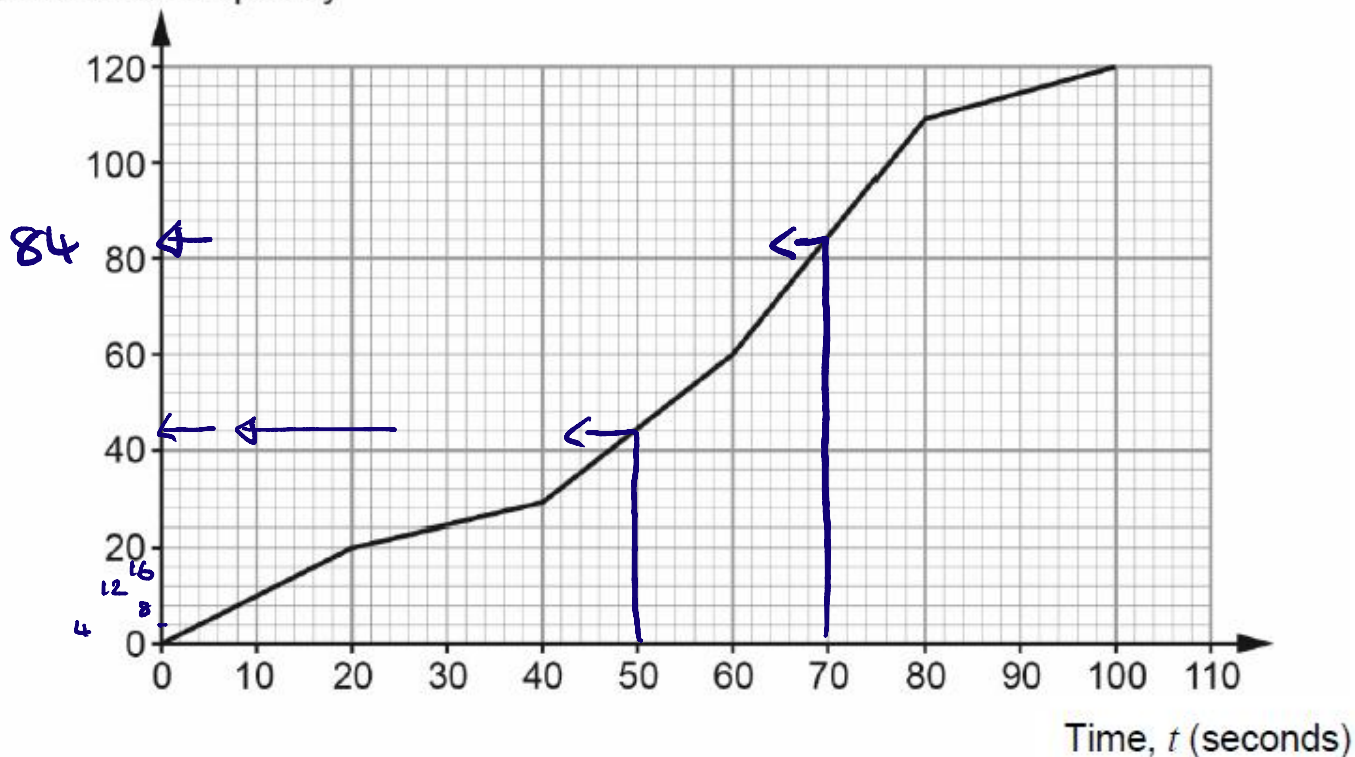# Cumulative Frequency (H)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	*Mel@JustMaths*
Total Marks:	

1. The times taken by customer service operators to answer 120 telephone calls are illustrated in the cumulative frequency diagram shown below.

(a) Calculate an estimate for the percentage of telephone calls that were answered within 50 seconds.

$$\frac{44}{120} \times 100 = 36.\dot{6} \qquad \underline{\underline{36.7\%}}$$

[2]

(b) The customer service team was given a target to answer 80% of the telephone calls within 70 seconds.

80% of 120 would be 96 calls.

Did the team meet their target?

Give a reason for your answer and state any assumption you have made when calculating your answer.

No they did not meet their target. They

You must show all your working. answered 84 and needed to answer 96

[3]

