

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

**A214/01**

Unit 4 Ideas in Context (Foundation 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

--	--	--	--

**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	
<b>TOTAL</b>	<b>40</b>	

This document consists of **11** printed pages, **1** blank page and an insert.

Answer **all** the questions.

**This question is based on the article ‘Is PVC safe for our children?’**

- 1 (a) (i) PVC is used to make window frames and soft toys.  
Name **two** other products mentioned in the article that are made from PVC.

1 .....

2 ..... [2]

- (ii) Plasticizer is added to the PVC used to make soft toys. Plasticizer is **not** added to the PVC used to make window frames.

Explain why plasticizer is **not** added to the PVC used to make window frames.

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

- (b) 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	25	23	23	

- (i) The scientists tested six samples of PVC for each percentage of plasticizer.  
 Explain why they tested several instead of just one sample for each percentage.

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

- (ii) 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]

- (iii) When the scientists worked out the mean for PVC with 0% plasticizer, they decided not to use the measurement for sample 5.

Explain why.

.....  
.....[1]

- (c) (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 in 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]

[Total: 13]

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

2 (a) (i) Why might patients volunteer to take part in a phase 1 cancer drug trial?

.....[1]

(ii) What two things can we find out from a phase 2 trial that we do not know from a phase 1 trial?

1 .....

.....

2 .....

.....[2]

(iii) 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]

(iv) 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]

(b) Opinions differ over the use of Herceptin for women with early stage breast cancer. These doctors are discussing the use of Herceptin.


**Dave**  
Herceptin has been used successfully to treat women with advanced breast cancer. It should be effective in early stages also, but it is very expensive.




**Caroline**  
Herceptin is not licensed or recommended by NICE for early breast cancer.




**Julian**  
The hearts of patients taking Herceptin have to be monitored.



**Marion**  
Many women with early breast cancer would like to take Herceptin.



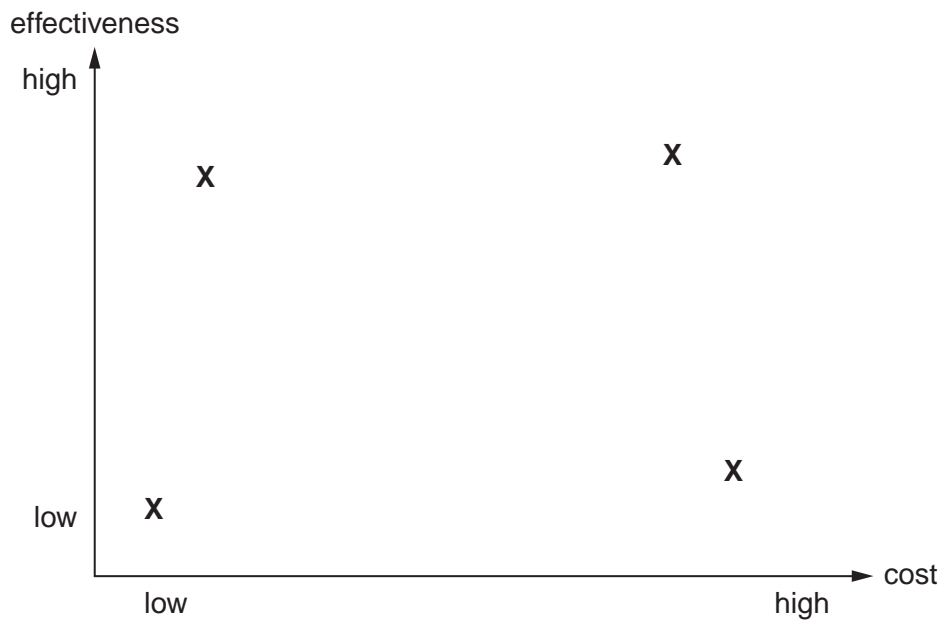
**Robert**  
Research trials have shown that Herceptin can reduce the chance of cancer reoccurring after surgery.



- (i) Which doctor is talking about official regulations?  
.....[1]
- (ii) Two of these doctors are using ideas about **correlation** and **cause** to support giving Herceptin to patients with early breast cancer. Name these two doctors.  
..... and .....[2]
- (iii) Write down two reasons stated by these doctors for **not** giving Herceptin to patients.  
1 .....  
2 .....[2]

- (c) NICE must decide which drugs the NHS uses.  
This is based on how effective the drug is at curing disease and how much it costs.

The graph shows the NICE analysis for four drugs.



Put a ring around the drug most likely to be recommended by NICE.

