Year 10 box plots worksheet

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Name: _____ Date: _____

Question 1

Two classes each sat the same maths test scored out of 100. Their results are summarised below.

	Class A	Class B
Minimum	42	55
Q1	58	62
Median (Q2)	70	71
Q3	80	76
Maximum	95	88

Compare the two distributions by commenting on centre, spread and skewness. Identify which class performed more consistently.

Answer: _____

Question 2

The numbers of goals scored by a hockey team in 9 matches were:

4, 7, 9, 11, 12, 15, 18, 20, 26

(a) Write the five-number summary (minimum, Q_1, median, Q_3, maximum), in that order.

(b) Find the interquartile range.

Answer: _____

Question 3

A box plot shows the times (in minutes) that 40 students took to run a cross-country course: minimum 5, $Q_1 = 12$, median 18, $Q_3 = 25$, maximum 40.

(a) Approximately how many students took more than 25 minutes?

(b) Find the upper fence, $Q_3 + 1.5 \times \text{IQR}$.

Answer: _____

Question 4

A box plot shows the waiting times of 60 people at a bus stop. Its five-number summary is: minimum 1 minute, Q_1 = 4 minutes, median 7 minutes, Q_3 = 12 minutes, maximum 20 minutes.

(a) What percentage of the people waited between 4 and 12 minutes?

(b) Approximately how many people waited more than 7 minutes?

(c) Approximately how many people waited less than 4 minutes?

Answer: _____

Question 5

The maximum daily temperatures (in °C) in a country town over 12 days were:

21, 18, 25, 30, 19, 23, 27, 22, 17, 24, 29, 26

Find the five-number summary.

Answer: _____

Question 6

The number of push-ups 16 students did in one minute is shown in order:

12, 15, 18, 20, 21, 22, 24, 25, 27, 28, 30, 32, 33, 35, 40, 44

(a) Find the five-number summary.

(b) Show that there are no outliers (use the 1.5 × IQR rule).

(c) Draw a box plot of the data on a scale from 10 to 50.

Answer: _____

Question 7

Two Year 10 classes sat the same test, marked out of 50. Their five-number summaries are:

	Minimum	Q_1	Median	Q_3	Maximum
Class A	18	28	34	40	48
Class B	22	31	36	39	45

(a) Which class has the higher median?

(b) Find the IQR for each class.

(c) Find the range for each class.

(d) Which class had more consistent results? Give a reason.

Answer: _____

Question 8

The commute times (in minutes) of workers in two suburbs, Northvale and Southbank, are summarised below.

	Minimum	Q_1	Median	Q_3	Maximum
Northvale	10	22	30	38	55
Southbank	15	30	42	50	70

State whether each statement is true or false.

(a) The median commute in Southbank is 12 minutes longer than in Northvale.

(b) About 75% of Southbank workers commute for 30 minutes or more.

(c) Northvale has the larger interquartile range.

(d) The range of Southbank commute times is 50 minutes.

Answer: _____

Question 9

For each five-number summary (minimum, Q_1, median, Q_3, maximum), state whether the data is symmetric, positively skewed or negatively skewed.

(a) 2, 10, 12, 14, 22

(b) 5, 8, 10, 18, 35

(c) 20, 45, 52, 55, 58

Answer: _____

Question 10

Ten people recorded how many kilometres they cycled on the weekend:

8, 12, 14, 15, 16, 18, 19, 21, 22, 48

(a) Find the five-number summary.

(b) Show that 48 is an outlier.

(c) When this data is drawn as a box plot with outliers shown, where does the upper whisker end, and how is 48 shown?

Answer: _____

Year 10 box plots: answers and worked solutions

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Question 1

Key idea: Compare boxplots by commenting on centre (median), spread (IQR and range) and skewness (symmetry of the box and whiskers).

1. **Centre:** The medians are almost identical (Class A: 70, Class B: 71), so both classes performed similarly on average. 2. **Spread:** IQR_A = 80 - 58 = 22, IQR_B = 76 - 62 = 14. Range_A = 95 - 42 = 53, Range_B = 88 - 55 = 33. Class B has a smaller IQR and smaller range, so Class B performed more consistently. 3. **Skewness:** For Class A: Q2 - Q1 = 12 and Q3 - Q2 = 10, with a longer lower whisker (70 - 42 = 28) than upper whisker (95 - 70 = 25), indicating slight negative skew. For Class B: Q2 - Q1 = 9 and Q3 - Q2 = 5, with the upper half of the box compressed and whiskers roughly equal (71 - 55 = 16, 88 - 71 = 17), indicating negative skew within the box (scores bunched toward the upper end).

Answer: Both classes have nearly the same median (70 vs 71). Class B is more consistent (IQR of 14 vs 22, range of 33 vs 53). Both distributions are slightly negatively skewed, with Class B showing more compression in the upper half of the box.

Question 2

Key idea: With 9 values, the median is the 5th value; Q_1 and Q_3 are the medians of the 4 values below and above it.

1. Median = 12 2. $Q_1 = (7 + 9)/(2) = 8$ and $Q_3 = (18 + 20)/(2) = 19$ 3. IQR = 19 - 8 = 11

Answer: (a) 4, 8, 12, 19, 26 (b) 11

Question 3

Key idea: Each quarter of a box plot holds about 25% of the data.

1. About 25% of 40 = 10 students 2. IQR = 25 - 12 = 13 3. Upper fence = 25 + 1.5 × 13 = 44.5

Answer: (a) 10 (b) 44.5

Question 4

Answer: (a) 50% (b) about 30 people (c) about 15 people

Question 5

Answer: minimum 17, $Q_1 = 20$, median 23.5, $Q_3 = 26.5$, maximum 30 (ordered: 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 29, 30)

Question 6

Answer: (a) 12, 20.5, 26, 32.5, 44 (b) IQR = 12; limits are 20.5 - 18 = 2.5 and 32.5 + 18 = 50.5; all values lie between these, so no outliers. (c) Box from 20.5 to 32.5 with a line at 26; whiskers to 12 and 44.

Question 7

Answer: (a) Class B (b) A: 12, B: 8 (c) A: 30, B: 23 (d) Class B, because its IQR and range are both smaller, so its marks are less spread out.

Question 8

Answer: (a) true (b) true (c) false (Northvale 16, Southbank 20) (d) false (it is 55 minutes)

Question 9

Answer: (a) symmetric (b) positively skewed (also accept skewed right) (c) negatively skewed (also accept skewed left)

Question 10

Answer: (a) 8, 14, 17, 21, 48 (b) IQR = 7; upper limit = 21 + 10.5 = 31.5, and 48 > 31.5 (c) The whisker ends at 22 (the largest value that is not an outlier) and 48 is shown as a separate point (a dot or cross).