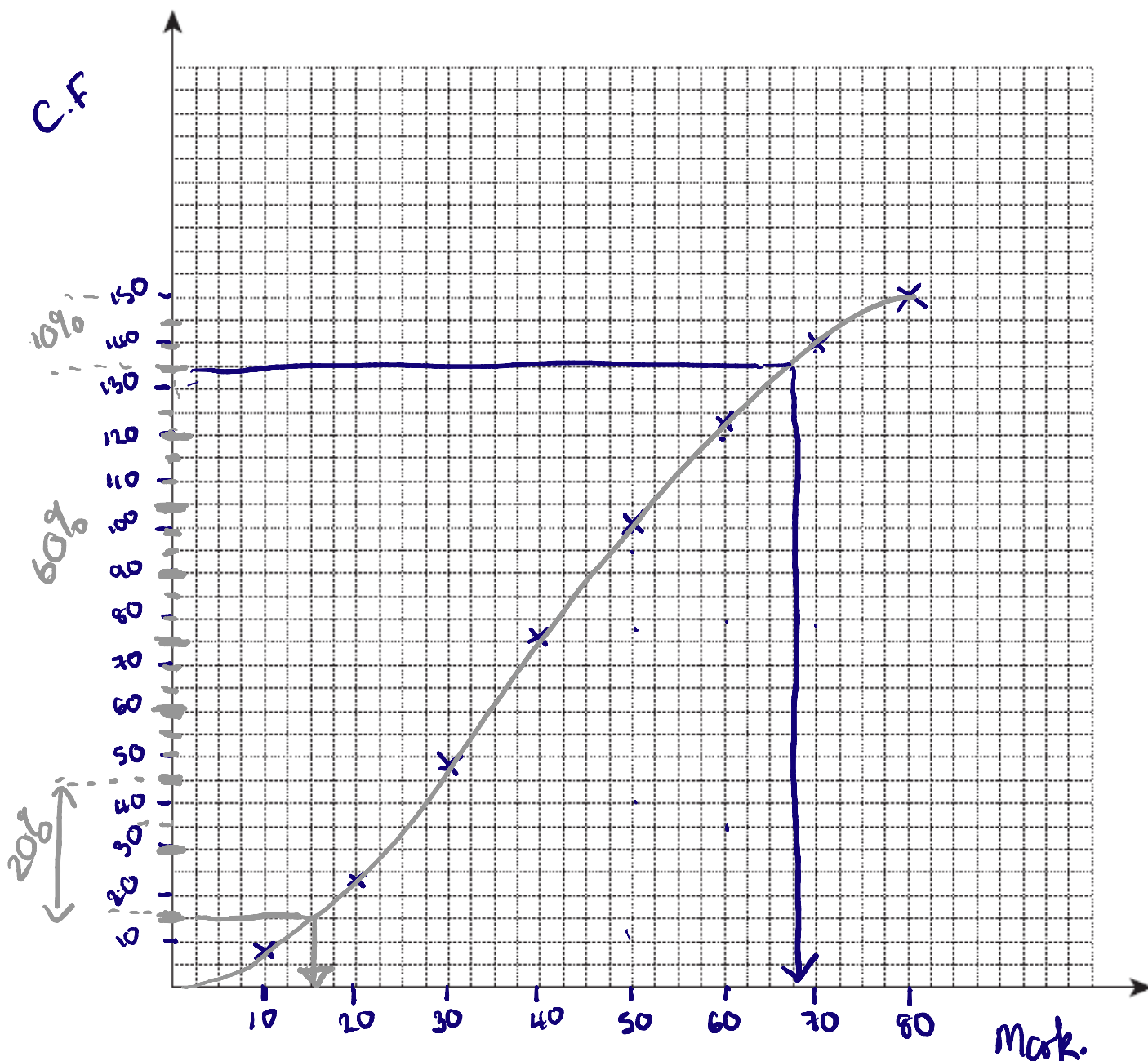2. The table shows the marks gained by 150 students taking an examination.

Mark (m)	0<m≤10	10<m≤20	20<m≤30	30<m≤40	40<m≤50	50<m≤60	60<m≤70	70<m≤80
Frequency	9	14	26	27	25	22	17	10

(a) (i) Construct a cumulative frequency table.

Mark (m)	m ≤ 10	m ≤ 20	m ≤ 30	m ≤ 40	m ≤ 50	m ≤ 60	m ≤ 70	m ≤ 80
Cumulative Frequency	9	23	49	76	101	123	140	150

[2]

(ii) Draw the cumulative frequency graph on the grid below.

[4]

(b) Students are to be awarded Gold, Silver, Bronze or Fail. *← 15*

105

The students' teacher wishes to award the top 10% of students Gold, the next 60% Silver and the next 20% Bronze.

Use your graph to estimate the lowest mark that Silver will be awarded for.

(b) ....15.............. [3]

