CUMULATIVE FREQUENCY

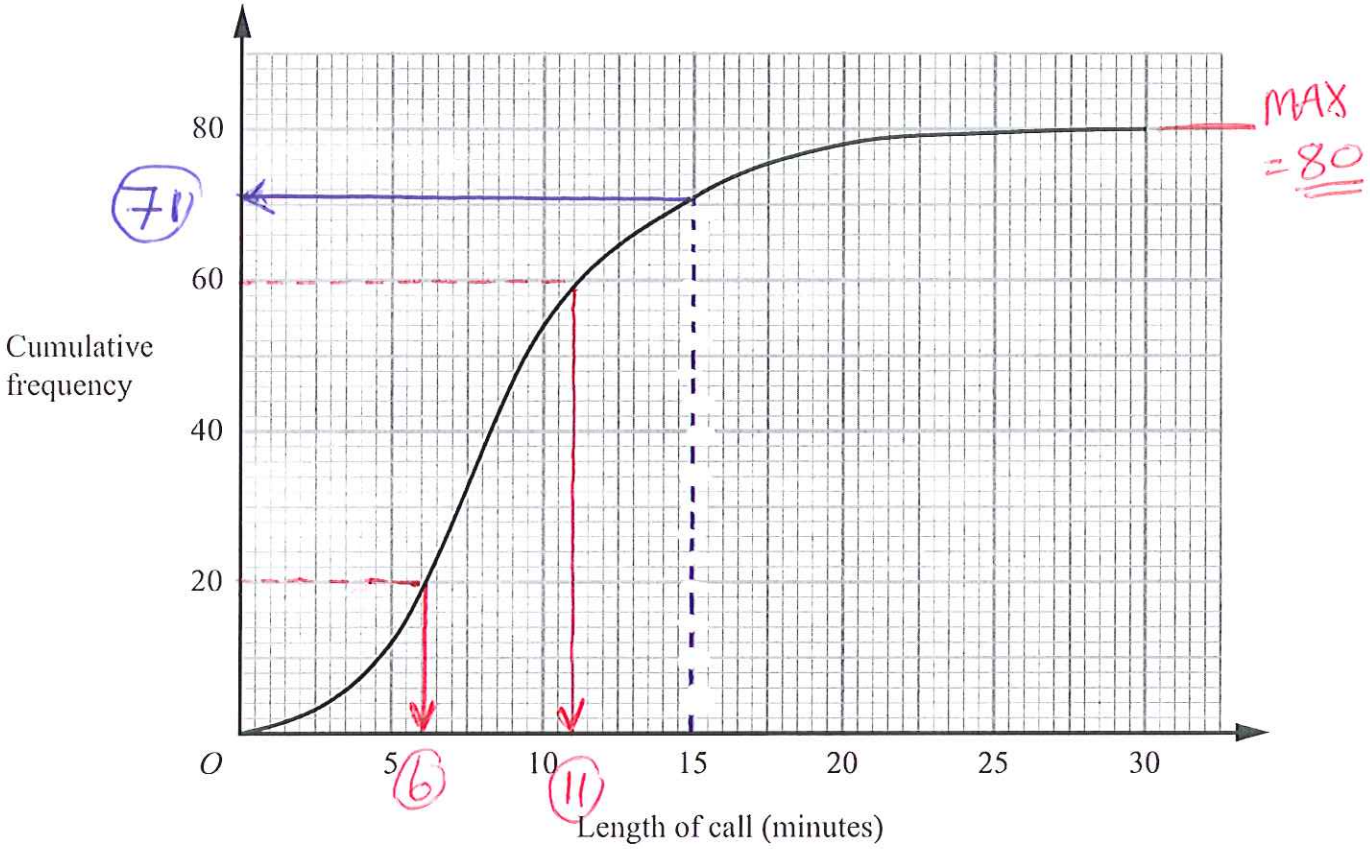
DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 37

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2012] Cumulative Frequency (Inc Interquartile Range) **[4 Marks]**

The cumulative frequency graph gives information about the lengths, in minutes, of 80 telephone calls.



(a) Find an estimate for the number of calls which were longer than 15 minutes.

80 − 71 (M1)

9 (A1)

.....

(2)

(ACCEPT 9 → 10)

(b) Find an estimate for the interquartile range of the lengths of the 80 calls.

