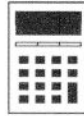


GCSE MATHEMATICS

Cumulative Frequency & Box Plots



SOLUTIONS

AQA These questions have been taken or modified from previous AQA GCSE Mathematics Papers.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer all questions.
- You must answer the questions in the spaces provided.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information

- The marks for questions are shown in brackets.
- The quality of your written communication is specifically assessed in questions that are indicated with an asterisk (*).

Advice

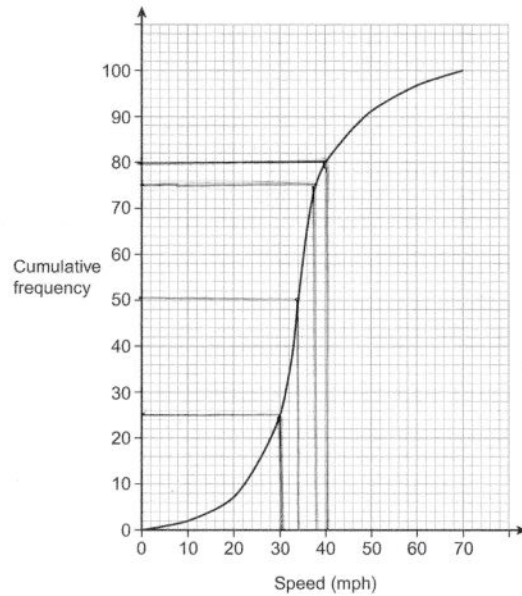
- Read each question carefully before you start to answer it.
 - In all calculations, show clearly how you work out your answer.
 - Use the number of marks for the question as a guide to the amount of time you need to spend.
 - Look at previous parts of the question, e.g. a), b), c) i) as there may be information there you need to answer later parts.
 - Check your answer is realistic and appropriate.
 - For calculator decimal numbers always write your full calculator display in the working out area and then, if you need to, round the answer on the answer line.
-

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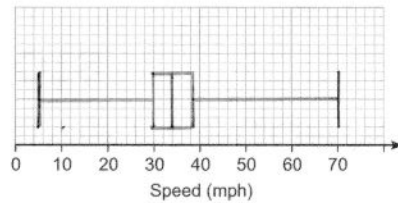
www.thecalculatorguide.com

- 1 The diagram shows information about the speeds of 100 cars. The fastest car had a speed of 70 mph

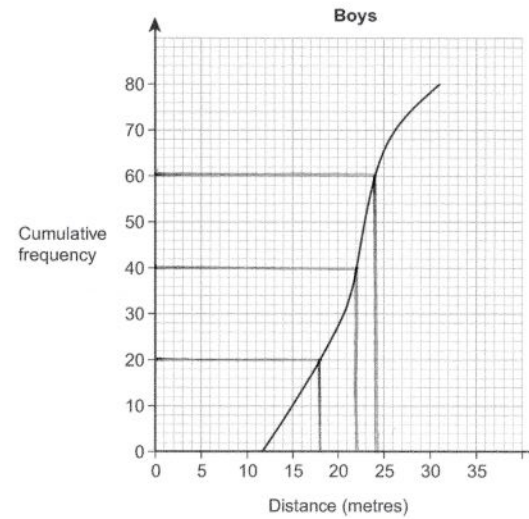


- 1 (a) How many cars were travelling above 40 mph?
Circle your answer. [1 mark]
- 20 33 37 80

- 1 (b) The slowest speed was 5 mph
The fastest speed was 70 mph
Draw a box plot for the speeds of the 100 cars. [3 marks]



- 2 The cumulative frequency graph shows the javelin distances thrown by 80 boys.



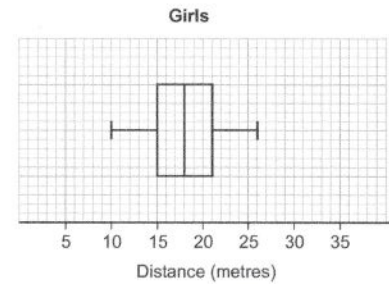
- 2 (a) Write down the median distance thrown. [1 mark]

Answer 22 metres

- 2 (b) Work out the interquartile range of the distances thrown. [2 marks]

..... 24 - 18 = 6
Answer 6 metres

- 2 (c) The box-and-whisker plot shows information about the javelin distances thrown by 80 girls.