(c) Explain why the teacher's method will not necessarily award Gold to exactly 10% of the students.
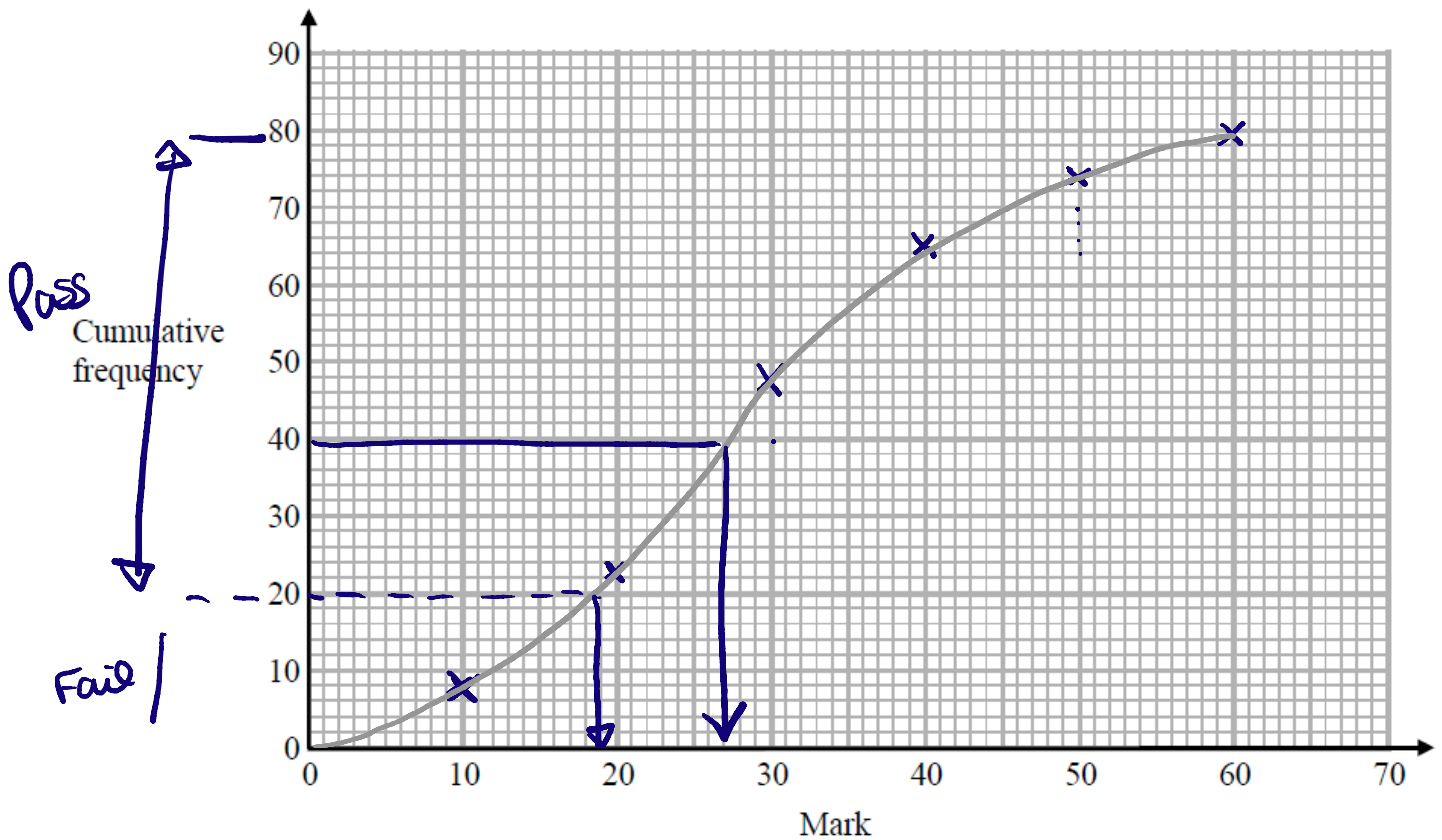
[1]

3. The cumulative frequency table shows the marks some students got in a test.

Mark (m)	Cumulative frequency
$0 < m \leqslant 10$	8
$0 < m \leqslant 20$	23
$0 < m \leqslant 30$	48
$0 < m \leqslant 40$	65
$0 < m \leqslant 50$	74
$0 < m \leqslant 60$	80

(a) On the grid, plot a cumulative frequency graph for this information.

[2]

Pass

Cumulative frequency

Fail

Mark

(b) Find the median mark.

.... 27 ....

[1]

Students either pass the test or fail the test.

The pass mark is set so that 3 times as many students fail the test as pass the test.

Pass = 3x fail
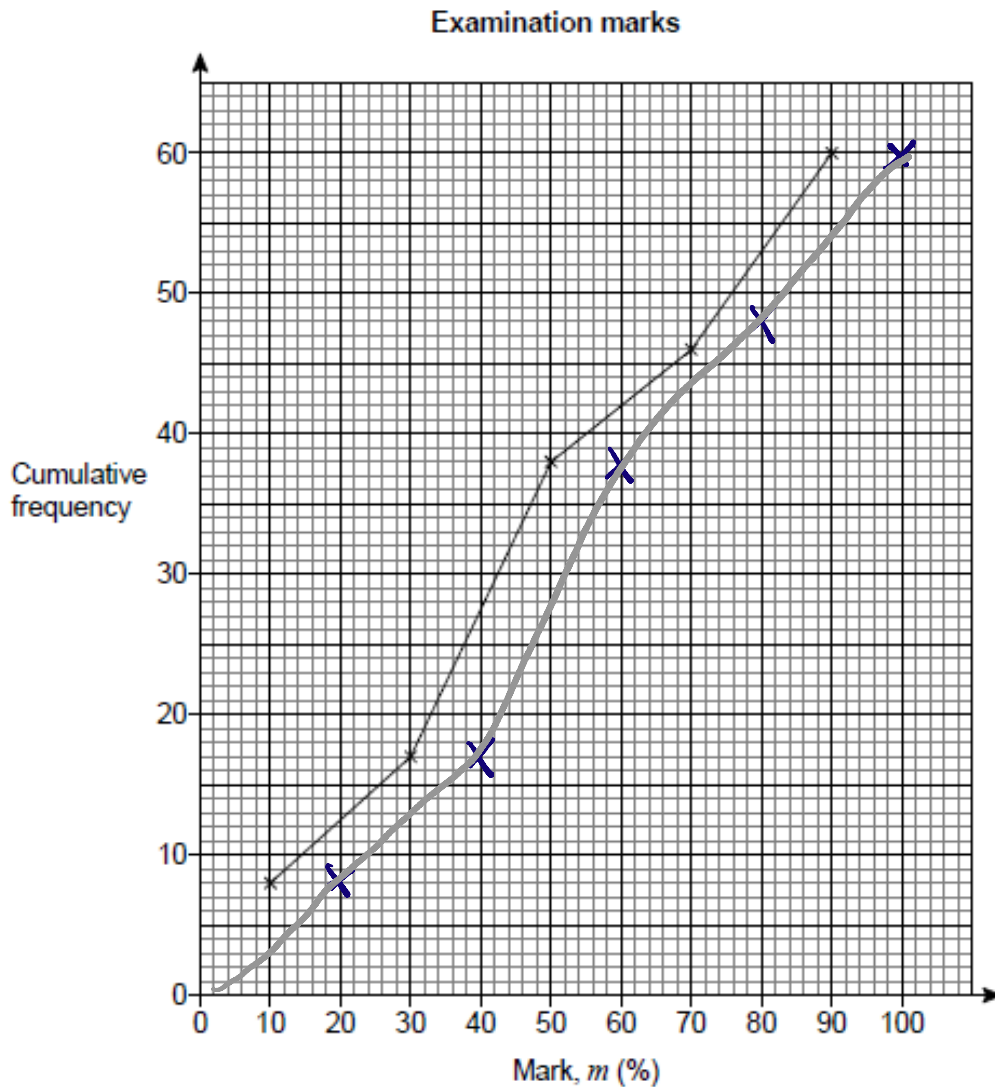
(c) Find an estimate for the lowest possible pass mark.

