Year 9 box plots worksheet

Year 9 · 10 questions · www.tuterly.com.au

Name: _____ Date: _____

Question 1

Two basketball players recorded their points scored in 8 games each.

Player A: 5, 9, 12, 15, 18, 22, 25, 28

Player B: 3, 7, 10, 14, 19, 21, 26, 30

Find the interquartile range (IQR) for each player, then find the difference between their IQRs.

Answer: _____

Question 2

The results of a fitness test for two classes are summarised below.

	Class A	Class B
Minimum	42	38
Lower quartile (Q_1)	55	60
Median	68	74
Upper quartile (Q_3)	76	85
Maximum	90	97

What is the interquartile range (IQR) of Class B?

Answer: _____

Question 3

Two classes completed a maths test. Their scores out of 50 are listed below.

Class X: 14, 18, 21, 25, 28, 33, 37, 41, 44, 48

Class Y: 16, 20, 23, 26, 30, 34, 38, 42, 45, 49

Find the IQR for each class, then find the difference between the two IQRs.

Answer: _____

Question 4

A school canteen records the number of sandwiches sold each day for 8 days.

18,; 21,; 22,; 24,; 25,; 26,; 27,; 56

A value is an outlier if it is more than 1.5 × IQR above Q_3 or below Q_1. Find the lower and upper outlier boundaries, then state which value is the outlier.

Answer: _____

Question 5

The ages (in years) of 8 members of a sports team are listed below.

14,; 15,; 15,; 16,; 17,; 18,; 19,; 21

Find the interquartile range (IQR) of these ages.

Answer: _____

Question 6

A box plot has minimum 12, lower quartile 18, median 23, upper quartile 30 and maximum 41.

(a) Find the range.

(b) Find the interquartile range.

Answer: _____

Question 7

A class of 25 students recorded how many hours they spent on screens last weekend. The results are listed below.

Hours	Frequency
0	2
1	3
2	5
3	7
4	5
5	2
6	1

What is the interquartile range (IQR) of this dataset?

Answer: _____

Question 8

Find the five-number summary of this data set, to be used for a box plot. Give the values in the order minimum, Q_1, median, Q_3, maximum. (Do not include the median in either half when finding the quartiles.)

3, 7, 8, 10, 12, 13, 15, 18, 21

Answer: _____

Question 9

The heights (in centimetres) of 8 plants grown in a science experiment are listed below.

12,; 15,; 17,; 19,; 23,; 26,; 29,; 34

Find the interquartile range (IQR) of these heights.

Answer: _____

Question 10

For a data set, $Q_1 = 20$ and $Q_3 = 32$. A value is an outlier if it is more than $1.5 \times$ IQR above Q_3 or below Q_1.

(a) Find the IQR.

(b) Find the upper boundary for outliers, $Q_3 + 1.5 \times$ IQR.

(c) Find the lower boundary for outliers, $Q_1 - 1.5 \times$ IQR.

Answer: _____

Year 9 box plots: answers and worked solutions

Year 9 · 10 questions · www.tuterly.com.au

Question 1

Key idea: With 8 values, split into a lower half (first 4) and upper half (last 4). Q_1 is the median of the lower half and Q_3 is the median of the upper half.

1. Player A lower half: 5, 9, 12, 15 and upper half: 18, 22, 25, 28.\ $Q_1 = (9+12)/(2) = 10.5$, $Q_3 = (22+25)/(2) = 23.5$ IQR_A = 23.5 - 10.5 = 13 2. Player B lower half: 3, 7, 10, 14 and upper half: 19, 21, 26, 30.\ $Q_1 = (7+10)/(2) = 8.5$, $Q_3 = (21+26)/(2) = 23.5$ IQR_B = 23.5 - 8.5 = 15 3. Difference between IQRs: 15 - 13 = 2.

Answer: The difference between the IQRs is 2.

Question 2

Key idea: The interquartile range (IQR) measures the spread of the middle 50% of data. It is calculated as $IQR = Q_3 - Q_1$.

1. Identify the quartiles for Class B from the table: $Q_1 = 60$ and $Q_3 = 85$. 2. Apply the formula: $IQR = Q_3 - Q_1$. 3. Substitute the values: IQR = 85 - 60. 4. Calculate: IQR = 25.

Answer: 25

Question 3

Key idea: With 10 values, split into a lower half (first 5) and upper half (last 5). Q_1 and Q_3 are the medians of those halves.

