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Thursday 26 January 2012 – Morning

**GCSE 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 for this paper.

Duration: 40 minutes

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

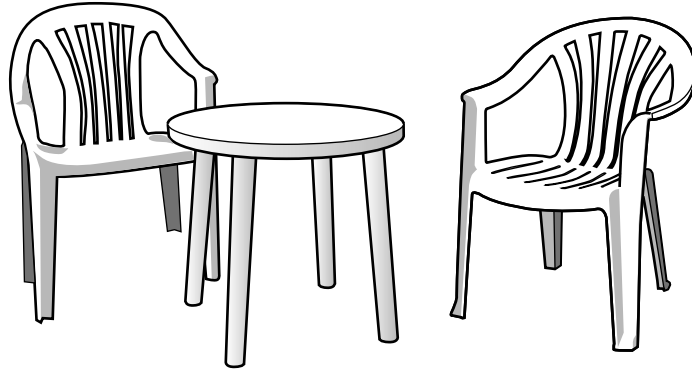
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

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.

Answer **all** the questions.

- 1 (a) A company makes garden chairs.
They look at different properties of plastics before choosing the plastic to use.



- (i) Draw a straight line from each **property** of plastic to the **reason** why it is important.

property	reason
density	so that the chairs do not bend
stiffness	so that the chairs do not break
strength	so that the chairs can be easily carried

[2]

- (ii) The company used to make garden chairs from wood.
Now they make them from plastic.

Why is plastic better than wood for making garden chairs?

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

Plastic is a renewable resource.

Most plastics melt when heated.

Plastic chairs are not as heavy.

[1]

- (b) The results from a Life Cycle Assessment (LCA) of a plastic garden chair are different from those of a wooden chair.

Here are some sentences about the differences between plastic and wooden chairs. Which of these make a difference to the LCA?

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

Wooden chairs rot faster than plastic chairs.

Chairs made from wood look better than chairs made from plastic.

Plastic chairs bend more than wooden chairs.

Wood comes from trees and plastic comes from crude oil.

Wooden chairs are more expensive than plastic chairs.

[2]

- (c) The company uses polypropene to make the chairs. Polypropene is a polymer that is made from crude oil.

- (i) Crude oil is a mixture of many chemicals. The molecules of these chemicals have some similarities and some differences. Describe one **similarity** and one **difference** between the molecules in these chemicals.

.....
.....
.....
..... [2]

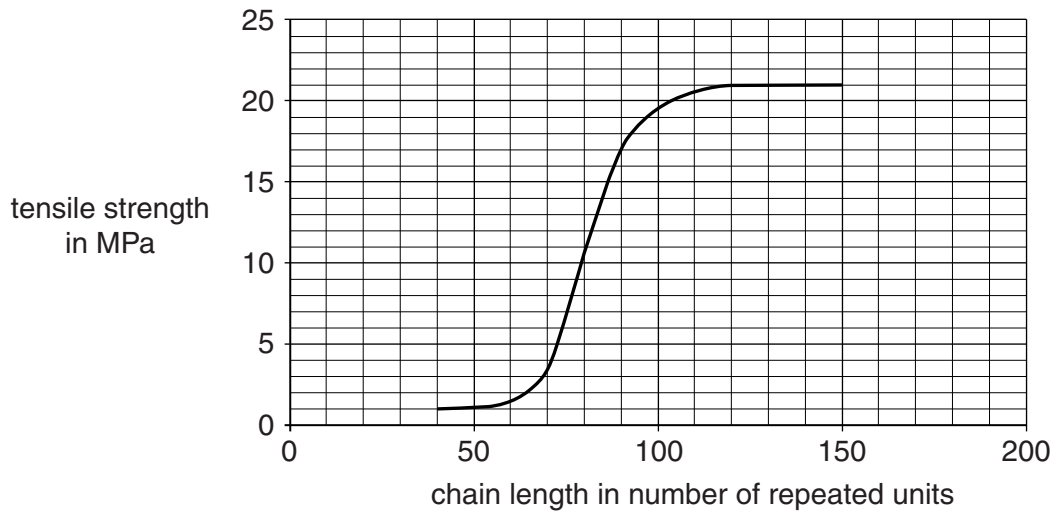
- (ii) Crude oil is refined to make propene molecules. What happens when propene molecules are turned into polypropene?

.....
.....
.....
..... [2]

[Total: 9]

- 2 Polyethene molecules can be made with different chain lengths.
The chain length shows how many repeated units of ethene there are in a molecule of polyethene.

The graph shows how the strength of polyethene changes with chain length.



- (a) Here are four statements about the graph.

Which of the statements are **true** and which are **false**?

