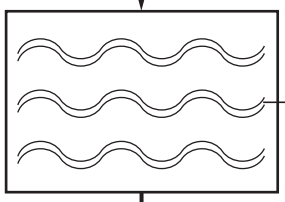
Label the diagram by writing the correct word in each box.

Choose words from this list.

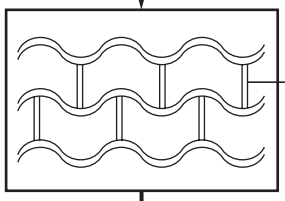
cross-link **small molecule** **plasticizer** **polymer**

The hydrocarbon molecules react together to make long chains of rubber.





The rubber is heated with sulfur so that bonds form between the chains.



Oils and carbon are added to improve the properties of the rubber.

The finished tyre.

[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]

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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 …… .

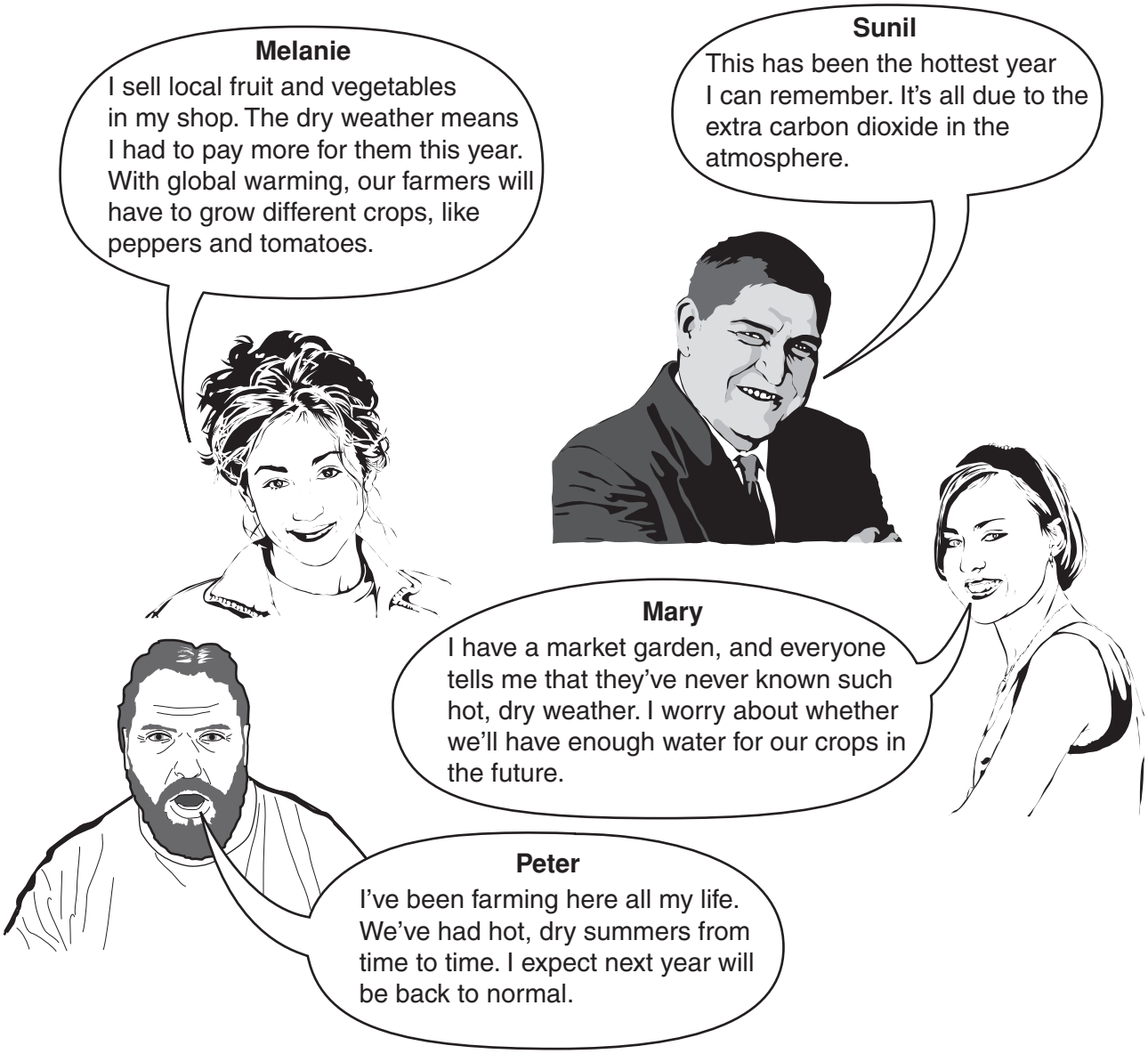
The warm Earth also gives out electromagnetic radiation, but some of this is absorbed by the …… .