On average, did the boys or the girls throw further?
Give a reason for your answer.

[1 mark]

Median for Boys 22. Median for girls 18
Boys threw further on average

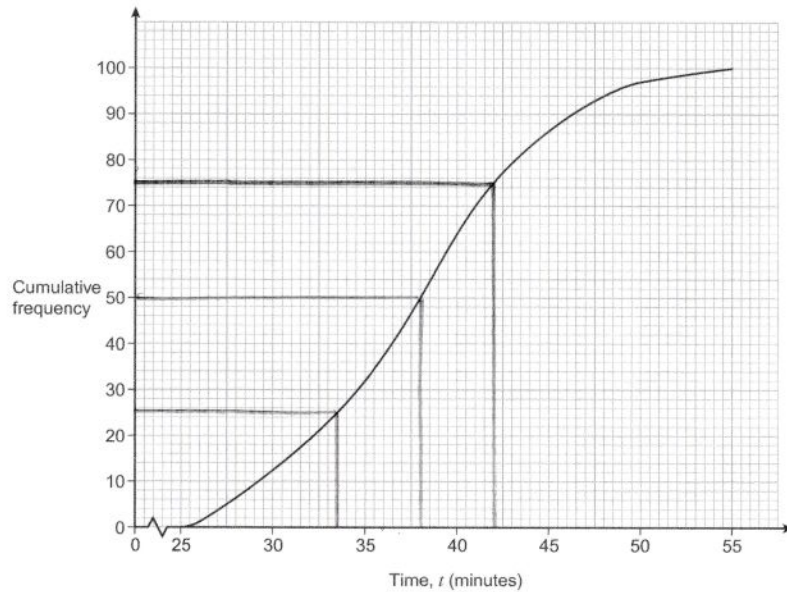
2 (d) The boys' and girls' results are combined.

Work out an estimate of the proportion of all throws that are greater than 21 metres.

[4 marks]

$\frac{4}{5}$ of $\frac{1}{4}$ of the girls throws are above
21 metres $\frac{4}{5}$ of 20 = 16
 $80 - 32 = 48$ boys
 $16 + 48 = \frac{64}{100}$
Answer $\frac{16}{45}$

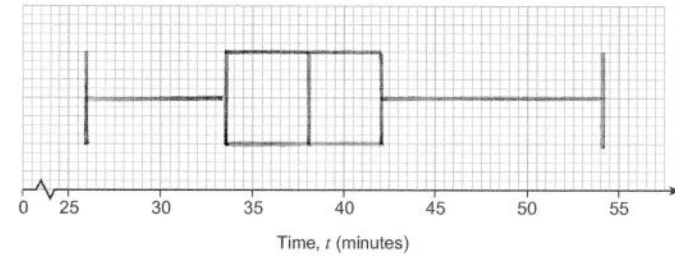
3 The cumulative frequency diagram shows information about the finishing times of 100 runners in a race in 2015



3 (a) The fastest runner finished in 26 minutes.
The slowest runner finished in 54 minutes.

Use this information and the cumulative frequency diagram to draw a box-and-whisker plot for these runners.

[3 marks]



3 (b) The table shows information about the finishing times of the runners in the same race in 2014

Fastest time	27 minutes
Lower quartile	32 minutes
Median	39 minutes
Upper quartile	45 minutes
Slowest time	54 minutes

Eli says,

"Times were faster on average and more consistent in 2014 than in 2015"

Comment on Eli's statement.

You **must** support your comments with working.

