



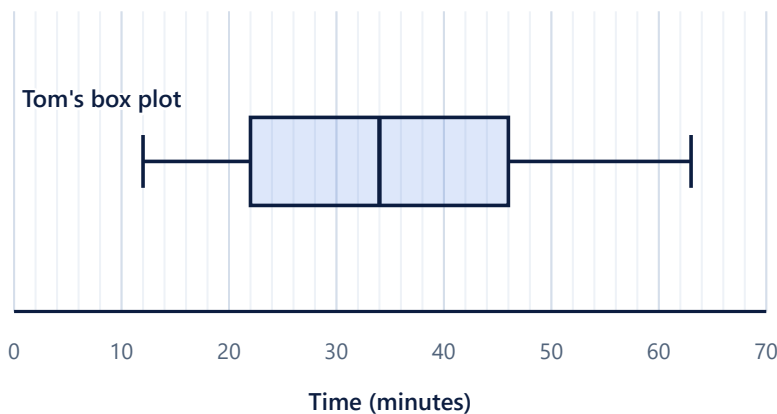
- 1 The table gives information about the times, in minutes, that 51 patients waited at a clinic.

Shortest time	15
Lower quartile	22
Median	38
Upper quartile	46
Longest time	63

Tom draws a box plot for this information. On his box plot:

- the left whisker ends at 12
- the line inside the box is drawn at 34

Write down two things that are wrong with Tom's box plot.



(2 marks)

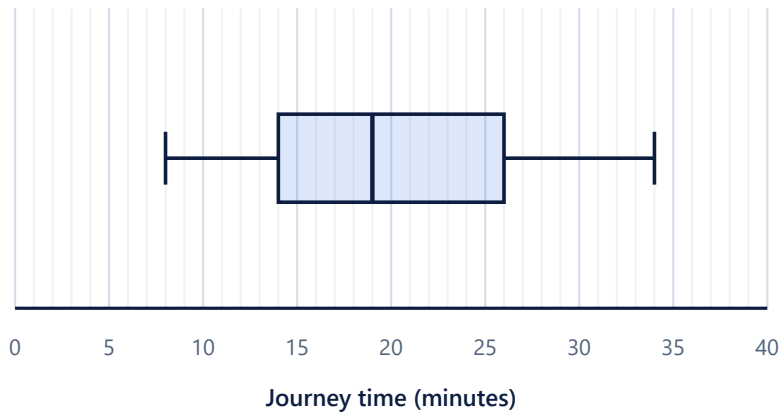
The whisker must end at the shortest time, 15 minutes, but Tom drew it at 12

The line inside the box shows the median, 38 minutes, but Tom drew it at 34

2

The box plot shows the journey times, in minutes, of 15 deliveries made by a courier.

- Write down the median journey time.
- Work out the interquartile range of the journey times.
- Work out the range of the journey times.



(3 marks)

The line inside the box is at 19, so the median is 19 minutes

Interquartile range = upper quartile - lower quartile = $26 - 14$
= 12 minutes

Range = longest - shortest = $34 - 8 = 26$ minutes

3

Here are the scores of 15 pupils in a spelling test, shown in a stem and leaf diagram.

Stem	Leaf
2	3 5 8
3	1 4 4 7
4	0 2 5 6
5	1 3 8
6	0

Key: 2 | 3 means a score of 23

- Write down the five values needed to draw a box plot: the minimum, lower quartile, median, upper quartile and maximum.
- Draw a box plot for these scores on a scale from 20 to 60.

(3 marks)

a) Count the values: 15

median = 8th value = 40

LQ = 4th value = 31

UQ = 12th value = 51

min = 23, max = 60

23, 31, 40, 51, 60

b) Box from 31 to 51, line at 40

whiskers to 23 and 60

4

Here are the numbers of emails Priya received on each of 11 days, written in order.

3 5 6 8 9 11 13 14 16 18 21

- Find the median.
- Find the lower quartile and the upper quartile.
- Work out the interquartile range.

(3 marks)

There are 11 values, so the median is the 6th value: 11

Exclude the overall median, then find the median of each remaining half. The lower five values have middle value 6; the upper five have middle value 16. These are the lower and upper quartiles

The lower quartile is the 3rd value: 6. The upper quartile is the 9th value: 16

Interquartile range = $16 - 6 = 10$

5

A box plot shows the times, in minutes, that 120 pupils took to complete a puzzle. The five values on the box plot are:

Minimum	12
Lower quartile	18
Median	25
Upper quartile	34
Maximum	50

- Work out the range and the interquartile range.
- What percentage of the pupils took between 18 and 34 minutes?
- Estimate how many pupils took more than 34 minutes.