$Q_1 = \frac{80}{4} = 20$TH $= 6$

$Q_3 = 3 \times \frac{80}{4} = 60$TH $= 11$

(M1)

$Q_3 - Q_1 = 11 - 6$

5 (A1)

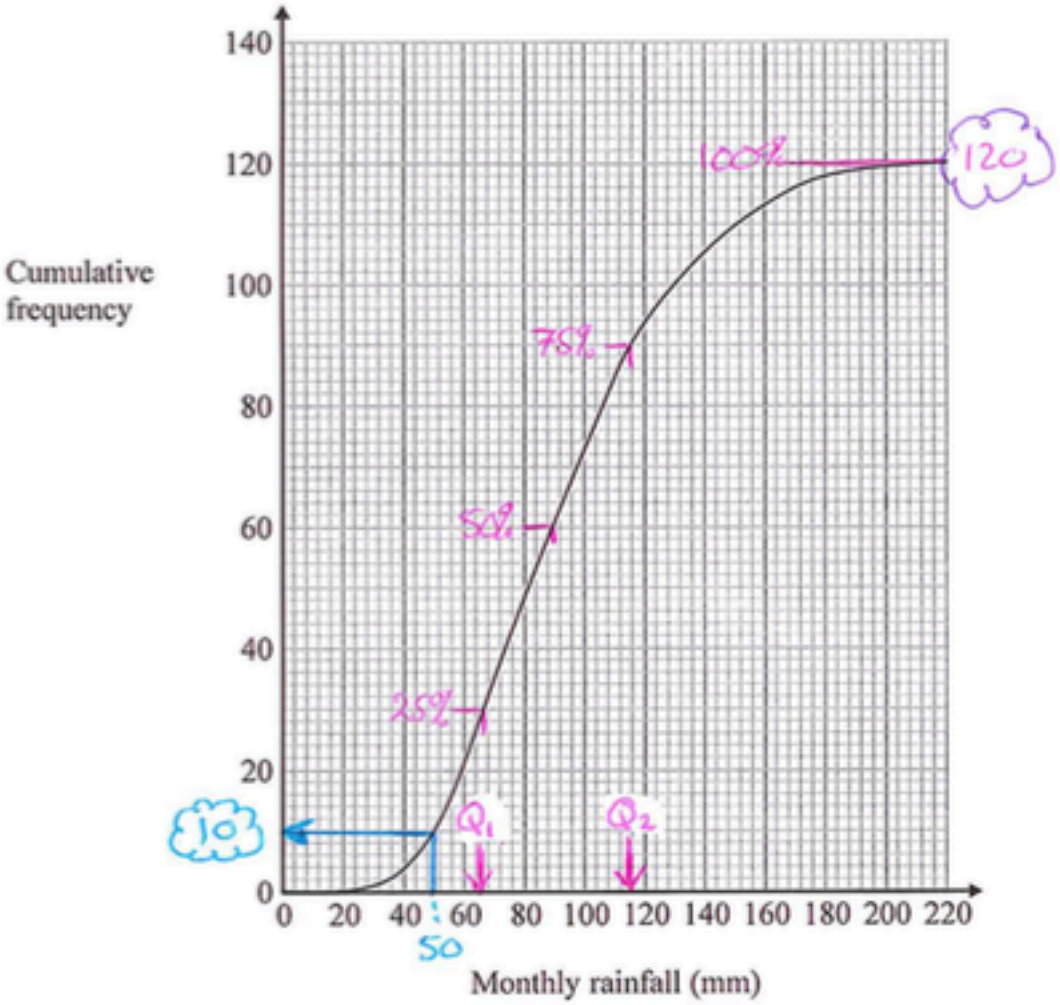
..... minutes

(2)

(ACCEPT 4.5 → 5.5)

2. [Edexcel, 2014] Cumulative Frequency (Inc Interquartile Range) **[4 Marks]**

The cumulative frequency graph gives information about the monthly rainfall, in millimetres, in the United Kingdom during 120 months in the years 2001 to 2010.



(a) Use the graph to estimate the number of months for which rainfall was less than 50 mm.

10 A1

(1)

(b) Use the graph to find an estimate for the median monthly rainfall.

$\frac{120}{2}$ = 60TH VALUE

90 A1 mm

(1)

(c) Use the graph to find an estimate for the interquartile range of the monthly rainfall.

IQR = $Q_3 - Q_1$

= 116 − 66 M1

50 A1 mm

(2)

3. [Edexcel, 2013] Cumulative Frequency (Inc Interquartile Range) **[4 Marks]**

The cumulative frequency table shows information about the diameters of 60 oranges.