[4 marks]

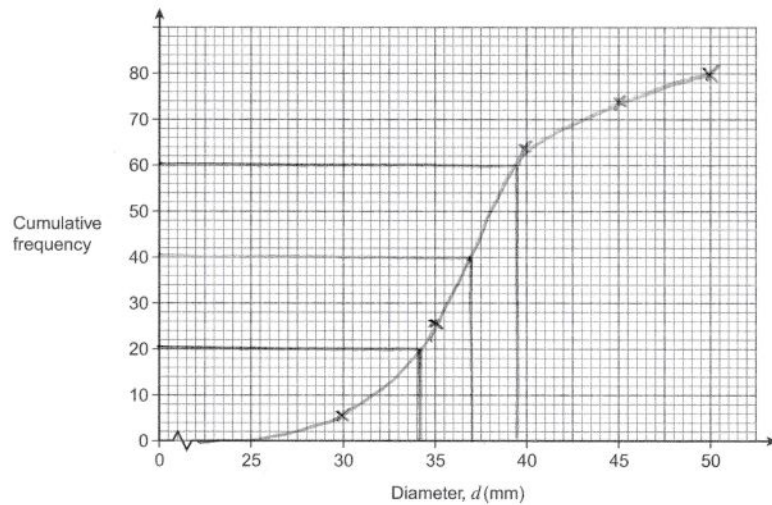
Median 2015 = 38 Median 2014 = 39
No, times were faster on average in 2015
 $IQR\ 2015 = 42 - 33.5 = 8.5$
 $IQR\ 2014 = 45 - 32 = 13$
No, times were more consistent in
2015 than in 2014.

4 Fiona buys tomatoes for her restaurant. She has a choice of two market gardens, Fruit4U and Greenfingers.

4 (a) This table gives information about a sample of 80 tomatoes from Fruit4U.

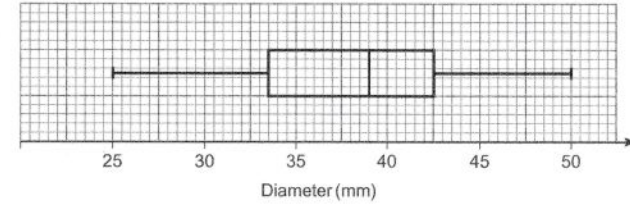
Diameter, d (mm)	Frequency	Cumulative Freq.
$25 \leq d < 30$	6	6
$30 \leq d < 35$	20	26
$35 \leq d < 40$	38	64
$40 \leq d < 45$	10	74
$45 \leq d < 50$	6	80

Draw a cumulative frequency graph to illustrate this data on the grid below.



[4 marks]

4 (b) The box plot shows the distribution of diameters of a sample of 80 tomatoes from Greenfingers.



Comment on the differences between the two samples.

Median Fruit4U = 37

Median Greenfingers = 39

The diameters are on average, larger from Greenfingers.

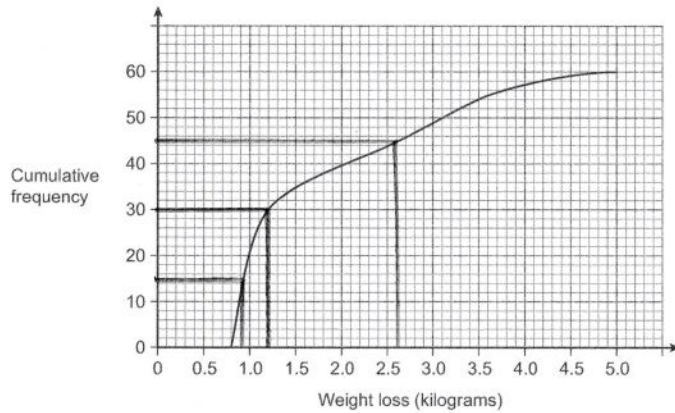
IQR Fruit4U = $39.5 - 34 = 5.5$

IQR Greenfingers = $42.5 - 33.5 = 9$

Diameters of tomatoes from Fruit4U are more consistent.

[6 marks]

- 5 Two groups of people are trying to lose weight.
- 5 (a) Group A join a gym.
The graph shows information about their weight loss after one month.



- 5 (a) (i) How many people are in group A?