(4 marks)

a)

$$\text{range} = 50 - 12 = 38$$

$$\text{IQR} = 34 - 18 = 16$$

b) LQ to UQ is the box

50%

c) Above UQ is the top quarter

$$\frac{1}{4} \times 120 = 30$$

30 pupils

6

The stem and leaf diagram shows the marks of 15 students in a spelling test.

Stem	Leaves
1	2 5 8
2	0 3 4 7 9
3	1 4 6 8
4	0 2 5

Key: 2 | 3 means 23 marks

Work out the five values needed to draw a box plot for this data: the lowest mark, the lower quartile, the median, the upper quartile and the highest mark.

(3 marks)

The ordered data is 12, 15, 18, 20, 23, 24, 27, 29, 31, 34, 36, 38, 40, 42, 45

With 15 values the median is the 8th value: 29

The lower quartile is the 4th value: 20. The upper quartile is the 12th value: 38

Lowest = 12, highest = 45

7

The cumulative frequency graph for 40 journey times, in minutes, shows that the shortest journey took 5 minutes, the 10th journey took 12 minutes, the 20th took 18 minutes, the 30th took 25 minutes and the longest took 41 minutes.

- Write down the minimum, lower quartile, median, upper quartile and maximum.
- Draw a box plot for the journey times.
- Estimate how many journeys took between 12 and 25 minutes.

(5 marks)

a) $n = 40$, so quartiles at 10th, 20th, 30th

min 5, LQ 12, median 18, UQ 25, max 41

b) Box from 12 to 25, line at 18

whiskers to 5 and 41

c) LQ to UQ holds half the journeys

$$\frac{1}{2} \times 40 = 20$$

20 journeys

8

Two Year 11 classes sat the same test. The box plots for their marks have these five values.

	Minimum	Lower quartile	Median	Upper quartile	Maximum
Class A	20	38	50	62	90
Class B	31	45	54	60	78

Compare the marks of the two classes. Use the medians and the interquartile ranges, and refer to the context.

(4 marks)

$$\text{IQR of A} = 62 - 38 = 24$$

$$\text{IQR of B} = 60 - 45 = 15$$

Compare the average

median B (54) is higher than median A (50)

Compare the spread

B has the smaller IQR so its marks are more consistent

B higher median, B more consistent

9

Two shops sell second-hand bikes. The tables summarise the prices, in pounds, of the bikes sold last month.

Shop A

Minimum	60
Lower quartile	95
Median	130
Upper quartile	180
Maximum	250

Shop B: median £150, interquartile range £45.

- Work out the interquartile range of the prices at Shop A.
- Compare the prices of bikes at the two shops. Give two comparisons.
- Which shop has the more consistent prices? Give a reason.

(4 marks)

Interquartile range for Shop A = $180 - 95 = £85$

Comparing averages: Shop B's median of £150 is higher than Shop A's £130, so on average bikes at Shop B cost more

Comparing spread: Shop A's IQR of £85 is larger than Shop B's £45, so Shop A's prices are more spread out

Shop B is more consistent because its interquartile range is smaller

10

60 students sat a mock exam. The lowest mark was 8 and the highest was 59. The lower quartile was 21, the median was 34 and the upper quartile was 47.

- Draw a box plot for the marks on a scale from 0 to 60.
- Estimate the number of students who scored more than 21.
- Estimate the number of students who scored between 34 and 47.