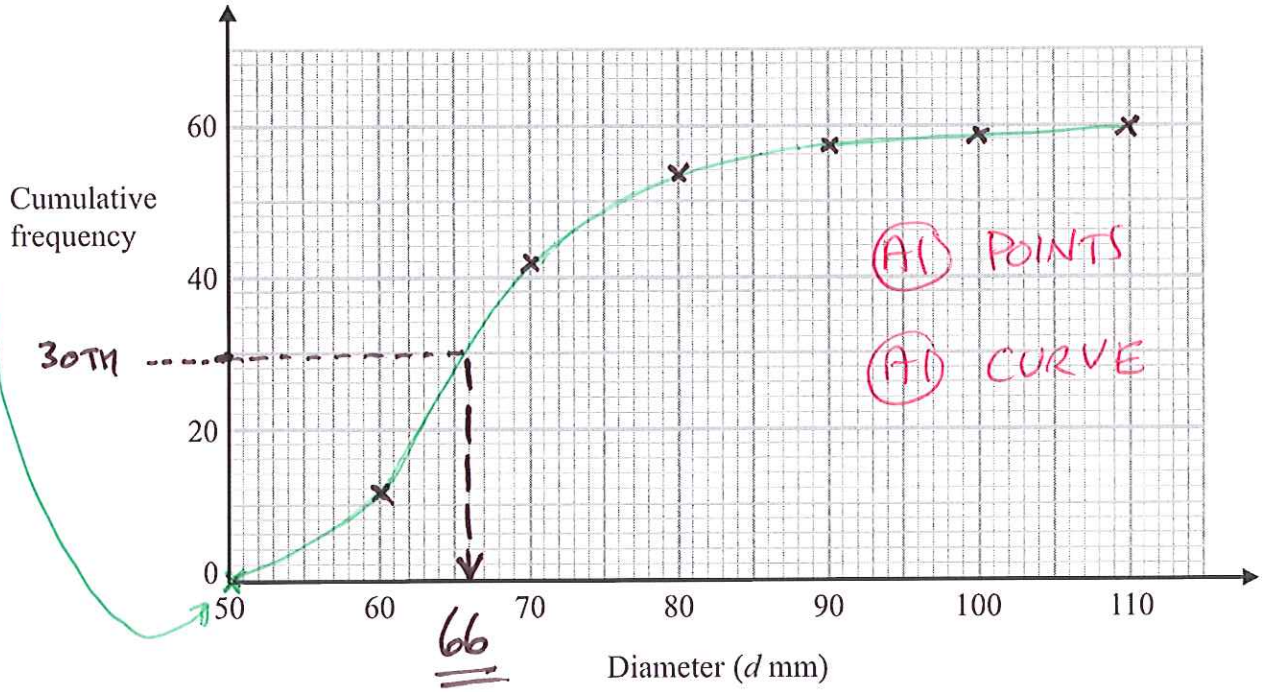
Diameter (d mm)	Cumulative frequency
$50 < d \leqslant 60$	12
$50 < d \leqslant 70$	42
$50 < d \leqslant 80$	54
$50 < d \leqslant 90$	57
$50 < d \leqslant 100$	59
$50 < d \leqslant 110$	60

COORDINATES
(60, 12)
(70, 42)
(80, 54)
(90, 57)
(100, 59)
(110, 60)

COORDINATE IS (50, 0)

(a) On the grid, draw a cumulative frequency graph for the table.

* STARTS AT 60! (2)



(b) Use your graph to find an estimate for the median diameter of the 60 oranges.

