



Rewarding Learning

ADVANCED

General Certificate of Education

Centre Number

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Candidate Number

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Life and Health Sciences

Assessment Unit A2 3

assessing

Medical Physics

[AZ031]

Assessment



AZ031

TIME

1 hour 45 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You may use an electronic calculator.

Quality of written communication will be assessed in question **2(b)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total Marks	
--------------------	--

2 A patient's body temperature is to be monitored over a period of time as part of a routine diagnostic investigation.

(a) Name two different types of **digital** thermometers and describe how each is used to measure body temperature.

1. _____

2. _____

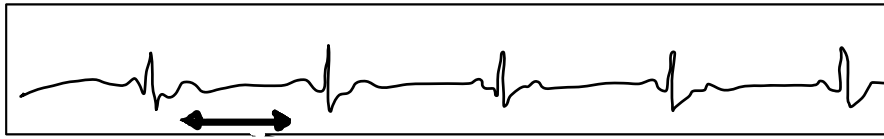
_____ [4]

Examiner Only	
Marks	Remark

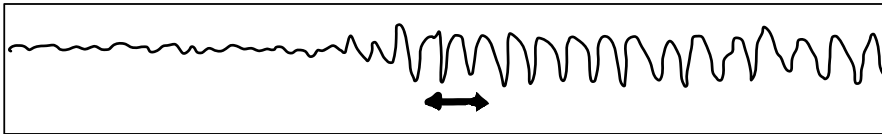
BLANK PAGE

(b) Below is a series of images, A, B, C, D, E, F and G, which demonstrate either an ECG examination or EEG examination.

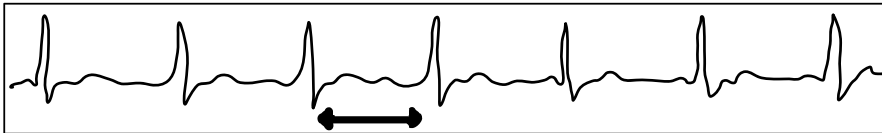
A double headed arrow has been placed beside each image to indicate a time of 1 second.



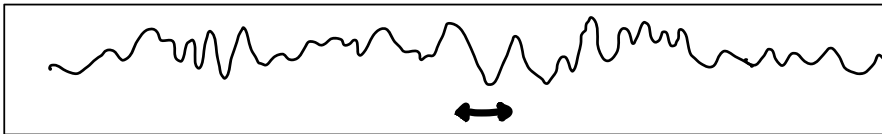
A



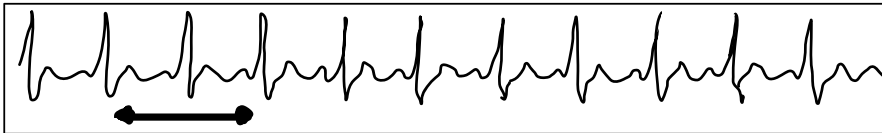
B



C



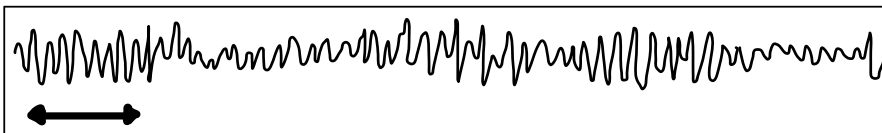
D



E



F



G

Source: Principal Examiner

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

- (b) The experiment is completed and a set of results are obtained. Some of these are shown in the table below.

Time /s	20	40	60	80	100	120	140
Activity /Bq	360	297	245	200	165	137	113

Complete a graph of Activity against Time as follows:

- (i) Choose a suitable scale for the x-axis and label the axis. [1]

- (ii) Plot a graph of Activity against Time. [2]

- (iii) Draw a best fit line. [1]

- (iv) Use the graph to estimate a value for the initial activity.

Show evidence on the graph.

