Cumulative frequency diagrams

Grade 5 | Worked solutions

GCSE Statistics topic practice

1 The table shows information about the weights, w kg, of 60 parcels at a sorting office.

Weight, w (kg)	Frequency	Cumulative frequency
$0 < w \leq 2$	7	7
$2 < w \leq 4$	15	
$4 < w \leq 6$	20	
$6 < w \leq 8$	12	
$8 < w \leq 10$	6	

a. Complete the cumulative frequency column. (2)

b. Work out the number of parcels that weigh more than 6 kg. (1)

c. Tariq is going to draw a cumulative frequency diagram for this information. He plots his first point at (1, 7). Explain what Tariq has done wrong. (1)

(4 marks)

a)

Add on each frequency in turn

$7 + 15 = 22$

$22 + 20 = 42$

$42 + 12 = 54$

$54 + 6 = 60$

b)

42 parcels weigh 6 kg or less

$60 - 42 = 18$

c)

He has used the midpoint of the class.

All 7 parcels are counted by the time $w = 2$

so the point should be at (2, 7).

a) 22, 42, 54, 60 b) 18 c) plot at the upper bound, (2, 7)

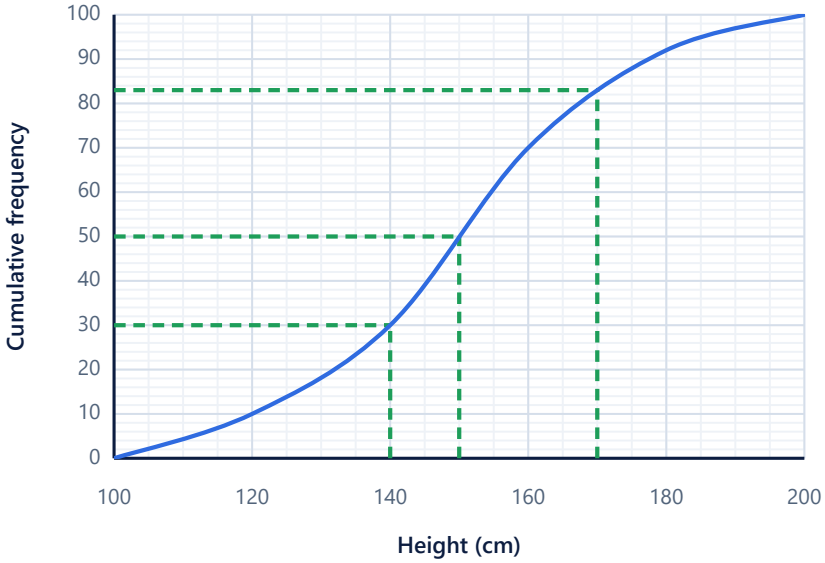
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2 A garden centre measures the heights of 100 sunflower plants. The cumulative frequency diagram shows the results.

a. Write down the number of plants with a height of 140 cm or less. (1)

b. Use the diagram to find an estimate for the median height. (1)

c. Use the diagram to find an estimate for the number of plants that are taller than 170 cm. (2)



(4 marks)

a)

Up from 140 to the curve, then across, gives 30

b)

100 ÷ 2 = 50

Across from 50 to the curve, then down, gives about 150

c)

Up from 170 to the curve, then across, gives about 83

100 - 83 = 17

a) 30 b) about 150 cm c) about 17 plants

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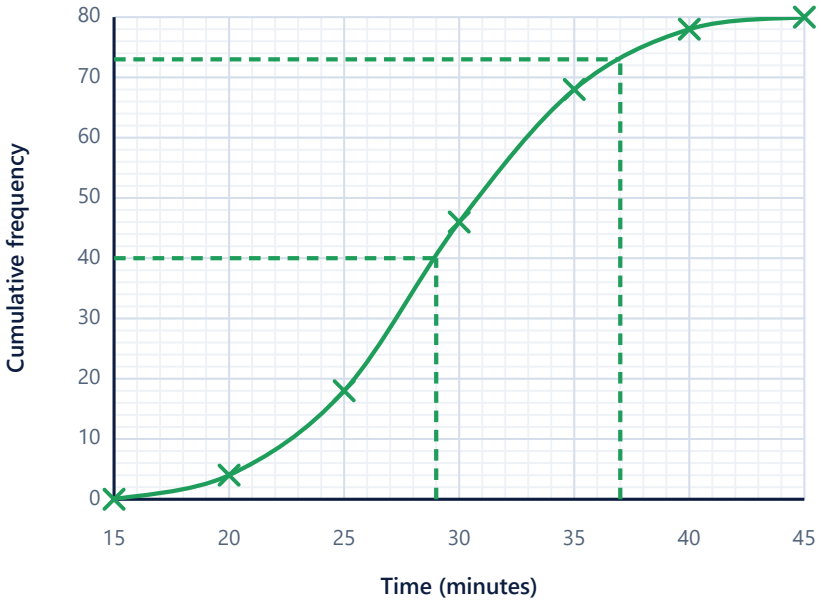
3 The cumulative frequency table shows the times, t minutes, taken by 80 runners to finish a 5 km run. No runner took 15 minutes or less.

Time, t (minutes)	**$t \leq 20$**	**$t \leq 25$**	**$t \leq 30$**	**$t \leq 35$**	**$t \leq 40$**	**$t \leq 45$**
Cumulative frequency	4	18	46	68	78	80

a. On the grid, draw a cumulative frequency diagram for this information. (2)

b. Use your diagram to find an estimate for the median time. (1)

c. Use your diagram to find an estimate for the number of runners who took more than 37 minutes. (2)



(5 marks)

a)

Plot each value at the top of its class.