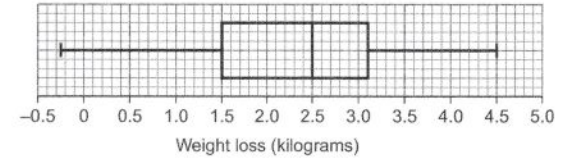
Answer **60** (1 mark)

- 5 (a) (ii) Does everyone in group A lose weight? Write down how you decide.

Yes, Lowest weight loss recorded is between 0.8 and 1 kg

..... (1 mark)

- 5 (b) Group B follow a diet.
The box plot shows information about their weight loss after one month.



- Does everyone in group B lose weight?
Write down how you decide.

No Minimum value is less than 0 (around -2.5)

..... (1 mark)

- 5 (c) Compare the weight loss of group A with group B.

Median A = 1.2 Median B = 2.5
Group B lost more weight on average.
 $IQR A = 2.6 - 0.9 = 1.7$
 $IQR B = 3.1 - 1.5 = 1.6$
Group B is slightly more consistent than Group A

.....

.....

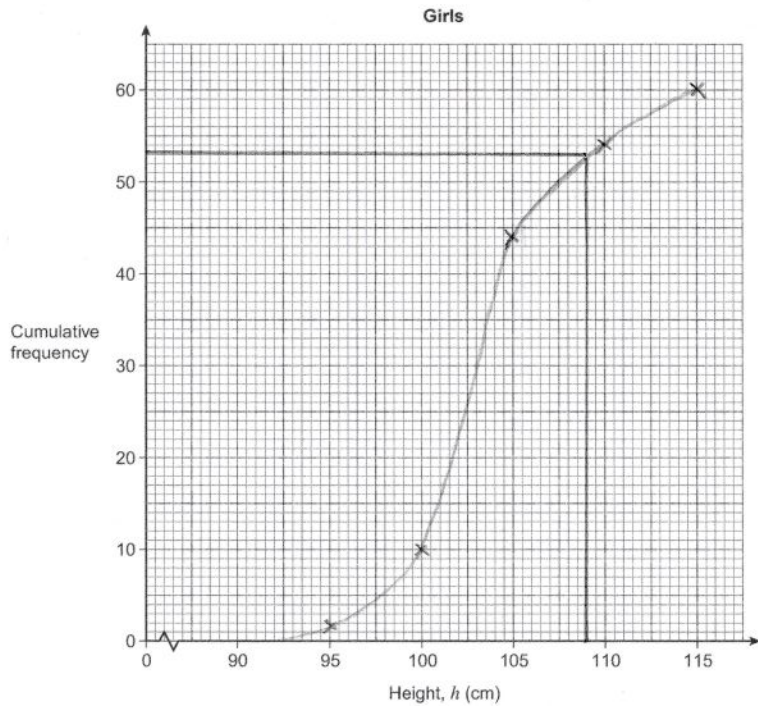
.....

(5 marks)

6 The table shows information about the heights of 60 girls in a nursery school.

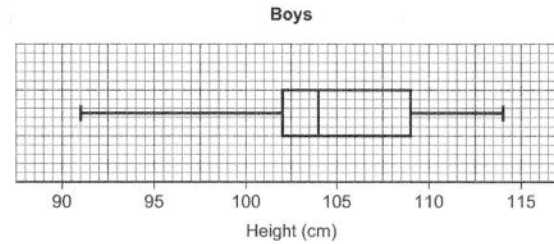
Height, h (cm)	Frequency	Cumulative frequency
$90 < h \leq 95$	2	2
$95 < h \leq 100$	8	10
$100 < h \leq 105$	34	44
$105 < h \leq 110$	10	54
$110 < h \leq 115$	6	60

6 (a) Draw a cumulative frequency diagram for the data.



(3 marks)

6 (b) The box plot shows information about the heights of 60 boys in the nursery school.



The 60 girls and the 60 boys visit a park.
Only children whose heights are under 109 cm are allowed in the soft play area.

Estimate the total number of these children that are allowed in the soft play area.