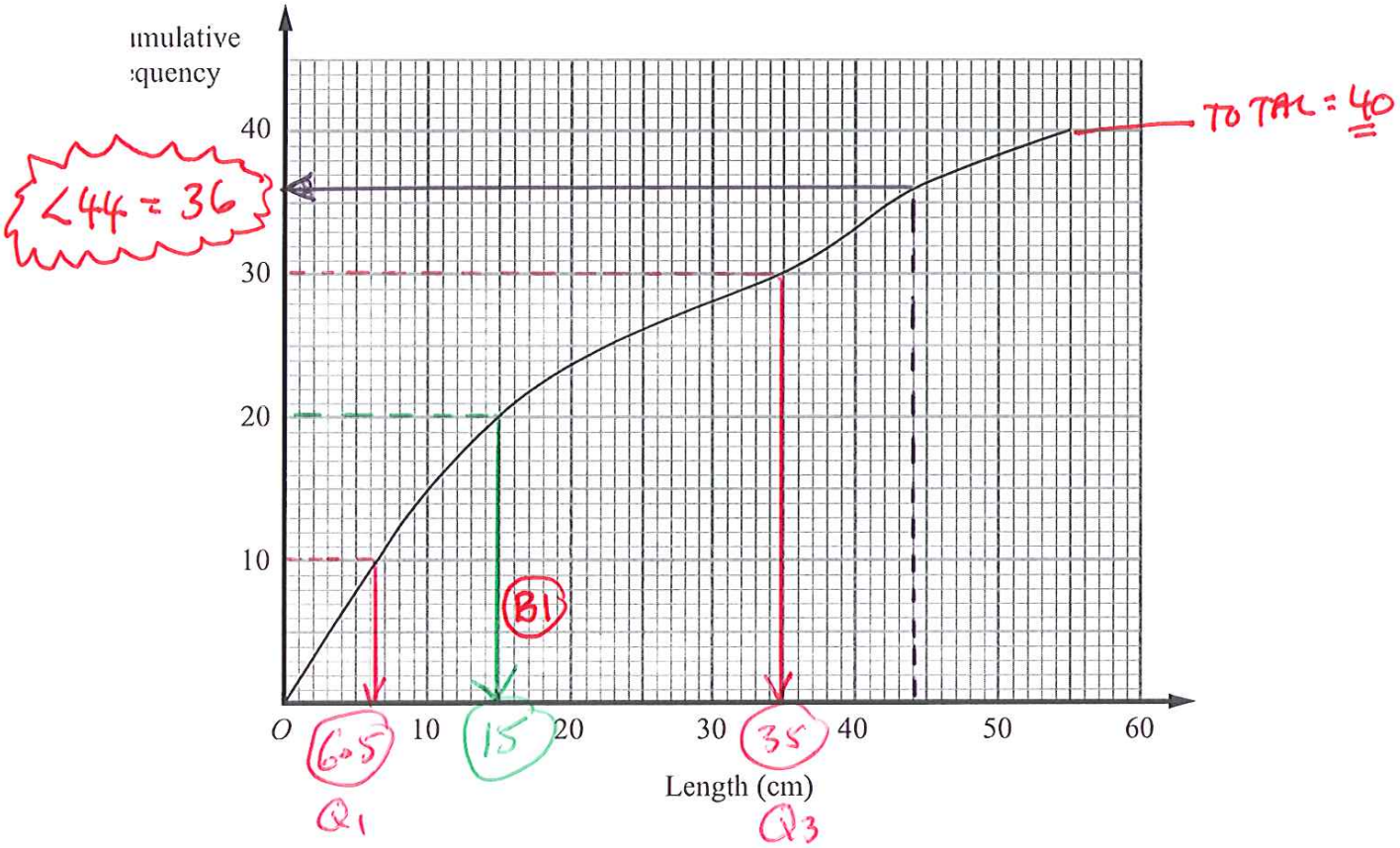
MEDIAN = $\frac{60}{2}$ = 30TH VALUE (M1)

= 66 (LOOKED UP ON GRAPH)

(A1)

4. [Edexcel, 2010] Cumulative Frequency (Inc Interquartile Range) **[5 Marks]**

The cumulative frequency graph gives information about the lengths of 40 tree branches.



(a) Find an estimate for the median length.

$\frac{40}{2}$ = 20TH VALUE

15 A1

..... cm

(14 – 16)

(2)

(b) Find an estimate for the interquartile range of the lengths.

B1 $Q_1 = \frac{40}{4}$ = 10TH VALUE

$Q_3 = \frac{40}{4} \times 3$ = 30TH VALUE

IQR = $Q_3 - Q_1$

= 35 – 6·5

28·5 A1

..... cm

(27 – 30)

(2)

(c) Find an estimate for the number of branches with lengths of more than 44 cm.