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

	true	false
When the chain length is 100 the strength is 21 MPa.	<input type="checkbox"/>	<input type="checkbox"/>
The maximum strength is 21 MPa.	<input type="checkbox"/>	<input type="checkbox"/>
As the chain length increases from 130 to 150 the tensile strength increases.	<input type="checkbox"/>	<input type="checkbox"/>
The steepest part of the graph is between a chain length of 70 and 90.	<input type="checkbox"/>	<input type="checkbox"/>

[3]

5

(b) Polyethene with longer chains is stronger.

Complete these sentences to explain why.

Put a **ring** around the correct choice to complete each sentence.

The forces between molecules with longer chains are

bigger than / smaller than / the same as

the forces between molecules with shorter chains.

This means it is

more difficult / easier / impossible

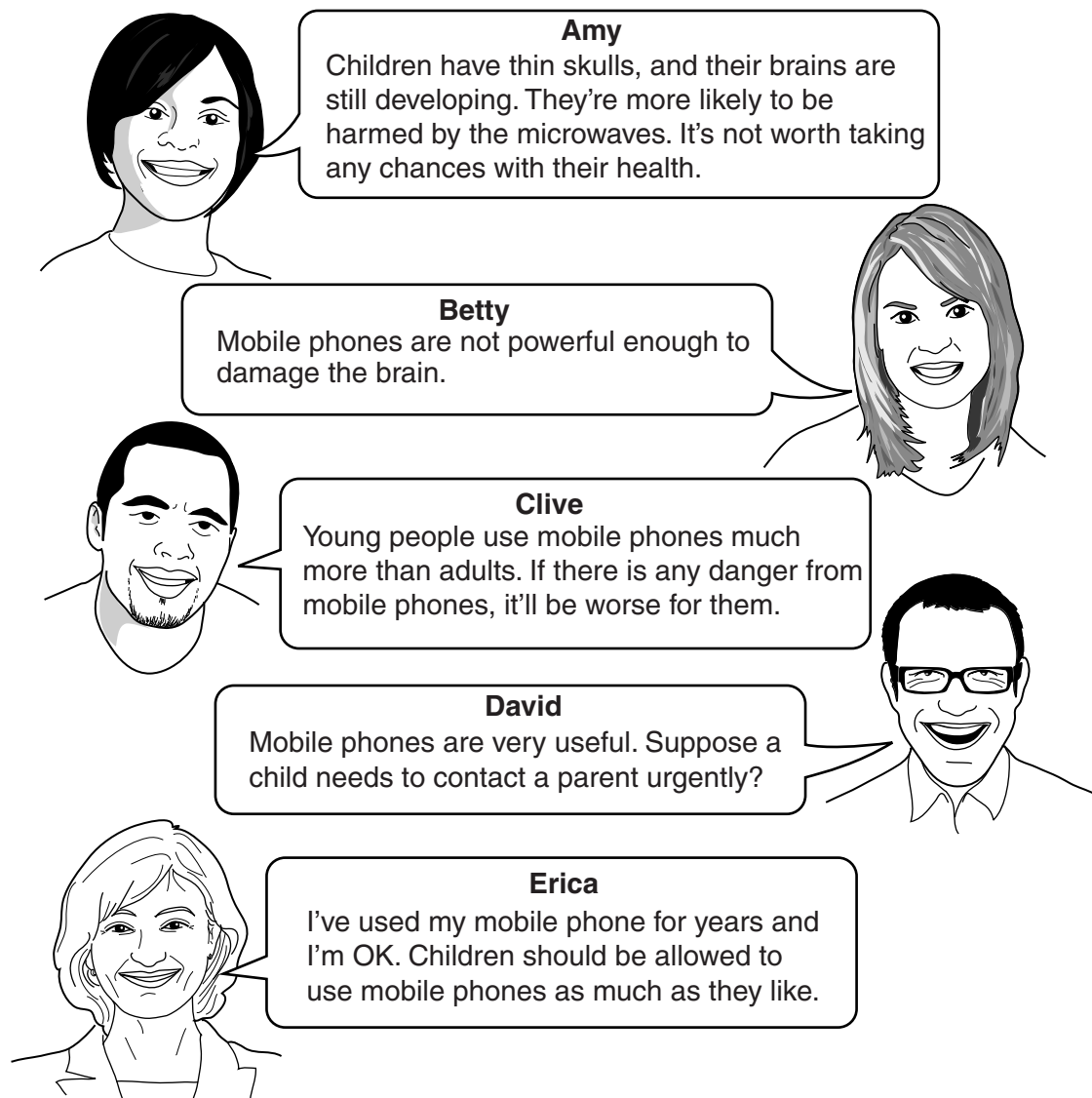
to pull the molecules apart.

[2]

[Total: 5]

- 3 A UK Government report in 2005 recommended that young children should not be given mobile phones.

