Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

A214/01

TWENTY FIRST CENTURY SCIENCE

SCIENCE A

Unit 4: Ideas in Context

(Foundation Tier)

WEDNESDAY 10 JUNE 2009: Afternoon
DURATION: 45 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

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)

READ INSTRUCTIONS OVERLEAF

DC (AC) OV90897 12812/1

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **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.**

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.**

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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 <u>HOMEOPATHIC DOCTORS</u> of how their medicine works?

_____

_____

_____ **[2]**

(ii) How do <u>CONVENTIONAL DOCTORS</u> explain how people get better after having homeopathic medicine?

_____

_____

_____ **[2]**

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

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

(i) Which <u>ONE</u> person is not sure whether the homeopathic medicine worked?

_____ **[1]**

(ii) Which <u>ONE</u> person makes a statement which does not support homeopathic doctors' claims?

_____ **[1]**

(iii) Which <u>ONE</u> 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]

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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 52 ppm (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.

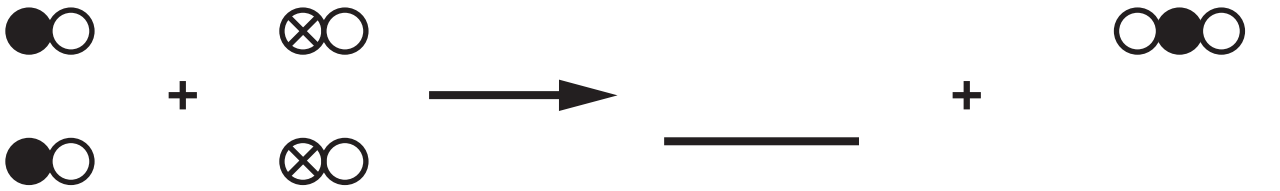
_____

_____

_____ **[2]**

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

Complete the diagram to show this change.



carbon monoxide **nitrogen monoxide** **nitrogen** **carbon dioxide**

[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 <u>RISK</u> and <u>BENEFIT</u> 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 0.2W. 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 <u>ONE</u> good reason why he might think that mobile phones <u>ARE</u> worth the risk, but the school wireless network is <u>NOT</u> 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 <u>ONE</u> 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 <u>EXTRACT 2</u> 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