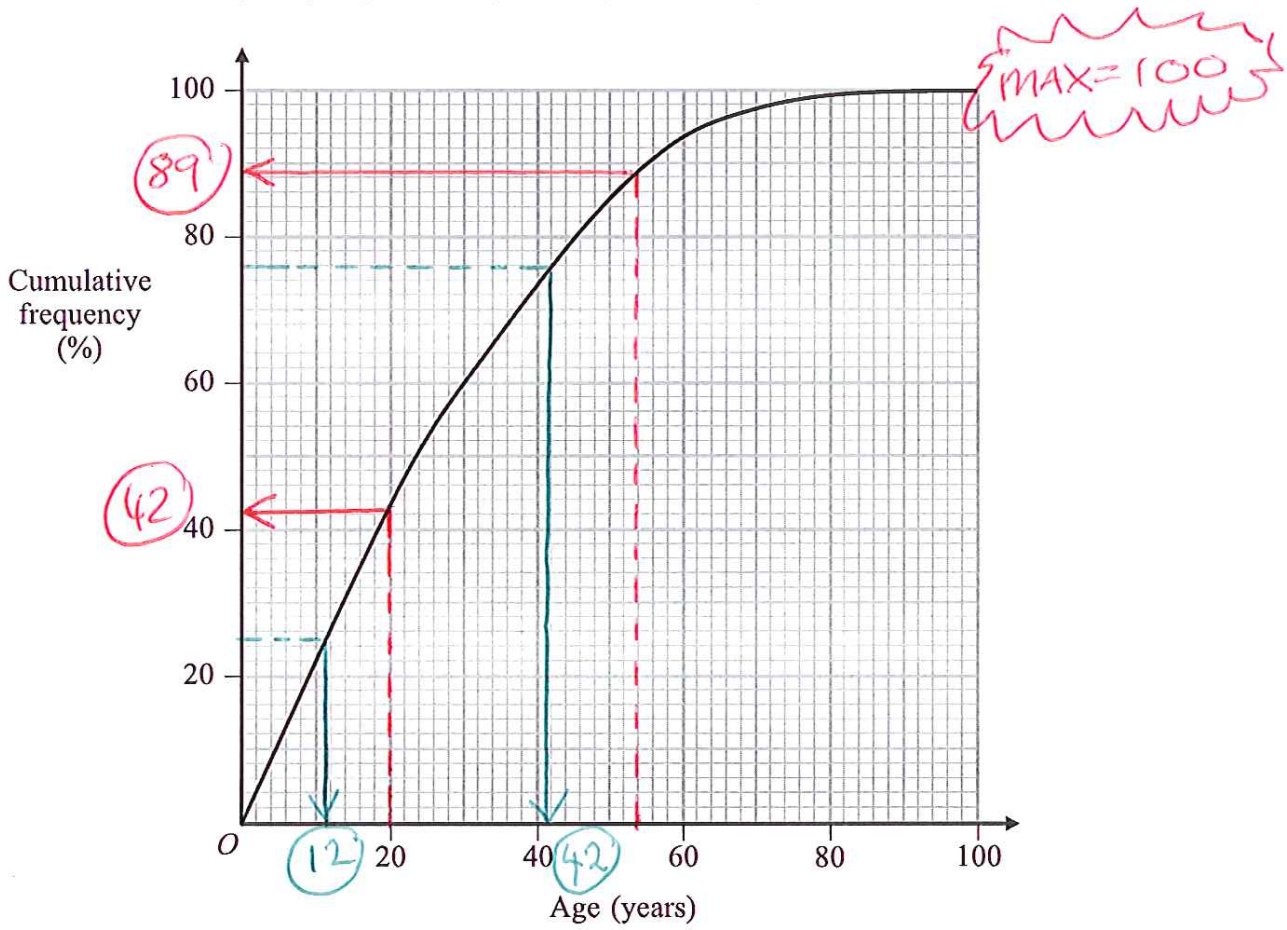
40 – 36 = 4

4 A1

.....

(1)

The cumulative frequency graph gives information about the ages of people in India.
The cumulative frequency is given as a percentage of all the people in India.



(a) Use the cumulative frequency graph to find an estimate for the percentage of people in India who are

(i) aged less than 20, $\frac{42}{100}$

42 (A1) ..... %

(ii) aged 54 for over.

$100 - 89 = 11$ $\frac{11}{100} = 11\%$

11 (A1) ..... %

(2)

(b) Find an estimate for the interquartile range of the ages of people in India.

Q_1 $\frac{100}{4}$ = 25TH VALUE

Q_3 $\frac{100}{4} \times 3$ = 75TH VALUE

$Q_3 - Q_1 = 42 - 12$ (M1)

$= 30$

30 (A1) (29 - 31) ..... years

(2)

6. [Edexcel, 2016] Cumulative Frequency (Inc Interquartile Range) **[6 Marks]**

The table gives some information about the incomes, £I, of 100 people in the UK.

