

Applying Mathematics

Sample assessment material

Paper 1 – Additional questions

- 1a Find the rate of decay of Carbon 14 when a living organism dies.
- b Show that 11 460 years after the death of a living organism the rate of decay of Carbon 14 will be approximately one quarter of its initial rate.
- 2a If you know the rate of decay, a cpm per gram, of Carbon 14 in a material, show that its age, t thousand years, is given by

$$t = \frac{\log a - \log 15.3}{\log 0.886}.$$

- b i Sketch a graph of t against a with a on the horizontal axis.
- ii State clearly how this is geometrically related to the graph given in the article.



Applying Mathematics

Assessing use of notation and presentation of mathematical argument / working

Notation

0 marks	Throughout no care has been taken with the use of notation, labeling of graphs, use of units etc.
1 mark	For limited correct use of notation, scaling of axes, use of units etc, across about half of the paper
2 marks	For correct use of notation, scaling of axes, use of units etc, across about three-quarters of the paper
3 marks	For correct use of notation, scaling of axes, use of units etc, throughout the paper, allowing at most a few minor slips

Mathematical argument / working

0 marks	Mathematical working throughout is presented in such a way that the reader has difficulty in following the writer's argument
1 mark	When mathematical argument and clarity are sustained across about half of the paper
2 marks	When mathematical argument and clarity are sustained across about three quarters of the paper
3 marks	When the paper as a whole, allowing for minor lapses, is clearly presented and is logical in its development of argument



Teacher Notes

Unit Advanced Level, Applying mathematics

Notes

The purpose of this activity is to familiarise students with the additional 6 marks that are awarded on Applying Mathematics Paper 1 for the presentation of work.

The questions on Page 1 are based on the sample comprehension activity (Radioactive Decay) which can be downloaded from www.qca.org.uk/nq/subjects/as_use_mathematics.asp Ideally students will already have completed the sample comprehension activity - these questions are intended as an extension.

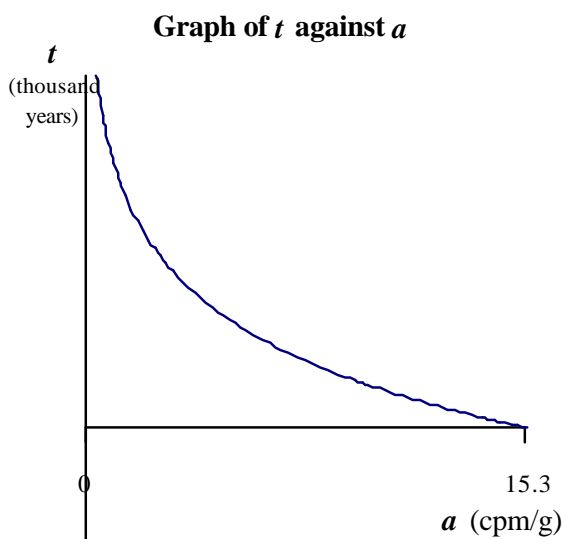
The way in which marks for presentation are allocated is described on Page 2. This page can be copied onto an OHT and used in class discussion before students attempt the additional questions. It is suggested that students are asked to work through the additional questions paying particular attention to presentation issues. (Page 1 can be copied onto an OHT or alternatively a paper copy can be given to each student.)

Having written their answers (allow about 15 minutes) the students can then be asked to work in pairs suggesting what marks they would award each other's work for the use of notation and presentation of mathematical argument / working.

Answers

1 a 15.3 cpm/g

2 a



In general the main points to be considered for presentation marks are:

- the use of correct notation
eg powers 0.886^t (not $0.886t$)
- correct use of "=" (and any other signs/symbols used)
- the inclusion of units in answers where appropriate
- scales and/or intercepts given on the axes of graphs
- labels on the axes of graphs
- working that is easy to follow (with incorrect working crossed out)
- the use of words and/or mathematical notation such as \Rightarrow to link mathematical arguments.

b This graph is the reflection of the original graph in $y = x$

