

**H****A214/02**

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
SCIENCE A

Unit 4 Ideas in Context (Higher Tier)

MONDAY 12 MAY 2008

Afternoon
 Time: 45 minutes

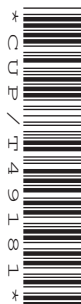
Candidates answer on the question paper.

Additional materials (enclosed):

Insert

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)



Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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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.
- 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 **40**.
-  Where you see this icon you will be awarded a mark for the quality of written communication in your answer.

FOR EXAMINER'S USE

Qu.	Max.	Mark
1	13	
2	13	
3	14	
TOTAL	40	

This document consists of **8** printed pages and an insert.

Answer **all** the questions.

This question is based on the article 'Is PVC safe for our children?'

- 1 (a) (i) The European Union has decided that
- phthalate plasticizer cannot be used in PVC to make toys for babies and small children
 - phthalate plasticizer can be used in PVC for articles used by adults.

Use ideas of **risk** and **benefit** to explain this difference.

.....

[2]

- (ii) Some toy manufacturers claim that it is safe to use phthalates to soften PVC used for children's toys.

Give one piece of evidence **for** this claim and one piece of evidence **against** it.

for

 against
[2]

- (b) The article says, 'we will not know if there are toxic effects in humans until after 2010.'

Explain why.

.....

[2]

- (c) Some people have suggested that there is a higher risk when using PVC containing phthalates for wrapping foods such as butter and cheese than for wrapping foods such as tomatoes and carrots.

Explain why.

.....

[2]

3

- (d) A consumer group has suggested that people may wish to buy cling film made from poly(ethene) rather than PVC containing phthalates.

Use the **precautionary principle** to explain why this may be a good idea.

.....

[1]

- (e) Scientists investigated the effect of a plasticizer on the flexibility of PVC. They measured the bending of PVC containing different amounts of the plasticizer. They used the apparatus shown in the article.

Their results are shown in the table.

% plasticizer in PVC	bending of PVC in mm						
	sample 1	sample 2	sample 3	sample 4	sample 5	sample 6	best estimate
0	12	14	14	13	5	12	13
5	17	16	18	18	17	16	17
10	26	23	24	24	33	23	

- (i) The scientists obtained best estimates for the bending of PVC containing 0% and 5% plasticizer by working out the mean of the results in each case.

Use this method to work out a best estimate for the bending of PVC containing 10% plasticizer.

You are advised to show your working.

best estimate = mm [2]

- (ii) There is a **real difference** between the best estimates for the bending of PVC containing 0% plasticizer and PVC containing 5% plasticizer.

Explain how the results show this.

.....

[2]

[Total: 13]

This question is based on the article 'Herceptin: a new cancer treatment'

- 2 (a) (i) Phase 1 drug trials are the first step in finding out about the effectiveness of the drug.
- Suggest two reasons, **apart from the fact that there is no other available treatment**, for patients volunteering to take part in a phase 1 cancer drug trial.
- 1
-
- 2
-[2]
- (ii) Phase 3 trials give researchers more reliable information on the effectiveness of new drugs than phase 1 or 2 trials do. Give **two** reasons for this.
- 1
-
- 2
-[2]
- (iii) Trials of cancer drugs often have a 4th phase or long follow-up studies so that scientists can draw firm conclusions.
- Why is this?
-
-
-
-
-[2]

5

- (b) (i) Use the article to give arguments **for** and **against** the use of Herceptin for patients with early stage breast cancer.

for

.....

.....

against

.....

.....[4]

- (ii) Herceptin is an expensive drug.
Explain how Herceptin may have long term **economic** benefits.

.....

.....

.....

.....

.....[2]

- (iii) Why are drugs not available for prescription until **after** they have been licenced?

.....

.....

.....