(4 marks)

a) Box 21 to 47, line at 34

whiskers to 8 and 59

b) Above LQ is 75% of the students

$$0.75 \times 60 = 45$$

45 students

c) Median to UQ is 25%

$$60 \div 4 = 15$$

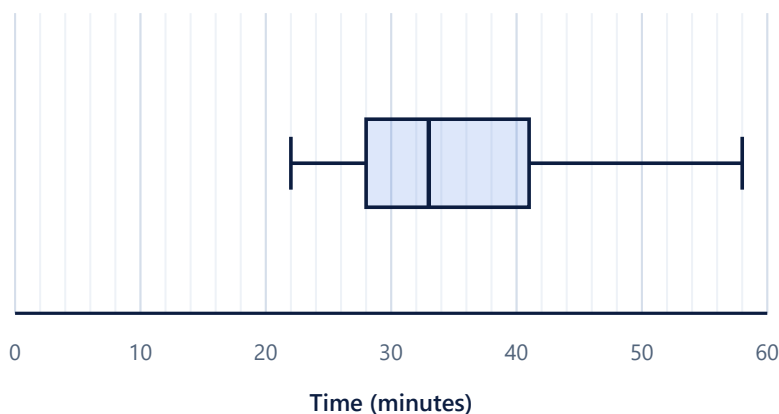
15 students

11

A box plot summarises the times, in minutes, taken by 120 runners to finish a 10 km race.

On the box plot: the whiskers are at 22 and 58, the box goes from 28 to 41, and the median line is at 33.

- Work out the interquartile range of the times.
- Estimate how many of the 120 runners took longer than 41 minutes.
- Explain why your answer to part (b) is an estimate.



(4 marks)

Interquartile range = $41 - 28 = 13$ minutes

41 minutes is the upper quartile, so about 25% of runners took longer: 25% of 120 = 30 runners

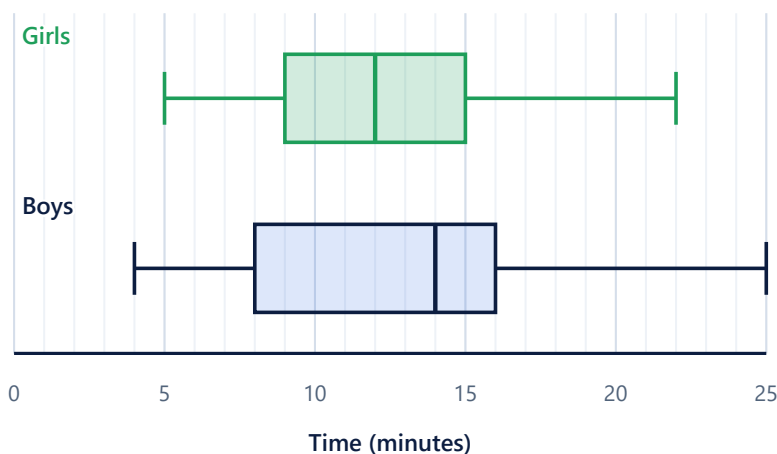
The box plot does not show individual times, so we can only assume a quarter of the data lies above the upper quartile

12

The table gives information about the times, in minutes, that the girls in a class spent on homework one evening.

Shortest time	5
Lower quartile	9
Median	12
Upper quartile	15
Longest time	22

- a. On the grid, draw a box plot for this information.
- b. The box plot for the boys in the class is shown on the same grid. The boys had a median of 14 minutes and an interquartile range of 8 minutes. Compare the times spent by the girls and the boys. Give two comparisons.



(5 marks)

Draw whiskers at 5 and 22, a box from 9 to 15 and the median line at 12

Girls' interquartile range = $15 - 9 = 6$ minutes

The girls' median of 12 minutes is lower than the boys' 14 minutes, so on average girls spent less time

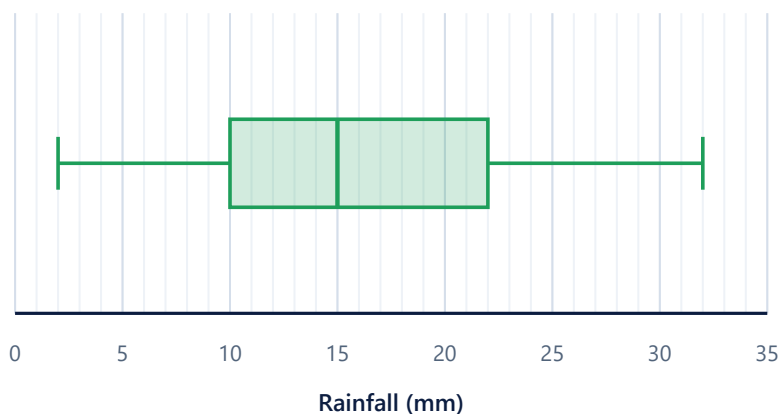
The girls' IQR of 6 minutes is smaller than the boys' 8 minutes, so the girls' times were less spread out

13

A weather station recorded the daily rainfall, in mm, on each of 60 days.