.... 19 marks .... [3]

4. Here are the examination marks for 60 pupils.

Mark, m (%)	Frequency	CF
$0 \leqslant m < 20$	8	8
$20 \leqslant m < 40$	9	17 / 21
$40 \leqslant m < 60$	21	38
$60 \leqslant m < 80$	10	48
$80 \leqslant m < 100$	12	60

Molly drew this cumulative frequency graph to show the data.

JustMaths

Examination marks

Make two criticisms of Molly's graph.

Criticism 1 she has plotted the midpoints of each interval not the endpoints

Criticism 2 she has not plotted the 4th height correctly.

[2]

5. Gavin measures the heights of 80 plants he has grown.
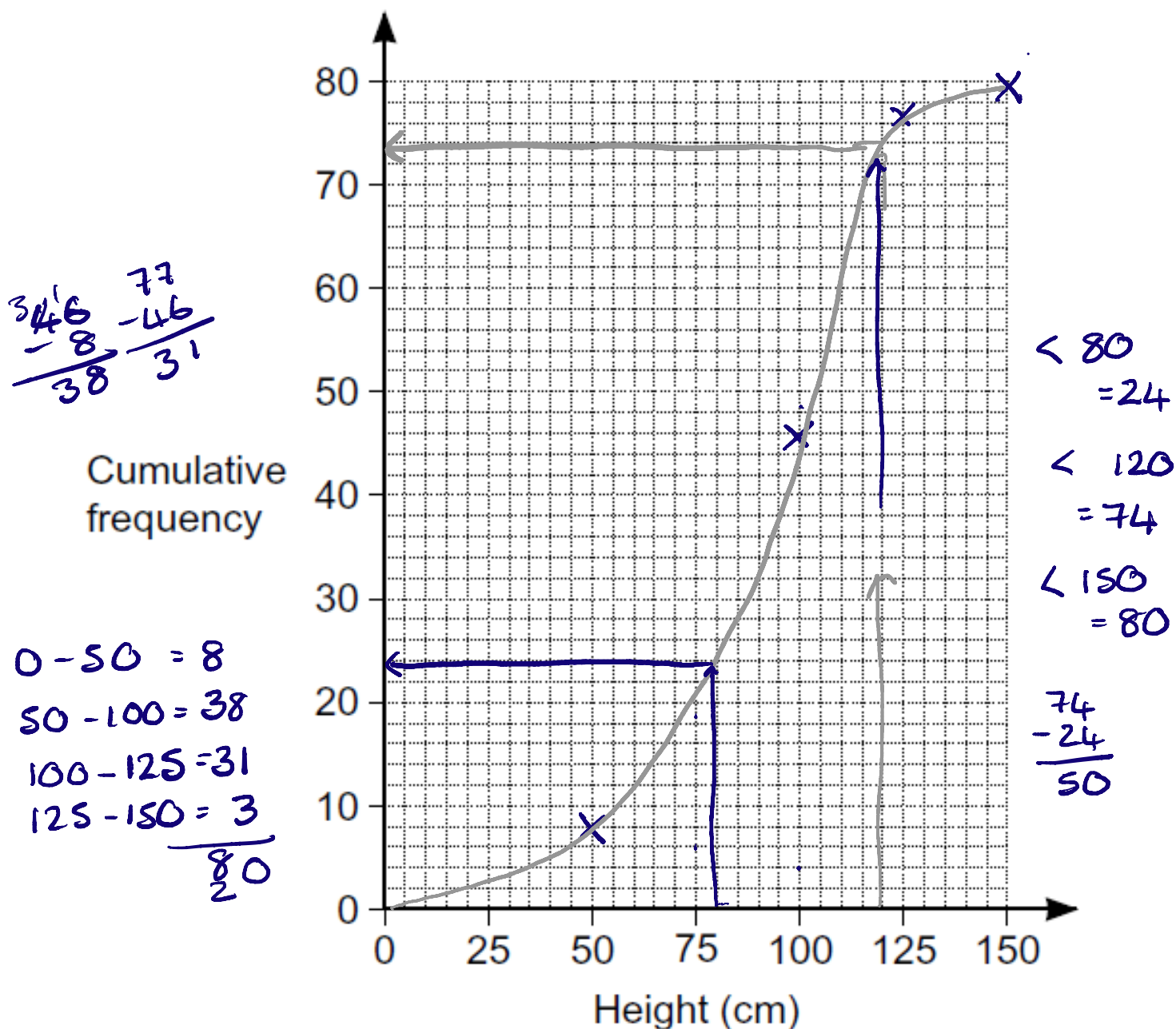
This table summarises his results.