[1]

[Total: 13]

**7**  
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**PLEASE DO NOT WRITE ON THIS PAGE**

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

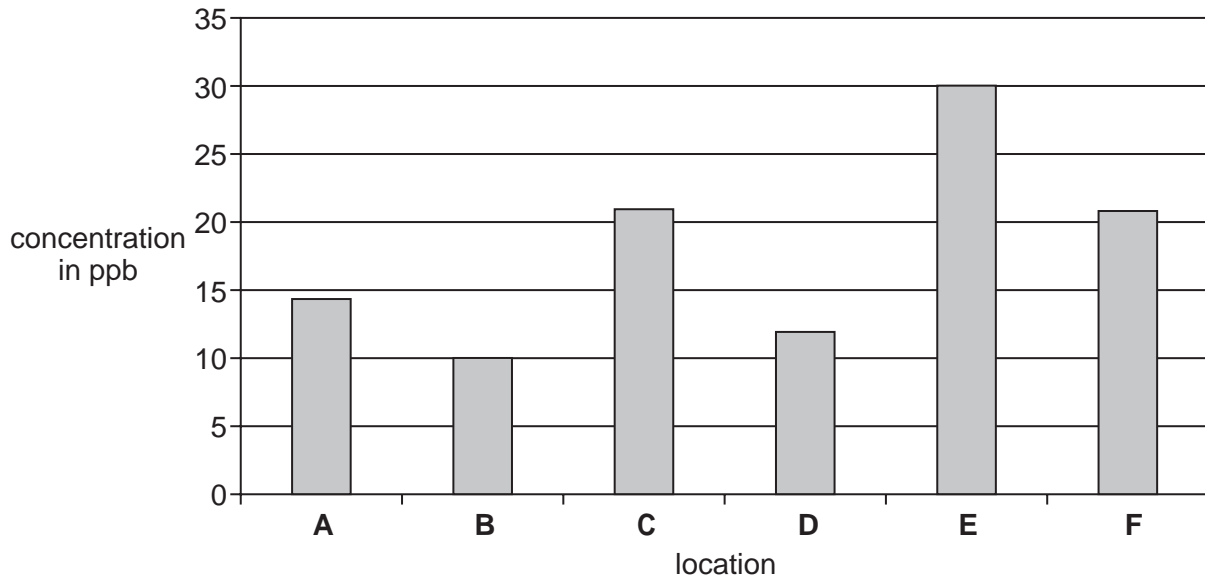
- 3 (a) Concentrations of the element iridium were measured in samples of rocks from different parts of the Earth.

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 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]



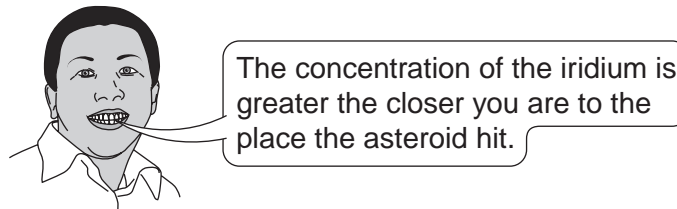
This map of the Earth shows where the results **A**, **B**, **C**, **D**, **E** and **F** in the bar chart were obtained.

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



(iii) Put a ring around the letter on the map showing where the concentration of iridium was greatest. [1]

(iv) One scientist says:



Use the map and the bar chart to argue **against** this scientist's statement.

.....

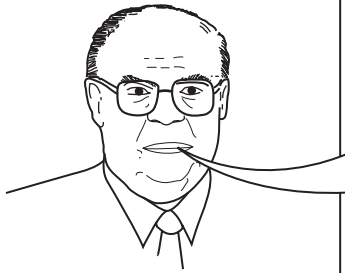
.....

.....[1]

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

.....  
.....[1]

- (ii) The Earth scientist in the article does not believe the asteroid theory. Complete the speech bubble below to give good scientific reasons why this other scientist doesn't think it is true.



I agree with the Earth scientist in this article.  
I think the dinosaurs were killed off by .....  
.....  
I don't believe the asteroid which landed in Chicxulub in Mexico was the cause, because .....  
.....  
.....  
.....  
.....

[2]

(c) Luis Alvarez thought that an asteroid killed off the dinosaurs.

(i) How does the **size** of an **asteroid** compare with the size of the **Sun** and the **planets** in the Solar System?

Write them in the spaces below in **order of size**, with the smallest first.

..... (smallest) ..... (largest) [1]

(ii) Asteroids, comets and moons are all parts of the Solar System.

1 Describe one difference between an asteroid and a moon

.....

2 Describe one difference between an asteroid and a comet

.....[2]

(iii) Asteroids sometimes come close to the Earth.

Scientists watch out for asteroids that could possibly hit the Earth.

Explain why scientists are worried about the effect of an asteroid hitting the Earth.

One mark is for correct spelling.



.....  
.....  
.....  
.....  
.....[2+1]

END OF QUESTION PAPER

[Total: 14]

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