

Thursday 24 May 2012 – Morning

**GCSE 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.

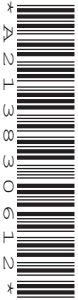
Duration: 45 minutes

OCR supplied materials:

- Insert (inserted)

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

- The Insert will be found in the centre of this document.
- 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 **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.

1 This question is based on the article “Particulate perils”.

(a) Particulates are linked to several diseases.

(i) Name **two** of these diseases.

1

2

[1]

(ii) Scientists think that particulates less than 10 micrometres in diameter are very harmful.

Explain why.

.....

.....

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

(b) How does burning fossil fuels release particulates into the air?

.....

.....

.....

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

(c) Suggest how an increase in particulate concentration in the air may cause a rise in sea level.

.....

.....

.....

..... **[3]**

(d) The ‘Boston study’ discovered a correlation involving particulates.

Complete the sentence to describe this correlation.

As the increases

the rises.

[1]

(e) Look at the graph of PM_{10} concentration in a European city centre from 1st to 6th January 2010.

(i) On some days the PM_{10} concentration measured at any one time **never** reached the daily average limit set for Europe.

On which days was this the case?

..... [2]

(ii) At each time on each day, the scientists measured the PM_{10} concentration once.

Describe how they could get a better estimate of the PM_{10} concentrations.

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

[Total: 13]

2 This question is based on the article “Scientist knows his own future”.

The article is about gene mapping.

(a) It is now possible to map a person’s genes.

(i) Explain what a gene is.

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

(ii) The first paragraph refers to Stephen Quake having his genes mapped.

Explain what this means.

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

(b) The gene mapping shows that Stephen is at risk of ‘sudden death syndrome’.

This means that there is an increased risk of him dying suddenly.

(i) Describe **two** implications that Stephen will have to think about.

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

(ii) Explain why **gene therapy** may be important for Stephen.

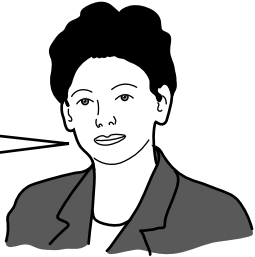
.....
..... [1]

(c) Four people are talking about the article.



Mike
It's hard to decide if finding out your own future risks for genetic diseases is the right thing to do, or not.

Anita
Who cares whether diseases are inherited or caught from somebody else? Either way you end up being ill.



Peter
Knowing your own genetic future is not right. It's only for God to know what lies ahead for us.

Mary
It may soon be possible to treat diabetes with genetic engineering.



(i) Which person is saying that certain actions are never justified because they are unnatural or wrong?

name [1]

(ii) Which person is stating something that could be addressed using a scientific approach?

name [1]

(iii) Which **two** people are talking about ethical issues?

name and [1]

- (d) When talking about gene mapping, Stephen said that this issue raises “many questions that need to be addressed”.

State clearly what issue Stephen is talking about and summarise **two** different views that might be held.



One mark is for presenting different points of view on the issue.

.....

.....

.....

.....

.....

..... [2+1]

- (e) Two people have their genes mapped. They are told that they have an equal risk of developing the same genetic disease.

Explain why one person may develop the disease whilst the other may not.

.....

.....

..... [2]

[Total: 14]

3 This question is based on the article "Observing the night sky".

(a) Sam is an astronomer.



Write down two ways in which Sam can tell that what she is looking at is likely to be a comet, **not** a star.

- 1
- 2 [2]

(b) The invention of the telescope allowed astronomers to make new discoveries.

Write down two discoveries made using a telescope that are mentioned in the article.

- 1
- 2 [2]

(c) The Solar System was formed from a nebula.

Write down what this nebula contained.

..... and [2]

(d) When Shapley and Curtis had their debate about stary nebulae, no-one knew who was right.

Who was right?

What was his idea, and what evidence showed that he was right?

.....

.....

..... [2]

(e) Scientific explanations often lead to predictions, which can be tested by new observations.

This happened to the explanations given by Shapley and Curtis.

Using the article, give **another** example of a prediction and an observation that tested it.

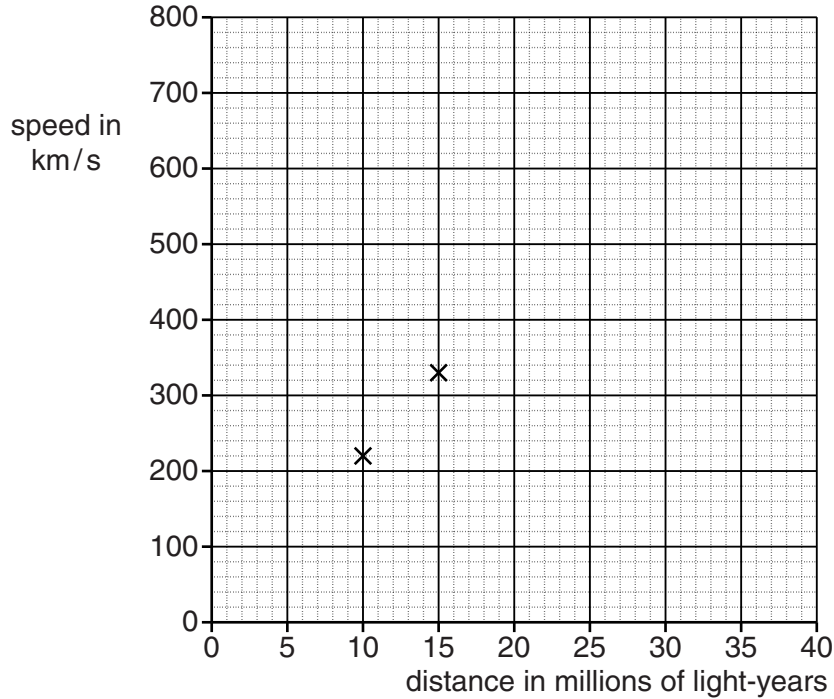
prediction

observation [1]

- (f) The table gives the distances to different galaxies and the speeds at which they are moving away from us.

distance in millions of light-years	10	15	22	31	35
speed in km/s	220	330	500	650	750

- (i) Plot the data on the graph. Two points have been plotted for you. [2]



- (ii) Draw a straight line of best fit through the data on the graph. [1]

- (iii) A galaxy is moving away from us at a speed of 300 km/s.

Use your graph to find the distance to this galaxy.

distance = million light-years [1]

[Total: 13]

END OF QUESTION PAPER

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