_____ [2]

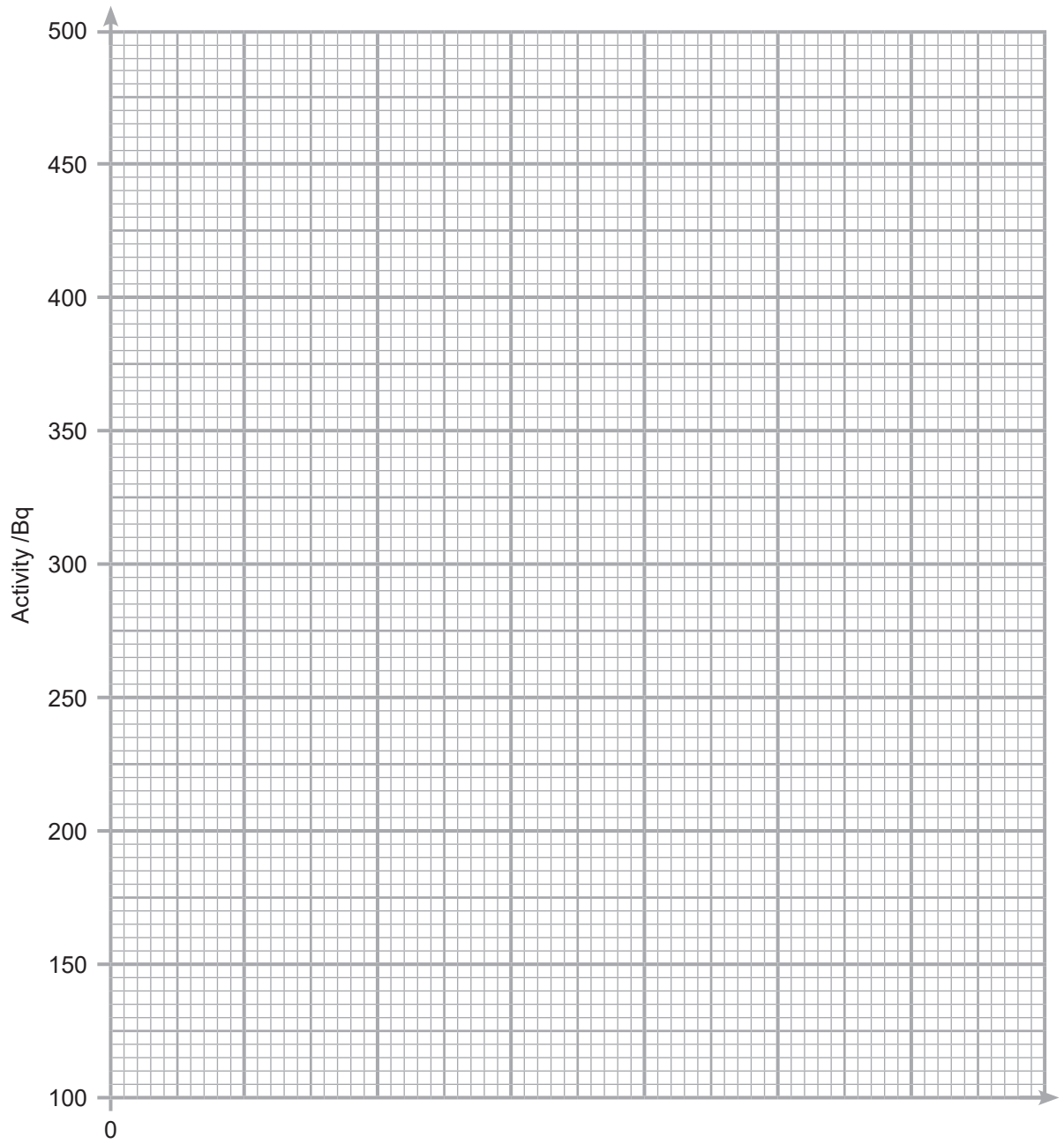
- (v) Use the graph to estimate the half-life of the sample of protactinium.

Show evidence on the graph.

Half-life = _____ s [2]

Examiner Only

Marks Remark



(d) An alternative method of investigating the heart is by using ultrasound. Discuss the advantages of using ultrasound to investigate the heart as compared to other methods.

[2]

Examiner Only	
Marks	Remark

7 The ease with which ultrasound can travel through a material depends on a property of the material called acoustic impedance.

(a) (i) Define specific acoustic impedance.

_____ [1]

(ii) Choose values from the table below to calculate the specific acoustic impedance of water. Include a unit.

Material	Density /kg m ⁻³	Speed of sound /ms ⁻¹
Air	1.2	330
Water	1000	1450
Bone	1500	4000

You are advised to show your working.

Specific acoustic impedance = _____ [3]

Examiner Only	
Marks	Remark

(iii) How many days will it take for the sample to register an activity of one-tenth of its initial value?

You are advised to show your working.

Time = _____ days [3]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

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