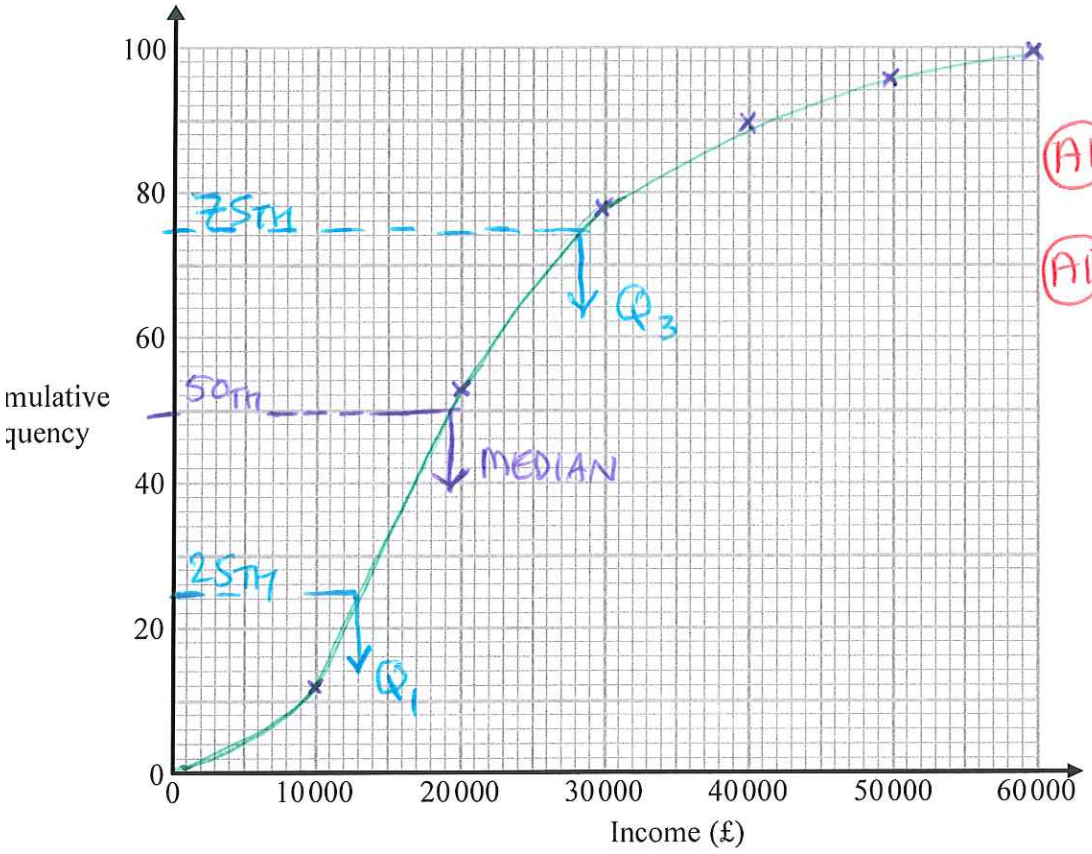
Income (£I)	**Frequency**
$0 < I \leqslant 10000$	12
$10000 < I \leqslant 20000$	41
$20000 < I \leqslant 30000$	25
$30000 < I \leqslant 40000$	12
$40000 < I \leqslant 50000$	6
$50000 < I \leqslant 60000$	4

(a) Complete the cumulative frequency table.

Income (£I)	**Cumulative frequency**
$0 < I \leqslant 10000$	12
$0 < I \leqslant 20000$	53
$0 < I \leqslant 30000$	78
$0 < I \leqslant 40000$	90
$0 < I \leqslant 50000$	96
$0 < I \leqslant 60000$	100

(10 000, 12)
(20 000, 53)
(30 000, 78)
⋮

A1 (1)



A1 [POINTS]

A1 [CURVE]

(2)

(c) Use your graph to find an estimate for

(i) the median,

$\frac{100}{2}$ = 50TH VALUE

£ 19 000 A1

[18000 – 20000]

(ii) the interquartile range.

$Q_1 = \frac{100}{4}$ = 25TH VALUE

$Q_3 = \frac{3 \times 100}{4}$ = 75TH VALUE

IQR = $Q_3 - Q_1$

= 28000 – 13 000 M1 M1

£ 15 000 A1

(3)

[14 000 – 16000]

7. [Edexcel, 2012] Cumulative Frequency (Inc Interquartile Range) **[5 Marks]**

The grouped frequency table gives information about the ages of 200 elephants.