Height, h cm	$0 < h \leqslant 50$	$50 < h \leqslant 100$	$100 < h \leqslant 125$	$125 < h \leqslant 150$
Number of plants	8	38	31	3

a) (i) Complete the cumulative frequency table below.

Height, h cm	$h \leqslant 50$	$h \leqslant 100$	$h \leqslant 125$	$h \leqslant 150$
Cumulative frequency	8	46	77	80

[2]

(ii) Draw the cumulative frequency graph.

$$3\overset{1}{4}\overset{}{6} \quad \overset{7}{7}\overset{}{7}$$
$$\underline{-8} \quad \underline{-46}$$
$$38 \quad 3\overset{1}{1}$$

Cumulative frequency

$0 - 50 = 8$

$50 - 100 = 38$

$100 - 125 = 31$

$125 - 150 = 3$

$$\overline{} \frac{}{80}$$

< 80
$= 24$

< 120
$= 74$

< 150
$= 80$

$$\begin{array}{r} 74 \\ -24 \\ \hline 50 \end{array}$$

[2]

b) Ted asks if Gavin has 10 plants over 120 cm in height.

Explain why Gavin cannot be certain that he has 10 plants over this height.

because the data is grouped and all 31 plants in the 100-125 interval could all be less than 120cm.

[1]

c) Gavin sells these 80 plants using the price list below.

24   50   6

Height, h cm	$h \leqslant 80$	$80 < h \leqslant 120$	$h > 120$
Price (£)	2.00	3.50	5.00

Each plant costs him 60p to grow. $80 \times 60 = £48$

Estimate the total profit Gavin will receive when he sells all these plants.
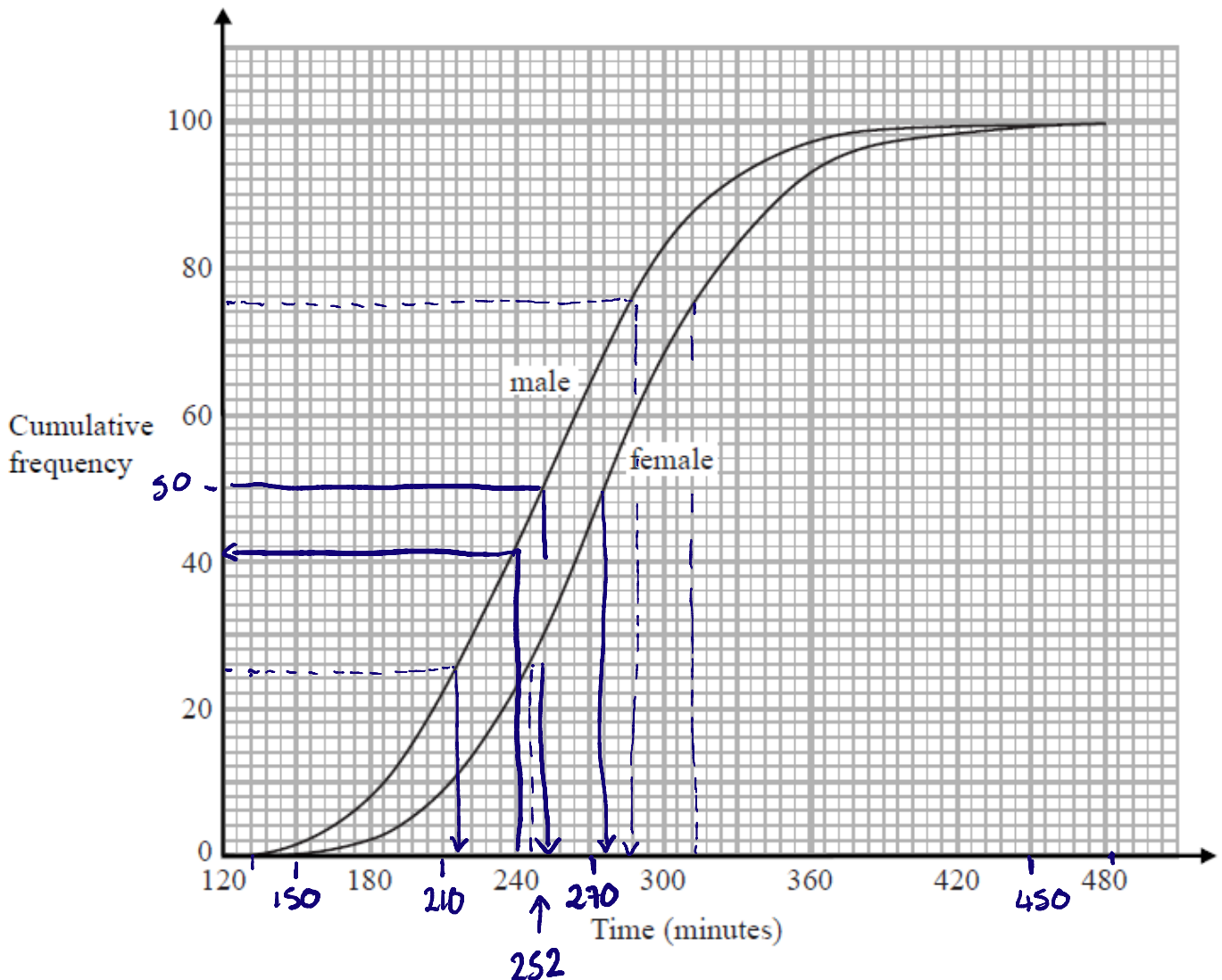
24×2 50×3.50 6×5
48 $= 105$ $= 30$