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 **(a)** The diagram shows the different parts of the electromagnetic spectrum.

A	microwaves	B	visible light	C	D	gamma rays

low energy high energy

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

infrared ☐

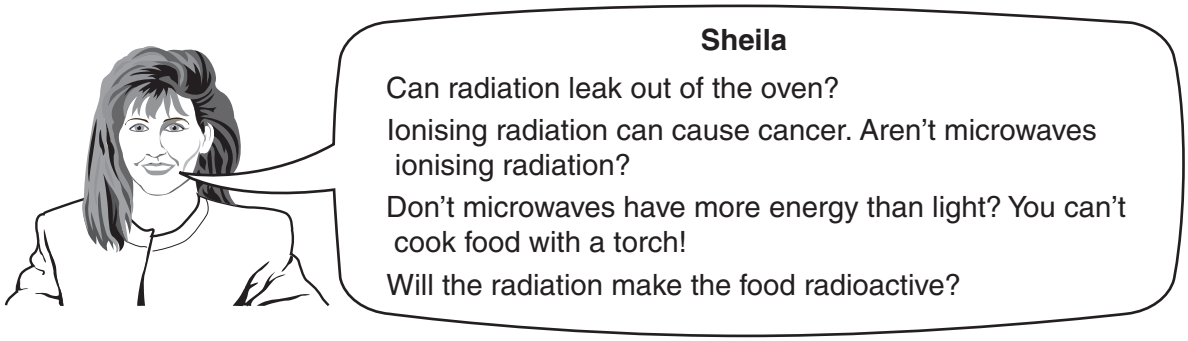
radio waves ☐

ultraviolet ☐

X-rays ☐

[3]

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



Her daughter Nicky tries to convince Sheila that microwave ovens are safe.

Draw a straight line from each of **Sheila's questions** to the best of **Nicky's answers**.

One has been done for you.

Sheila's questions	Nicky's answers
Can radiation leak out of the oven?	Microwaves can't break molecules into bits.
Will the radiation make the food radioactive?	The metal keeps the microwaves inside.
Aren't microwaves ionising radiation?	Microwave radiation is different from nuclear radiation.
Don't microwaves have more energy than light?	Microwave photons have much less energy than light photons.

[3]

[Total: 6]

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) Use the words in this list to complete the sentences about what happens when microorganisms get past these barriers.

antibodies

bacteria

poisons

reproduce

symptoms

viruses

When they get past the barriers, microorganisms will start to …… .

The feelings you get when you are ill are called …… .

These feelings are caused by your cells being damaged or by the microorganisms making …… . [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.
>
> Nowadays, TB can be prevented using vaccinations, and is curable by using antibiotics. The death rate is now much lower.

(i) What percentage of the population in the UK died from TB 100 years ago?

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 **two** harmful microorganisms which can be killed using antibiotics.

bacteria **enzymes** **fungi** **proteins** **viruses**

[2]

(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: 10]

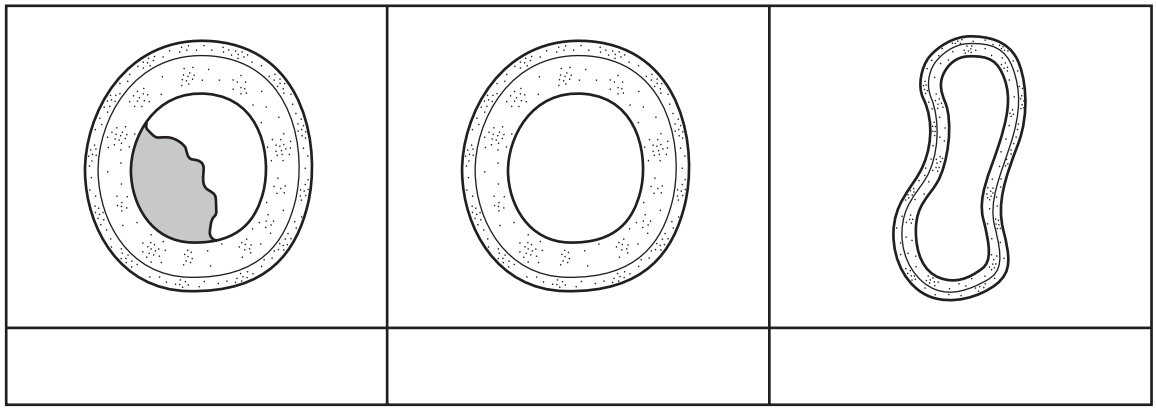
6 **(a)** The diagrams show three blood vessels.