Read what these people say about the Government report.



Amy
Children have thin skulls, and their brains are still developing. They're more likely to be harmed by the microwaves. It's not worth taking any chances with their health.

Betty
Mobile phones are not powerful enough to damage the brain.

Clive
Young people use mobile phones much more than adults. If there is any danger from mobile phones, it'll be worse for them.

David
Mobile phones are very useful. Suppose a child needs to contact a parent urgently?

Erica
I've used my mobile phone for years and I'm OK. Children should be allowed to use mobile phones as much as they like.

- (a) Who talks about a factor that gives a greater risk to children than to adults?

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

Amy	<input type="checkbox"/>
Betty	<input type="checkbox"/>
Clive	<input type="checkbox"/>
David	<input type="checkbox"/>
Erica	<input type="checkbox"/>

(b) Who gives a scientific reason which suggests that mobile phones are safe for children?

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

Amy

Betty

Clive

David

Erica

[1]

(c) Who gives a reason for accepting the possible risk from mobile phones?

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

Amy

Betty

Clive

David

Erica

[1]

[Total: 4]

4 Most scientists believe that global warming is due to human activities.

Write down **one** human activity that may contribute to global warming and describe how it does this.

.....
.....
..... [2]

[Total: 2]

5 The following sentences explain why ultraviolet radiation can damage the skin.

In each sentence, put a (ring) around the correct word to complete the sentence.

Ultraviolet radiation consists of packets of energy called **electrons / ions / photons**.

Ultraviolet radiation is ionising because its packets have **low energy / high energy / low frequency**.

Skin can be damaged when it **absorbs / emits / reflects** ultraviolet radiation.

[3]

[Total: 3]

6 The Earth's atmosphere contains carbon dioxide, which is important for life in plants and animals.

Explain why carbon dioxide is important for life, and how plants and animals change the amount of carbon dioxide in the atmosphere.

.....

.....

.....

..... [3]

[Total: 3]

7 The diagram below shows the electromagnetic spectrum.

Two parts of the spectrum are missing.

Fill in the missing parts.

Choose words from this list.

heat

light

microwaves

sound

radio waves		infrared		ultraviolet	X-rays	gamma rays
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[2]

[Total: 2]

8 (a) A 13-year-long study of 40 000 people in the Netherlands has been done.

The study concluded that drinking several cups of tea or coffee a day appears to protect against heart disease compared to drinking water.

Put ticks (✓) in the boxes next to **two** characteristics of this study that would make people confident about the conclusion.

It was carried out in the Netherlands.

The scientists used a control group to make it a valid test.

The scientists studied the drinking of tea and coffee.

40 000 people were studied.

[2]

(b) The study was published in a scientific journal.

Describe how the study would have been **peer reviewed** before being published by the journal.

.....
.....
.....
..... [2]

(c) Heart disease can lead to a heart attack.

Put a tick (✓) in the box next to the correct cause of a heart attack.

Fatty deposits block ...

... a vein carrying blood to the heart muscle.