- The lowest rainfall was 2 mm.
- The range was 30 mm.
- The median was 15 mm.
- The lower quartile was 10 mm.
- The interquartile range was 12 mm.

- Use this information to draw a box plot for the rainfall.
- Estimate the number of days on which the rainfall was more than 22 mm.



(5 marks)

Highest rainfall = lowest + range = $2 + 30 = 32$ mm

Upper quartile = lower quartile + IQR = $10 + 12 = 22$ mm

Draw whiskers at 2 and 32, the box from 10 to 22 and the median line at 15

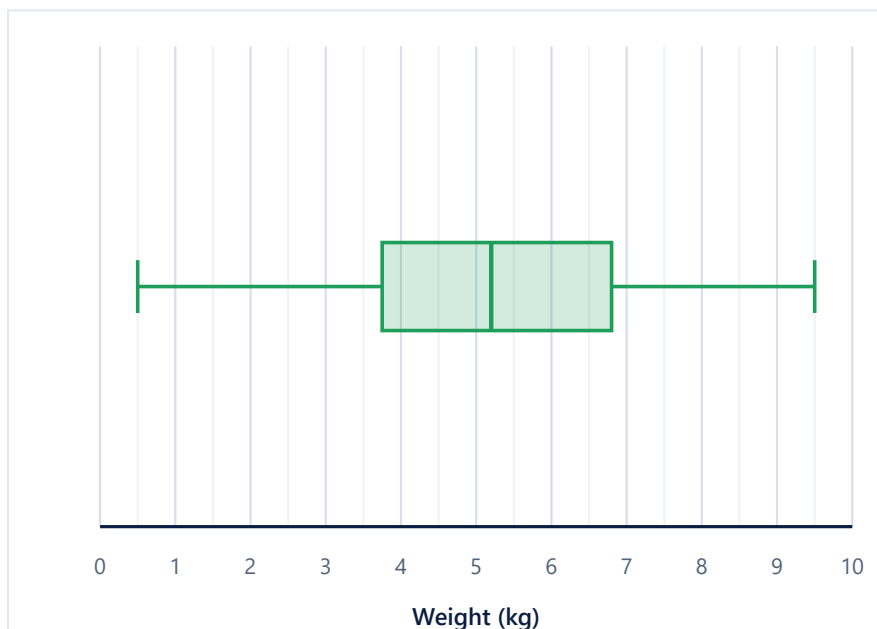
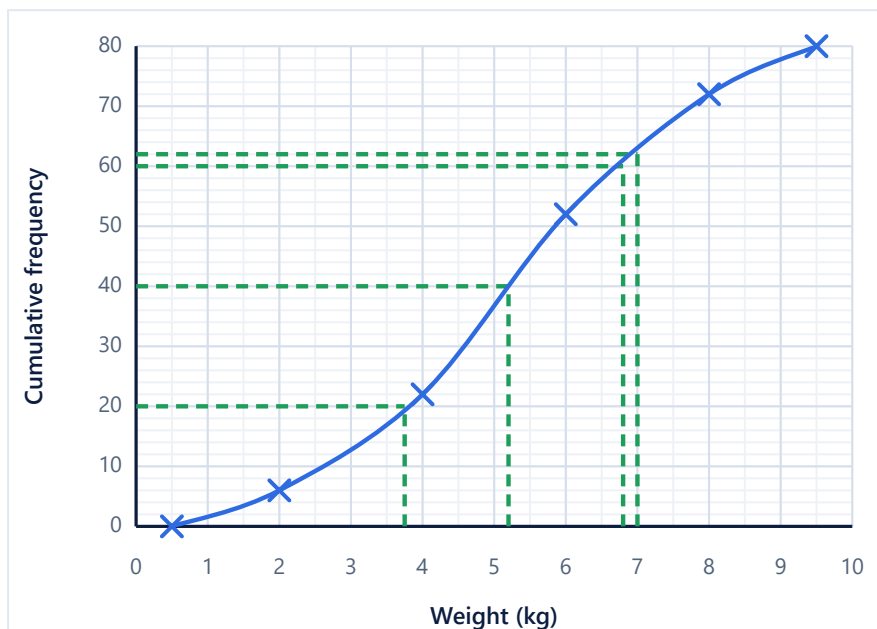
22 mm is the upper quartile, so about a quarter of the days had more rainfall: $60 \div 4 = 15$ days

14

The cumulative frequency graph shows the weights, in kg, of 80 parcels sent from a depot on Monday.