A a normal artery

B an artery with fat build-up

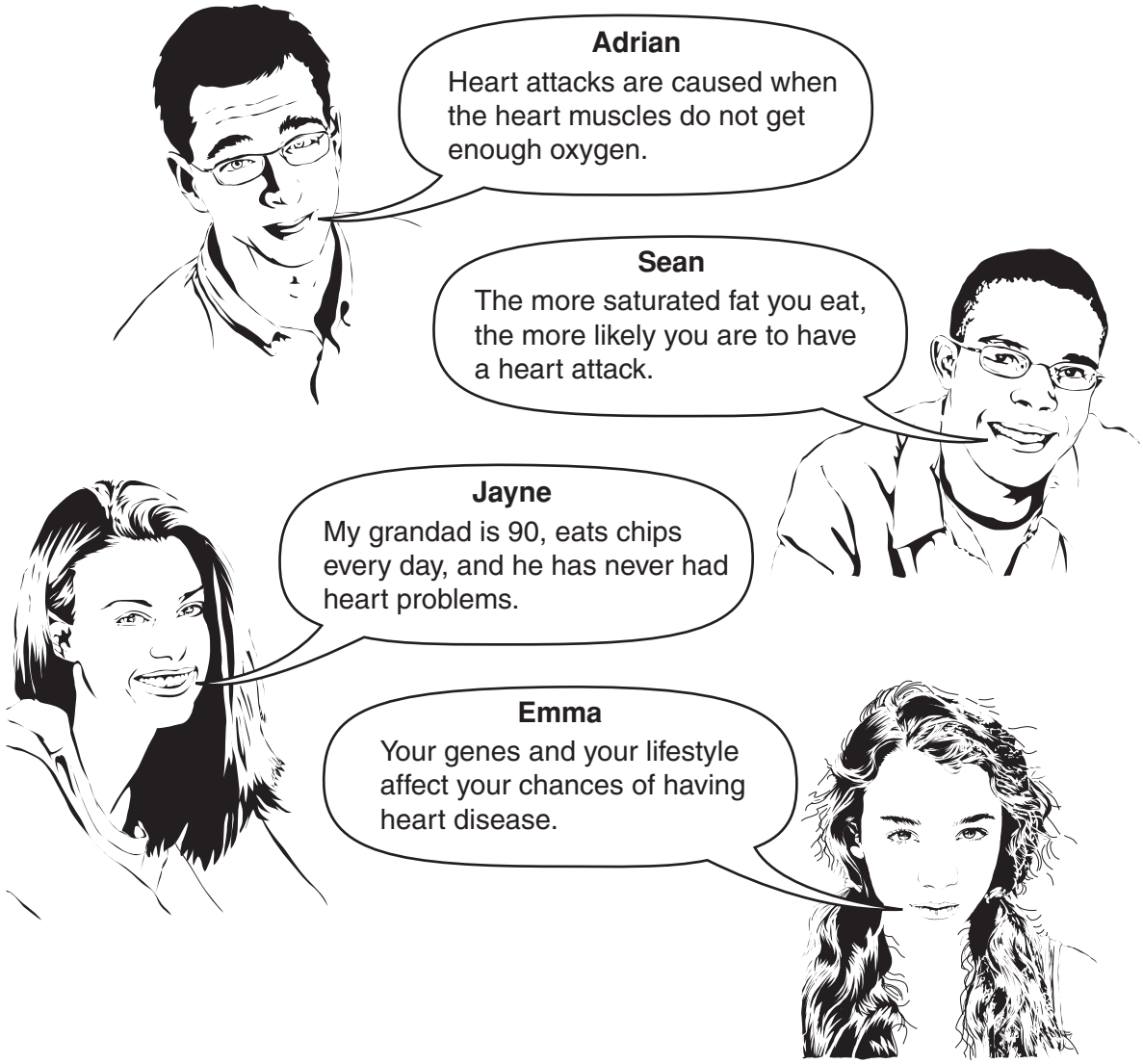
C a normal vein

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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