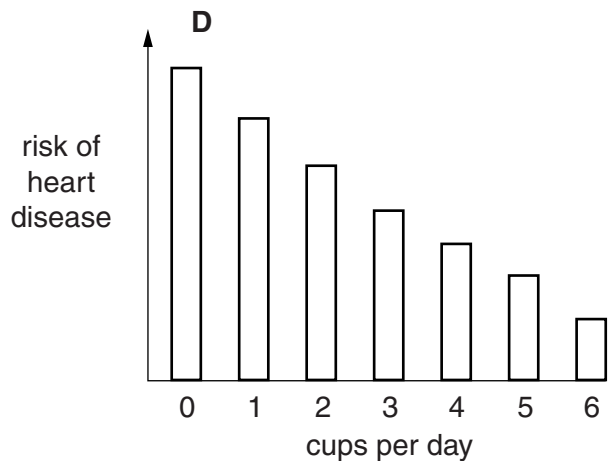
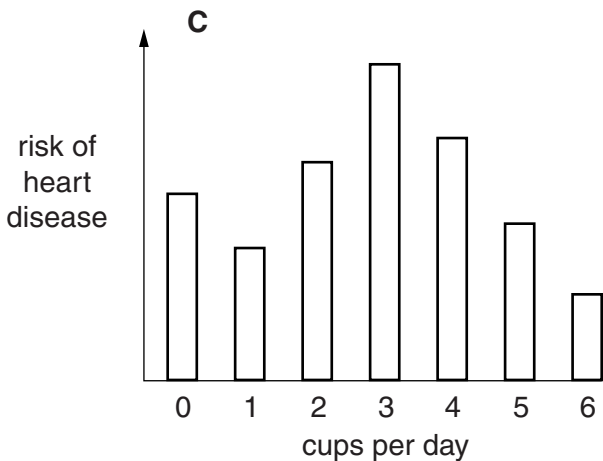
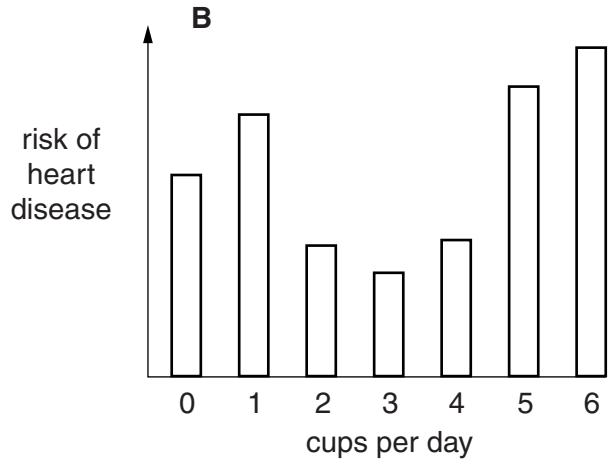
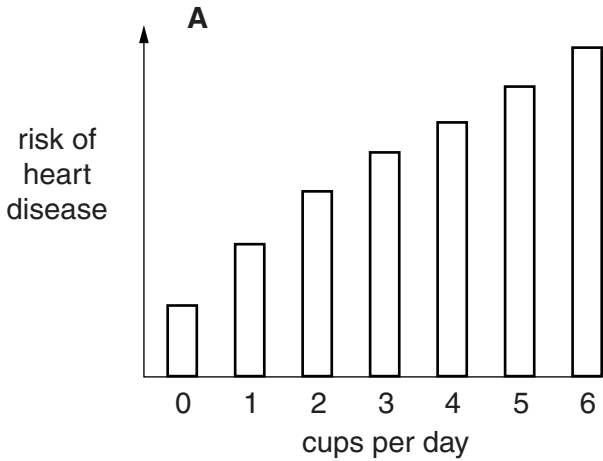
... an artery carrying blood to the heart muscle.

... a vein carrying blood away from the heart muscle.

... an artery carrying blood away from the heart muscle.

[1]

- (d) The scientists think that tea and coffee contain **two** different types of substance connected to heart disease.
 Substance 1 **protects** against heart disease.
 Substance 2 **increases** the risk of heart disease.
 The scientists think that the benefits of substance 1 only outweigh the increased risk due to substance 2 when a person drinks between **two and four** cups a day.
 Here are four graphs, **A, B, C** and **D**.



Write down the letter, **A, B, C** or **D**, of the graph which supports the scientists' conclusion.

answer

[1]

- (e) A spokesperson for the British Heart Foundation said, "having a cigarette with your tea or coffee could completely cancel any benefits".
 Suggest three **other** lifestyle factors that could increase someone's risk of heart disease.

1

2

3

[1]

[Total: 7]

9 Annie has a sore throat and goes to see her doctor.

The doctor says the sore throat is caused by a microorganism.

(a) Put ticks (✓) in the boxes next to the **two best** statements that describe how some microorganisms can make us ill.

Microorganisms...

... can reproduce asexually.

... contain antibodies.

... produce poisons.

... are very small.

... can damage cells.

[1]

(b) Annie's doctor tells her that the sore throat is caused by a virus.

The doctor refuses to give her antibiotics to treat her sore throat.

The doctor explains why to Annie.

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

Antibiotics do not kill viruses.

Using antibiotics unnecessarily increases antibiotic resistance.

Using antibiotics will make the virus resistant.

Antibiotics encourage bacterial growth.

[1]

(c) Annie's sore throat is a mild infection and she will get better.

Some diseases caused by viruses, such as measles, are much more serious.

Here are some statements about measles and vaccination.

Measles infections can be fatal. Measles causes damage to the nervous system in 1 in 1000 cases.

Measles is very infectious.

Most doctors recommend that babies are vaccinated at around 12 to 15 months old.

About 20% of vaccinated babies suffer mild side-effects such as a rash.

Annie has a daughter who is 12 months old.

Explain to Annie why having her daughter vaccinated benefits her daughter and society as a whole.

.....

.....

.....

..... [3]

(d) Annie wants to know how the vaccine works.

Put ticks (✓) in the **two** boxes that explain how the vaccine works.

The vaccine...

- ... causes white blood cells to make viruses.
- ... contains white blood cells.
- ... contains antibodies.
- ... causes white blood cells to make antibodies.
- ... contains a safe form of the measles virus.
- ... acts as a barrier stopping the measles virus entering the body.

[2]

[Total: 7]

END OF QUESTION PAPER

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