Sales $= 48 + 105 + 30 = £183$

Profit $= 183 - 48$

135

c) £ ....135......................... [6]

6. The cumulative frequency graphs show information about the times taken by 100 male runners and by 100 female runners to finish the London marathon.

Cumulative frequency

male

female

50

150   210   270   450

252

Time (minutes)

A male runner is chosen at random.

a) Find an estimate for the probability that this runner took less than 4 hours to finish the London marathon.

.. 43/100 .... [2]

b) Use medians and interquartile ranges to compare the distribution of the times taken by the male runners with the distribution of the times taken by the female runners.

	male	female
median	252 mins	276 mins
LQ	216	240
UQ.	288	312
IQR	72	72

The male median is lower so on average the men were faster. However the IQR's are the same showing they are equally consistent

[4]

7. The table shows the running times of some films.

Time, t (minutes)	Number of films	CF
$0 \leqslant t < 80$	0	0
$80 \leqslant t < 100$	9	9
$100 \leqslant t < 120$	35	44
$120 \leqslant t < 140$	30	74
$140 \leqslant t < 160$	18	92
$160 \leqslant t < 180$	8	100

a) Draw a cumulative frequency graph on the grid to represent the data.

Cumulative frequency

Time, *t* (minutes)

60
60
30
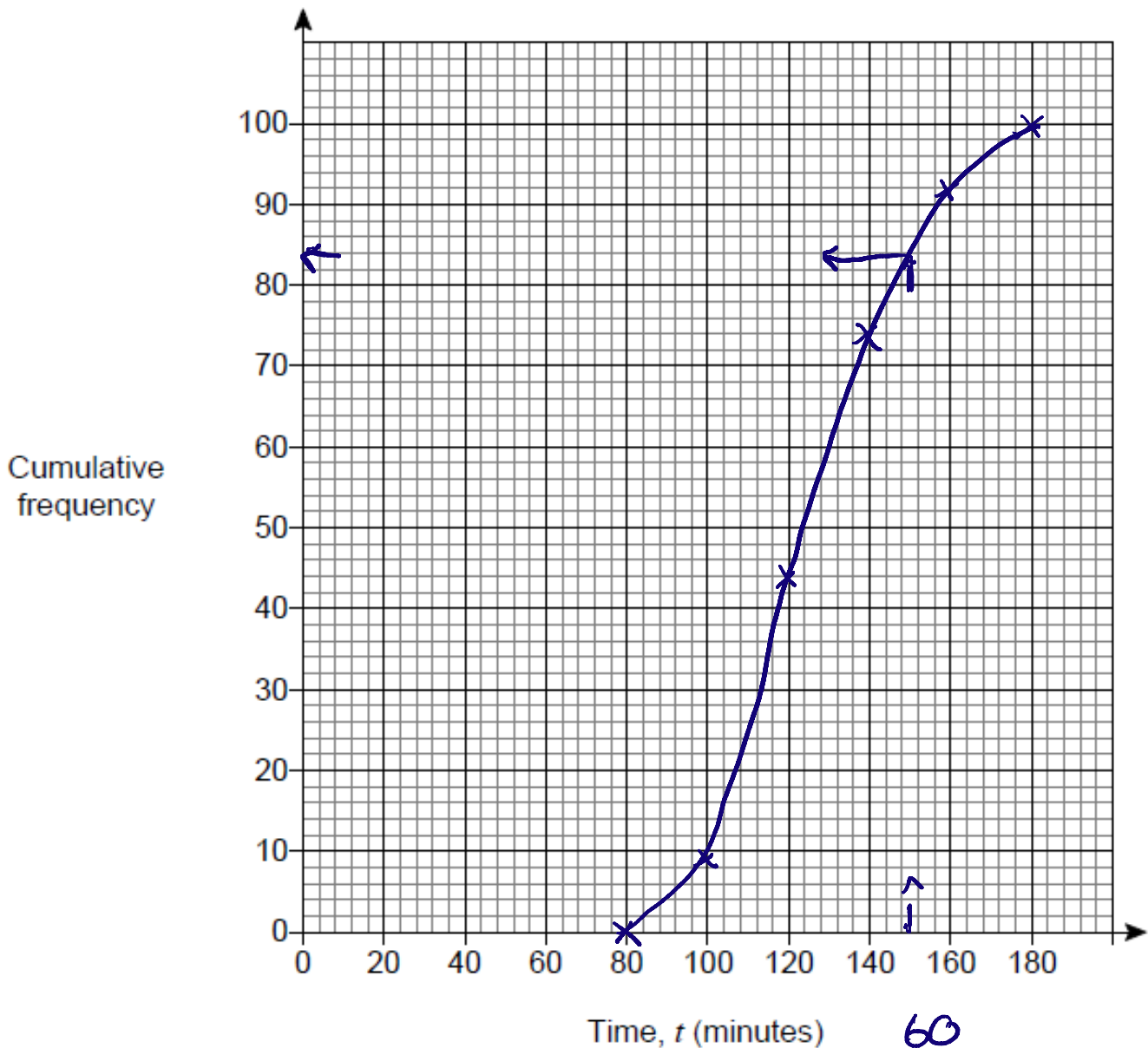
150 mins

[3]

b) Estimate the number of these films with a running time of less than 2 $\frac{1}{2}$ hours.

84 films

[1]

8. What percentage of a distribution is covered by the inter-quartile range?   Circle your answer.
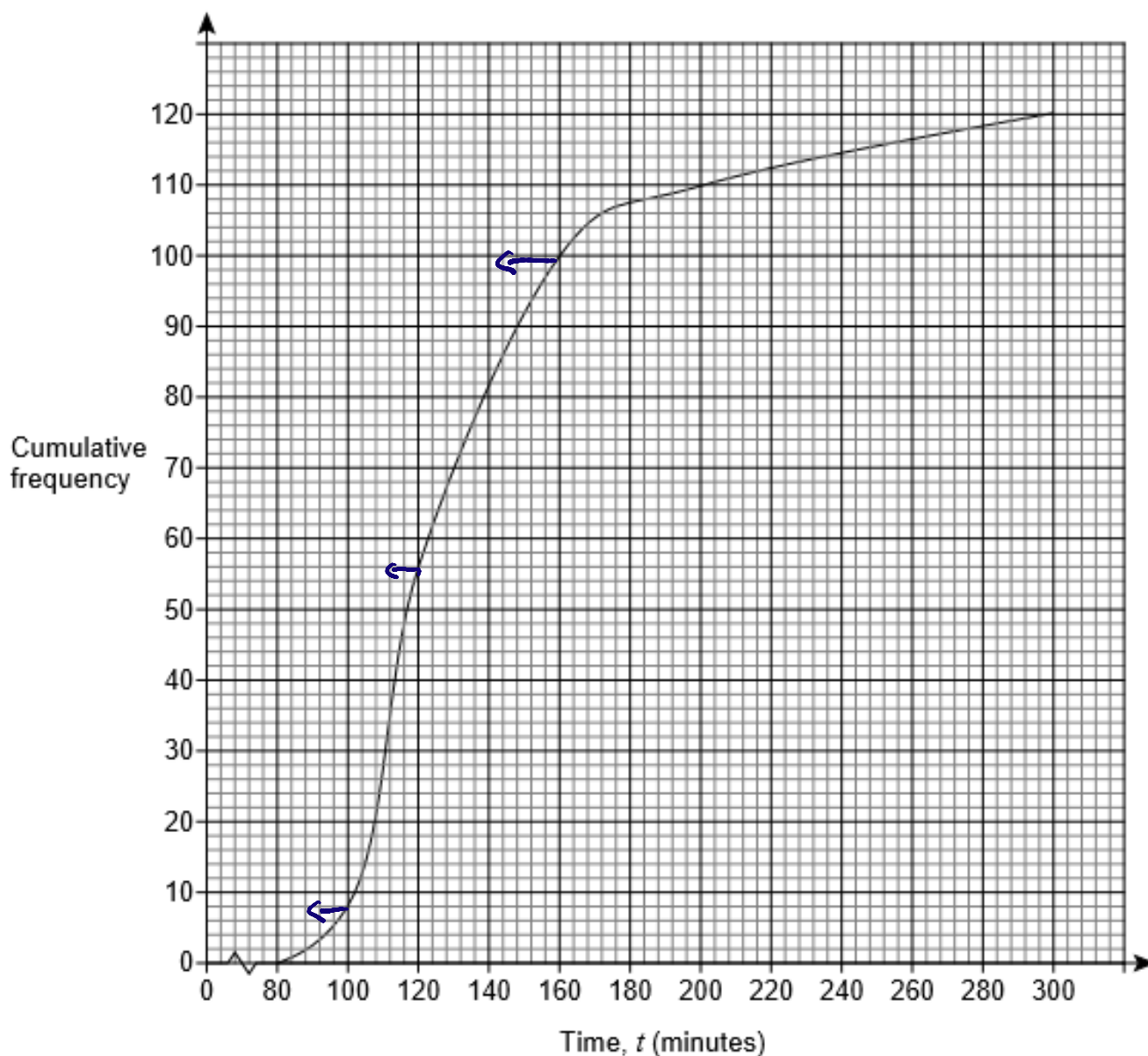
[1]

25%   37.5%   50%   75%

9. The cumulative frequency diagram shows the times taken by runners to complete a half-marathon.


On the grid opposite, draw a histogram to represent the data.

