

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

A214/01

Unit 4: Ideas in Context
(Foundation Tier)

Candidates answer on the question paper
A calculator may be used for this paper

OCR Supplied Materials:

- Insert (inserted)

Other Materials Required:

- Pencil
- Ruler (cm/mm)

**Wednesday 10 June 2009
Afternoon**

Duration: 45 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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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.

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 **40**.
-  Where you see this icon you will be awarded a mark for the quality of written communication in your answer.
- This document consists of **8** pages. Any blank pages are indicated.

Answer **all** the questions.

This question is based on the article 'Does homeopathy really work?'.

- 1 (a) Homeopathic doctors say that they treat 'like with like'.

Explain what they mean by this.

.....
 [1]

- (b) The dilution table in the insert shows how a homeopathic solution is prepared.

Each dilution makes the solution 100 times less concentrated.

- (i) How many dilutions are done to produce the final medicine?

..... [1]

- (ii) The dilution table shows that no molecules of the original substance remain in a typical dose. But an actual dose **may** contain one or more molecules.

Explain why.

.....
 [1]

- (c) (i) What explanation is given by **homeopathic doctors** of how their medicine works?

.....

 [2]

- (ii) How do **conventional doctors** explain how people get better after having homeopathic medicine?

.....

 [2]

3

- (d) Homeopathic doctors claim that their treatments will help people to get better.

Read the statements from Jane, Ranjit, Peter and Stella.

- (i) Which **one** person is not sure whether the homeopathic medicine worked?

..... [1]

- (ii) Which **one** person makes a statement which does **not** support homeopathic doctors' claims?

..... [1]

- (iii) Which **one** person makes a statement which clearly supports homeopathic doctors' claims?

..... [1]

- (e) A new conventional medicine is tested before doctors are allowed to use it.

The table shows **what happens** at each **stage** of testing, and **why it is carried out**.

Complete the table.

stage	what happens	why it is carried out
1	medicine is tested on human cells	to check that it is suitable for further investigation
2	medicine is tested on live animals	to check how well the treatment works in whole animals
3	trials on healthy volunteers	
4	trials on a small group of people with the disease	

[2]

- (f) Explain why conventional doctors think that homeopathy is risky for a seriously ill patient.

.....

..... [1]

[Total: 13]

This question is based on the article 'Carbon monoxide – the invisible killer'.

- 2 (a) (i) Carbon monoxide is a dangerous gas.

State why carbon monoxide is dangerous.

.....
 [1]

- (ii) The World Health Organisation gives guidelines for the maximum exposure times for different concentrations of carbon monoxide.

What is the maximum exposure time for a carbon monoxide concentration of 52ppm (parts per million)?

..... minutes [1]

- (b) The concentration of carbon monoxide is likely to be higher in a city than in the countryside.

Suggest **two** reasons for this.

One mark is for correct spelling, punctuation and grammar.



.....

 [2+1]

- (c) Look at the graph 'Carbon monoxide emissions by source: 1970 to 2005 – United Kingdom'.

- (i) From 1989 onwards, more and more cars have been made with catalytic converters.

There is a correlation between the use of catalytic converters and the change in carbon monoxide emissions.

Describe this correlation.

.....

 [1]

- (ii) The graph also shows that the carbon monoxide emission from houses has decreased.

Explain why.

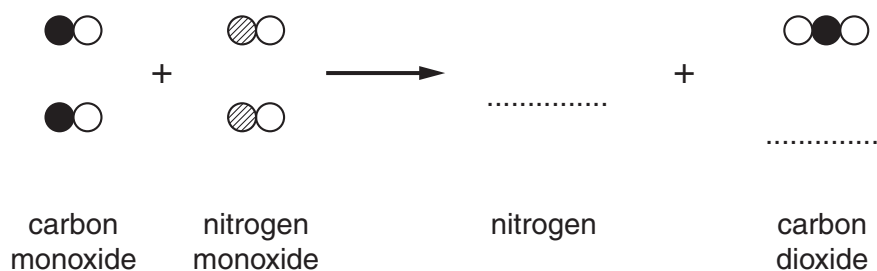
.....

 [2]

5

- (d) In a catalytic converter carbon monoxide reacts with nitrogen monoxide, producing nitrogen and carbon dioxide.

Complete the diagram to show this change.



[2]

- (e) (i) Carbon monoxide released from cars is a health risk for people in cities.

Despite this, the number of cars used in most cities increases each year.

Use ideas of **risk** and **benefit** to explain why.

.....

.....

.....

..... [2]

- (ii) If a gas fire is not serviced regularly, there is a risk that it will release carbon monoxide into the room. This carbon monoxide could reach dangerous levels.

Despite this danger, many people do **not** have gas fires serviced regularly.

Suggest **two** reasons why these people accept the risk.

1

.....

2

..... [2]

[Total: 14]

This question is based on the article 'The risk from microwave radiation'.

- 3 (a) **Extract 1** gives some possible harmful effects of microwave radiation.

Write down **one** of the possible harmful effects.

..... [1]

- (b) A teacher and a student are discussing the safety of the school network.



Mrs Thomson

The school network has a power of only 0.2 W.
Your mobile phone is ten times more powerful, and
you put it right by your ear!

Salim

It's up to me to choose if I use a mobile phone or not.
The school doesn't give me any choice about being
near the wireless network.



- (i) Use what Mrs Thomson says to work out the power of Salim's phone.

Show your working clearly.

power = W [2]

- (ii) Salim is ready to take a risk about mobile phones, but not about the school wireless network.

Suggest **one** good reason why he might think that mobile phones **are** worth the risk, but the school wireless network is **not** worth the risk.

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

- (c) Michael has been reading these two extracts.

This is what he said:



Michael

If people feel ill near a wireless network, there must be a reason for it. They wouldn't be making it up! There has to be a correlation between their illness and the microwave radiation.

- (i) Look at **Extract 1**. This extract does **not** give convincing evidence of a correlation between illness and microwave radiation.

Explain why.

.....
 [1]

- (ii) Describe a method scientists would use to investigate the health effects of microwave radiation.

.....
 [1]

- (iii) Give **one** example from everyday life of a correlation between a factor and an outcome.

Describe this correlation.

factor outcome

correlation

..... [2]

(d) An Essex University study is described in **Extract 2**.

(i) The table contains information on this study.

group	total number in group	number who correctly judged when the radio waves were on
radiosensitive	44	2
not radiosensitive	114	5

The percentage of the radiosensitive group who judged correctly whether the radio waves were on is given by this calculation:

$$\text{percentage} = \frac{2}{44} \times 100 = 4.5\%$$

The extract states, 'The percentage judging correctly was very similar in each case'.

Do a similar calculation for the 'not radiosensitive' group to check if this statement is correct.

.....

 [2]

(ii) The Essex University study described in **Extract 2** was published in a scientific journal.

Before it was published, it had to be peer reviewed.

Explain what 'peer review' means.

.....

 [2]

[Total: 13]

END OF QUESTION PAPER

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