The lightest parcel weighed 0.5 kg and the heaviest weighed 9.5 kg.

- Use the graph to draw a box plot for the weights of Monday's parcels.
- Use the graph to estimate the number of parcels that weighed more than 7 kg.
- On Tuesday the parcels had a median weight of 4.4 kg and an interquartile range of 2.1 kg. Compare the weights of Monday's and Tuesday's parcels.



(6 marks)

Median: read across from 40, giving about 5.2 kg

Lower quartile: read across from 20, giving about 3.75 kg. Upper quartile: read across from 60, giving about 6.8 kg

Draw the box from the lower quartile to the upper quartile with a line at the median, and whiskers to 0.5 kg and 9.5 kg

At 7 kg the cumulative frequency is about 62, so about $80 - 62 = 18$ parcels weighed more than 7 kg

Monday's median (about 5.2 kg) is higher than Tuesday's (4.4 kg): Monday's parcels were heavier on average. Monday's IQR (about $6.8 - 3.75 = 3.05$ kg) is larger than Tuesday's (2.1 kg): Monday's weights were more spread out

15

Here are the times, in seconds, taken by the 15 swimmers in Team A to swim 50 metres.

41 38 45 36 50 39 43 47 35 44 40 52 37 46 42

- Find the median, the lower quartile and the upper quartile of the times for Team A.
- Team B's times had a median of 44 seconds and an interquartile range of 13 seconds. Compare the times of the two teams. Give two comparisons.

(5 marks)

Ordered times: 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 50, 52

With 15 values the median is the 8th value: 42 seconds

The lower quartile is the 4th value: 38. The upper quartile is the 12th value: 46

Team A's interquartile range = $46 - 38 = 8$ seconds

Team A's median of 42 is lower than Team B's 44, so on average Team A swam faster; Team A's IQR of 8 is smaller than Team B's 13, so Team A's times were more consistent

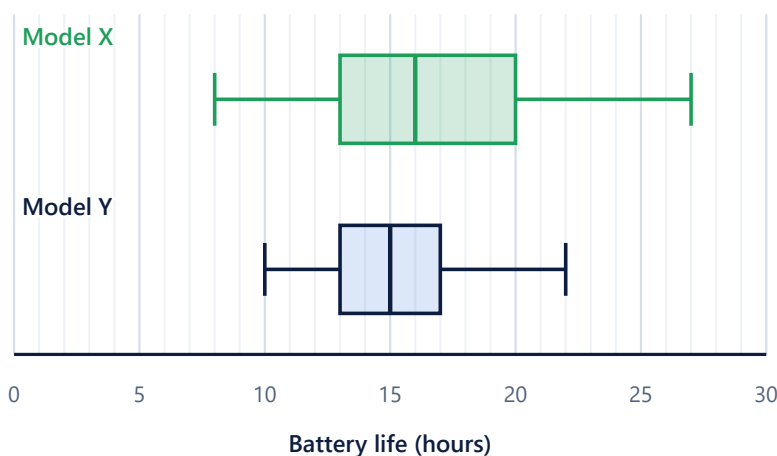
16

The table summarises the battery life, in hours, of 80 phones of Model X.

Minimum	8
Lower quartile	13
Median	16
Upper quartile	20
Maximum	27

Jay tries to draw a box plot for Model X. On his diagram the whiskers are at 13 and 20 and the box goes from 8 to 27 with a line at 16.

- Write down two mistakes Jay has made.
- On the grid, draw a correct box plot for Model X.
- The box plot for Model Y is drawn on the same grid. Model Y has a median of 15 hours and an interquartile range of 4 hours. Compare the battery lives of the two models.



(5 marks)

Jay swapped the box and the whiskers: the box must span the quartiles 13 to 20 and the whiskers must reach the minimum 8 and maximum 27

Draw whiskers at 8 and 27, the box from 13 to 20 and the median line at 16

Model X's interquartile range = $20 - 13 = 7$ hours

Model X's median of 16 hours is higher than Model Y's 15 hours, so on average Model X lasts longer; Model X's IQR of 7 hours is larger than Model Y's 4 hours, so Model X's battery life varies more