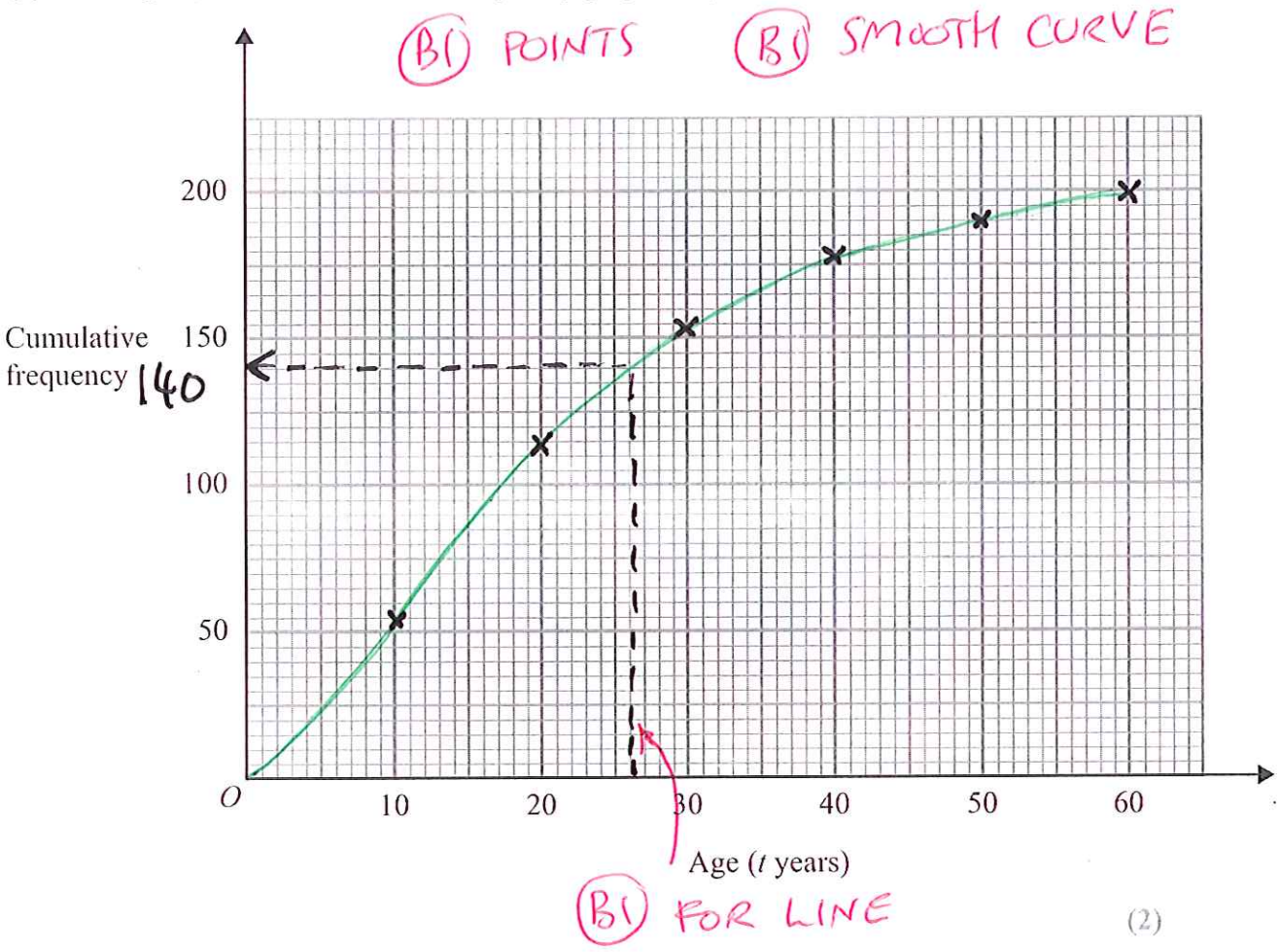
Age (t years)	Frequency
$0 < t \leqslant 10$	55
$10 < t \leqslant 20$	60
$20 < t \leqslant 30$	40
$30 < t \leqslant 40$	22
$40 < t \leqslant 50$	13
$50 < t \leqslant 60$	10

(a) Complete the cumulative frequency table.

Age (t years)	Cumulative frequency
$0 < t \leqslant 10$	55
$0 < t \leqslant 20$	115
$0 < t \leqslant 30$	155
$0 < t \leqslant 40$	177
$0 < t \leqslant 50$	190
$0 < t \leqslant 60$	200

A1

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use the graph to find an estimate for the number of elephants with ages of more than 26 years.

LESS THAN 26 = 140

∴ MORE THAN 26 = 200 − 140

= 60

60 A1

8. [Edexcel, 2015] Cumulative Frequency (Inc Interquartile Range) **[5 Marks]**

The table shows information about the lengths of time that 120 people spent in a supermarket.