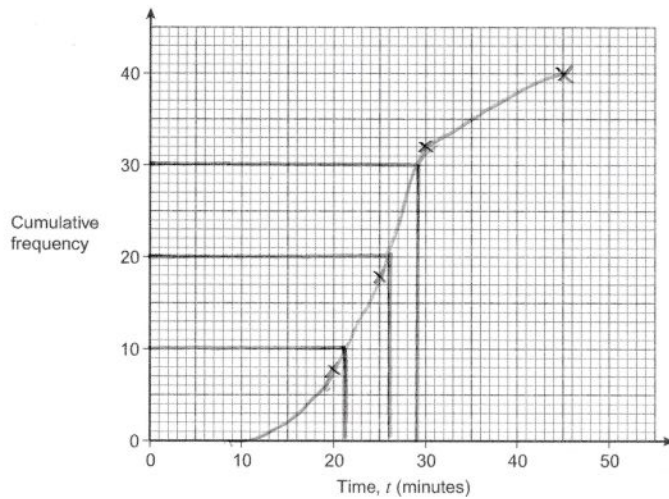
$\frac{3}{4}$ of Boys are under 109, $\frac{3}{4}$ of 60 = 45
53 girls are under 109
 $45 + 53 = 98$

Answer 98 (4 marks)

- 7 Dan and Jane take it in turns to drive to work.
The table shows information about 40 journeys when Dan drives.

Time, t (minutes)	Frequency
$10 \leq t < 20$	8
$20 \leq t < 25$	10
$25 \leq t < 30$	14
$30 \leq t < 45$	8

- 7 (a) Draw a cumulative frequency diagram to show this information on the grid.



(4 marks)

- 7 (b) Use your graph to estimate the median journey time.

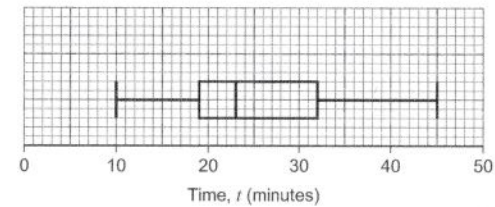
Answer 26 minutes (1 mark)

- 7 (c) Use your graph to estimate the interquartile range.

..... 29 - 21

Answer 8 minutes (2 marks)

- 7 (d) The box-and-whisker plot shows information about 40 journeys when Jane drives.



Jane says,

"My times are quicker and more consistent than Dan's."

Comment on Jane's statement.

..... IQR for Jane $32 - 19 = 13$

..... IQR for Dan = 8

..... Median for Jan = 23, Median for Dan = 26

..... Jane's times are quicker on average than Dan's, but Dan's times are more consistent

(4 marks)

8

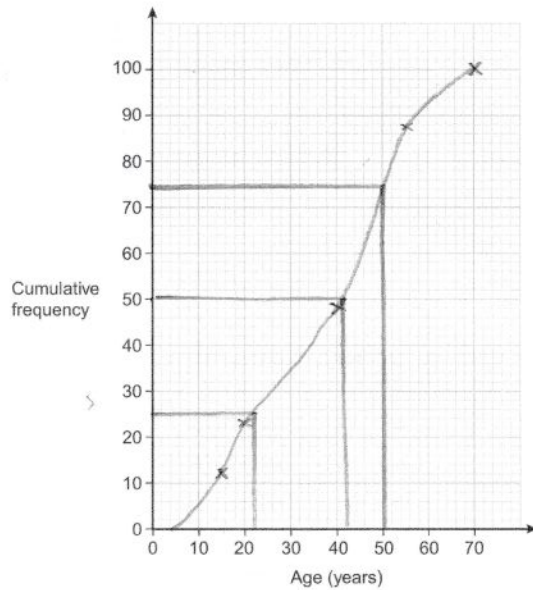
The table shows information about the ages of 100 rugby supporters.

Age, a (years)	Frequency	C.F.
$5 \leq a < 15$	12	12
$15 \leq a < 20$	11	23
$20 \leq a < 40$	25	48
$40 \leq a < 55$	39	87
$55 \leq a < 70$	13	100

8 (a)

Plot a cumulative frequency diagram for the data.

[4 marks]



8 (b)

The youngest supporter is 8 years old.
The oldest supporter is 69 years old.

Draw a box plot for the data.

[3 marks]