.....[1]

[Total: 13]

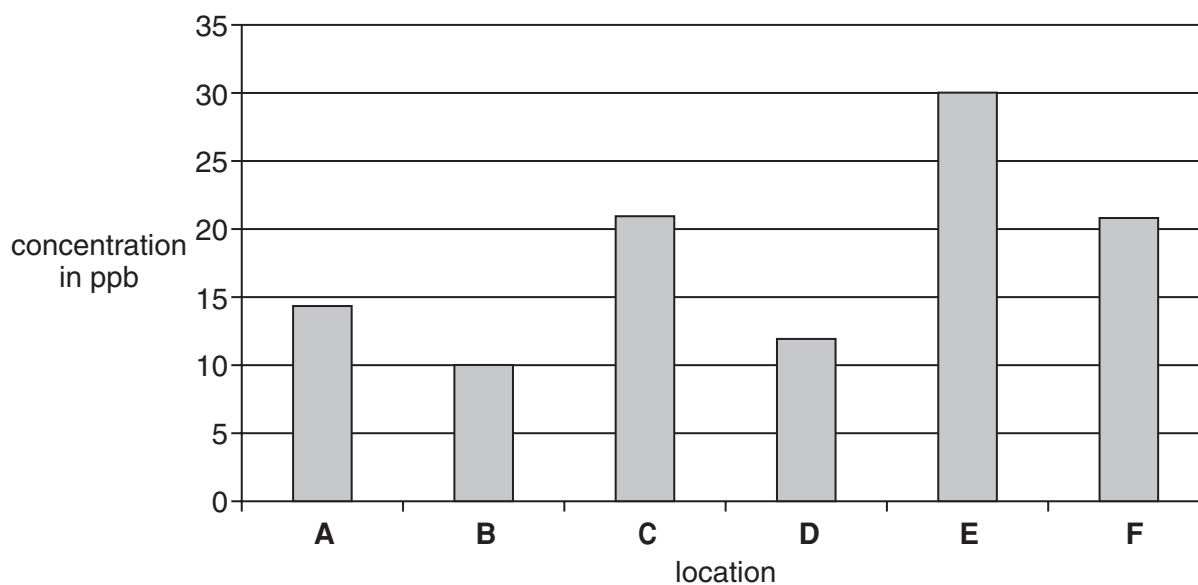
This question is based on the article 'How did the dinosaurs die?'

- 3 (a) Concentrations of the element iridium were measured in samples of rocks from different parts of the Earth.

The results are shown in the bar chart below.

All of the samples came from the boundary layer between the Cretaceous and Tertiary rocks. Each result is the mean of many measurements.

iridium concentrations in the Cretaceous-Tertiary boundary rocks



- (i) Write down the **range** of these values.

..... to [1]

- (ii) The mean of the measurements taken at location **B** was 10 parts per billion (ppb).
Not all the measurements taken at **B** had this value.
Suggest **two** reasons why.

1

.....

.....

2

.....

.....[2]

- (iii) The concentration of the element iridium in most rocks of the Earth's crust is about 0.3 parts per billion (ppb).
The article states that the concentration of iridium in the boundary layer is 'many times higher than the concentration of iridium in other parts of the rocks'.
Show that the article is correct.

.....

[2]

- (iv) This map of the Earth shows where the results **A, B, C, D, E** and **F** in the bar chart were obtained.

Chicxulub in Mexico, where the asteroid is thought to have hit the Earth, is marked on the map.



A scientist suggests that there is a **correlation** between iridium concentration and distance from the point of impact of the asteroid.
Explain carefully whether the data supports this suggestion.

.....

[2]

- (b) When scientists create new theories, they need to show imagination and creativity. Give **one** example of this from the article.

.....
[1]

- (c) When Walter and Luis Alvarez published their asteroid theory for the extinction of the dinosaurs, it took some time to be accepted. Use the article to suggest **one** reason why the scientific community did not accept this theory straight away.

.....
[1]

- (d) The asteroid theory is now thought by many in the scientific community to be correct. However, some scientists still do not believe the asteroid theory. Use the article to suggest reasons why there are two different opinions in the scientific community about the way in which the dinosaurs became extinct. One mark is for correct spelling.



.....

[4+1]

[Total: 14]

END OF QUESTION PAPER

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