Use this table to help you.

Time, t (minutes)	Cumulative frequency
$t < 100$	8
$t < 120$	55
$t < 160$	100
$t < 200$	110
$t < 300$	120

Time, t (minutes)	Frequency	Class width	Frequency density
$80 \leqslant t < 100$	8 ÷ 20		0·4
$100 \leqslant t < 120$	46 ÷ 20		2·3
$120 \leqslant t < 160$	44 ÷ 40		1·1
$160 \leqslant t < 200$	10 ÷ 40		0·25
$200 \leqslant t < 300$	10 ÷ 100		0·1

Frequency density

2·3×20
=46

1·1×40
=44

0·4×20
=8

0·25×40
=10

0·1×100
=10

Time, *t* (minutes)
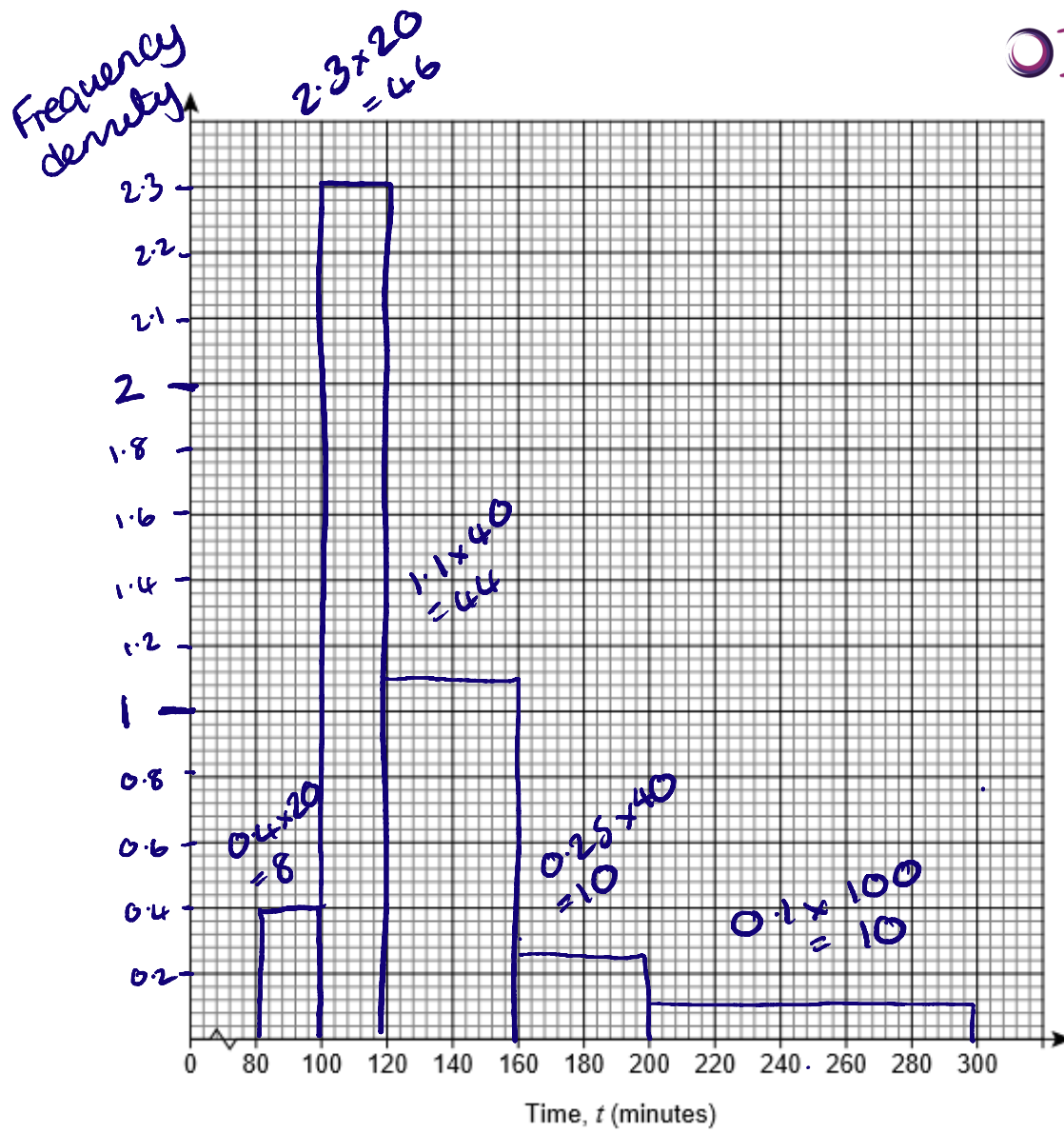
[6]

CREDITS AND NOTES

Question	Awarding Body
1	WJEC Eduqas
2	OCR
3	Pearson Edexcel
4	AQA
5	OCR
6	Pearson Edexcel
7	AQA
8	AQA
9	AQA

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board s (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.

Links:

AQA http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300

OCR http://ocr.org.uk/gcsemaths

Pearson Edexcel http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html

WJEC Eduqas http://www.eduqas.co.uk/qualifications/mathematics/gcse/

Contents:

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material