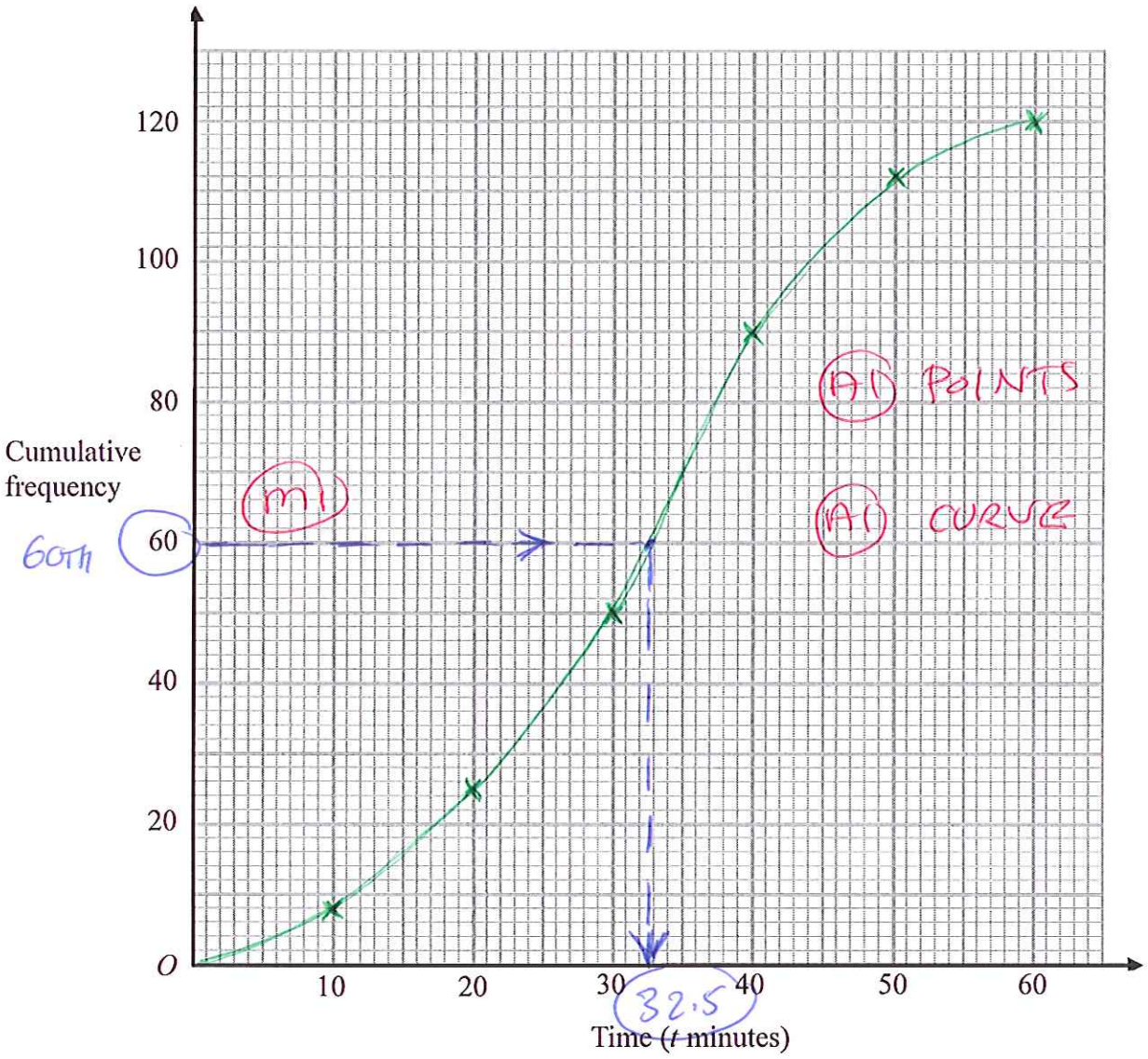
Time (t minutes)	Frequency
$0 < t \leqslant 10$	8
$10 < t \leqslant 20$	17
$20 < t \leqslant 30$	25
$30 < t \leqslant 40$	40
$40 < t \leqslant 50$	22
$50 < t \leqslant 60$	8

(a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency	COORDINATES
$0 < t \leqslant 10$	8	(10, 8)
$0 < t \leqslant 20$	25	(20, 25)
$0 < t \leqslant 30$	50	(30, 50)
$0 < t \leqslant 40$	90	(40, 90)
$0 < t \leqslant 50$	112	(50, 112)
$0 < t \leqslant 60$	120	(60, 120)

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median length of time spent in the supermarket by these people.

MEDIAN = $\frac{120}{2}$

= 60TH VALUE

A1

32.5 minutes

[± ½ SQUARE]

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Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners' mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners' mark scheme.

B1 – This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').

M1 – This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.

A1 – These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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