1. Class X lower half: 14, 18, 21, 25, 28 so $Q_1 = 21$. Upper half: 33, 37, 41, 44, 48 so $Q_3 = 41$.\ IQR_X = 41 - 21 = 20 2. Class Y lower half: 16, 20, 23, 26, 30 so $Q_1 = 23$. Upper half: 34, 38, 42, 45, 49 so $Q_3 = 42$.\ IQR_Y = 42 - 23 = 19 3. Difference between IQRs: 20 - 19 = 1.

Answer: The difference between the two IQRs is 1.

Question 4

Key idea: Calculate Q_1, Q_3 and the IQR, then apply the outlier rule.

1. Lower half (first 4 values): 18, 21, 22, 24 $\Rightarrow$ $Q_1 = (21 + 22)/(2) = 21.5$. 2. Upper half (last 4 values): 25, 26, 27, 56 $\Rightarrow$ $Q_3 = (26 + 27)/(2) = 26.5$. 3. IQR = 26.5 - 21.5 = 5. 4. Lower boundary: $Q_1 - 1.5 \times IQR = 21.5 - 7.5 = 14$. Upper boundary: $Q_3 + 1.5 \times IQR = 26.5 + 7.5 = 34$. 5. The value 56 is above 34, so 56 is the outlier.

Answer: 56 sandwiches is the outlier.

Question 5

Key idea: Split the data into a lower half and an upper half, then find the median of each half.

1. There are n = 8 values in order: 14, 15, 15, 16, 17, 18, 19, 21. 2. Lower half (first 4 values): 14, 15, 15, 16 ⇒ Q_1 = (15 + 15)/(2) = 15. 3. Upper half (last 4 values): 17, 18, 19, 21 ⇒ Q_3 = (18 + 19)/(2) = 18.5. 4. IQR = Q_3 - Q_1 = 18.5 - 15 = 3.5 years.

Answer: 3.5 years.

Question 6

Key idea: Range = max - min; IQR = Q_3 - Q_1.

1. Range = 41 - 12 = 29 2. IQR = 30 - 18 = 12

Answer: (a) 29 (b) 12

Question 7

Key idea: The IQR = Q3 − Q1, where Q1 and Q3 are the medians of the lower and upper halves of the ordered dataset.

1. Write out all 25 values in order using the frequency table:\ 0, 0, 1, 1, 1, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 4, 5, 5, 6

2. The median is the 13th value: 3.

3. The lower half is the first 12 values:\ 0, 0, 1, 1, 1, 2, 2, 2, 2, 2, 3, 3 Q1 = average of 6th and 7th values = (2 + 2)/(2) = 2

4. The upper half is the last 12 values:\ 3, 3, 3, 3, 3, 4, 4, 4, 4, 4, 5, 5 Q3 = average of 6th and 7th values = (4 + 4)/(2) = 4

5. IQR = Q3 - Q1 = 4 - 2 = 2

Answer: 2

Question 8

Key idea: The quartiles are the medians of the lower and upper halves.

1. There are 9 values, so the median is the 5th value, 12 2. Lower half 3, 7, 8, 10: Q_1 = (7 + 8)/(2) = 7.5 3. Upper half 13, 15, 18, 21: Q_3 = (15 + 18)/(2) = 16.5 4. Minimum 3, maximum 21

Answer: 3, 7.5, 12, 16.5, 21

Question 9

Key idea: Split the 8 values evenly into a lower half and an upper half, find the median of each, then subtract.

1. The values are already in order: 12, 15, 17, 19, 23, 26, 29, 34. 2. Lower half (first 4 values): 12, 15, 17, 19 ⇒ Q_1 = (15 + 17)/(2) = 16. 3. Upper half (last 4 values): 23, 26, 29, 34 ⇒ Q_3 = (26 + 29)/(2) = 27.5. 4. IQR = Q_3 - Q_1 = 27.5 - 16 = 11.5 cm.

Answer: 11.5 cm.

Question 10

Key idea: Find the IQR first, then go 1.5 × IQR beyond each quartile.

1. IQR = 32 - 20 = 12 2. 1.5 × 12 = 18 3. Upper boundary = 32 + 18 = 50 4. Lower boundary = 20 - 18 = 2

Answer: (a) 12 (b) 50 (c) 2