Start at (15, 0) and join the points with a curve.

b)

$80 \div 2 = 40$

Across from 40 to the curve, then down, gives about 29

c)

Up from 37 to the curve, then across, gives about 73

$80 - 73 = 7$

a) curve drawn b) about 29 minutes c) about 7 runners

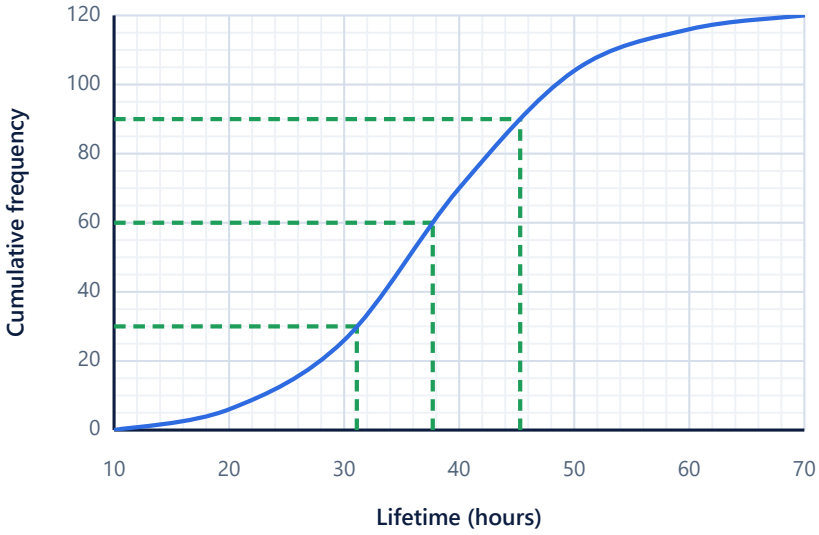
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4 A company tests 120 batteries. The cumulative frequency diagram shows how long, in hours, the batteries lasted.

a. Use the diagram to find an estimate for the median. (1)

b. Use the diagram to find an estimate for the interquartile range. (2)

c. The company claims that at least 75% of its batteries last for more than 30 hours. Does the diagram support this claim? Give a reason for your answer. (2)



(5 marks)

a)

120 ÷ 2 = 60

Across from 60 to the curve, then down, gives about 38

b)

120 ÷ 4 = 30

Across from 30 gives a lower quartile of about 31

3 x 30 = 90

Across from 90 gives an upper quartile of about 45

45 - 31 = 14

c)

Up from 30 hours to the curve gives 26

120 - 26 = 94

75% of 120 = 90

94 is more than 90, so the claim is supported.

a) about 38 h b) about 14 h c) yes, 94 is more than 90

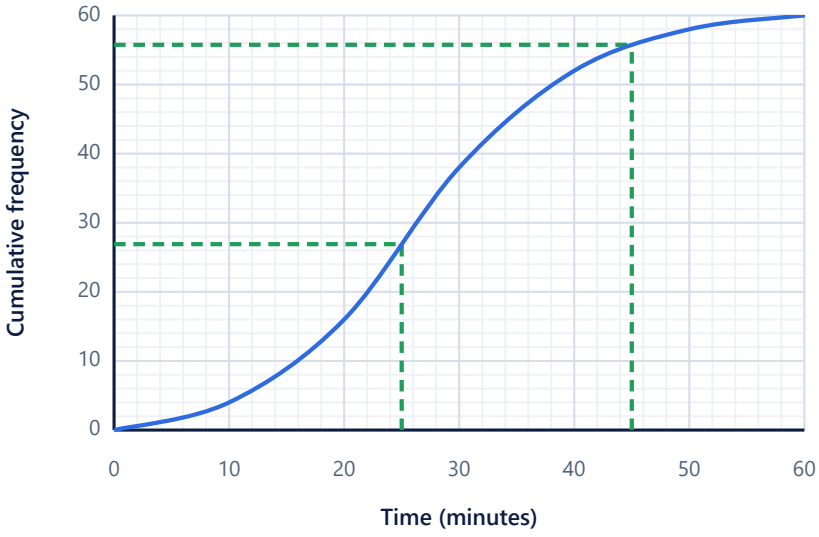
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5 The cumulative frequency diagram shows the times, t minutes, taken for 60 takeaway deliveries.

Time, t (minutes)	**$0 < t \leq 10$**	**$10 < t \leq 20$**	**$20 < t \leq 30$**	**$30 < t \leq 40$**	**$40 < t \leq 50$**	**$50 < t \leq 60$**
Frequency	4					

a. Use the diagram to complete the frequency table. (3)

b. Use the diagram to find an estimate for the number of deliveries that took between 25 minutes and 45 minutes. (2)



(5 marks)

a)

Read the curve at 10, 20, 30, 40, 50 and 60

Cumulative frequencies are 4, 16, 38, 52, 58, 60

Subtract to get each frequency

16 − 4 = 12

38 − 16 = 22

52 − 38 = 14

58 − 52 = 6

60 − 58 = 2

b)

Up from 45 to the curve, then across, gives about 56

Up from 25 to the curve, then across, gives about 27

56 − 27 = 29

a) 12, 22, 14, 6, 2 b) about 29 deliveries

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