



F04-30min Skewness by Inspection: 30-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A data set has a long tail stretching towards the higher values, with most of the data bunched at the lower end. Write down whether this distribution is positively skewed or negatively skewed.

(Total for Question 1 is 1 mark)

- 2** A data set has a long tail stretching towards the lower values, with most of the data bunched at the higher end. Write down whether this distribution is positively skewed or negatively skewed.

(Total for Question 2 is 1 mark)

- 3** For each statement about skewness, write down whether it is True or False.

(i) In a symmetric distribution, the mean, median and mode are all equal (or very close). **(1)**

(ii) A distribution is positively skewed when the mean is greater than the median. **(1)**

(iii) Negative skew means the distribution has a long tail on the right-hand (high-value) side. **(1)**

(iv) If the mode is greater than the mean, the distribution is likely to be positively skewed. **(1)**

(Total for Question 3 is 4 marks)

4 In a spelling test out of 20, a class of pupils obtained a mean score of 14.2, a median score of 15 and a modal score of 16.

(a) State whether the distribution of scores is symmetric, positively skewed or negatively skewed. **(1)**

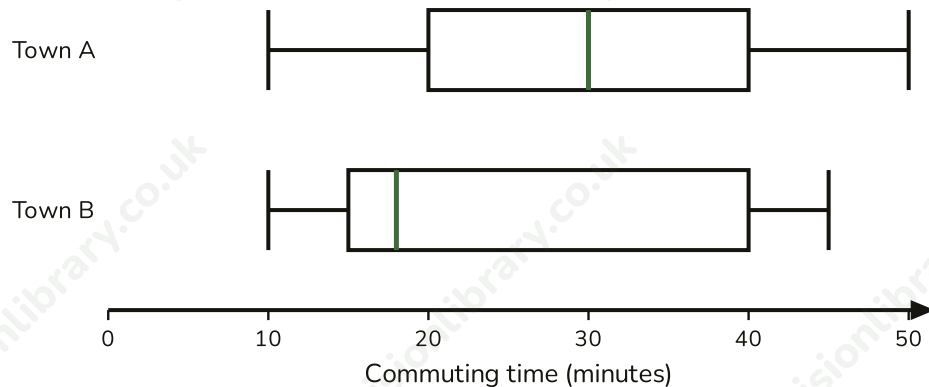
(b) Justify your answer to part (a) by referring to the mean, median and mode. **(2)**

(Total for Question 4 is 3 marks)

5 The selling prices of 7 houses on a small road are: £180,000, £185,000, £190,000, £195,000, £200,000, £205,000, £595,000 (one much larger detached house). Work out the median price and the mean price, and state which average better represents a 'typical' house price on this road, giving a reason.

(Total for Question 5 is 3 marks)

- 6** The box plots show the commuting times, in minutes, of workers travelling to Town A and to Town B, drawn on the same scale.



- (a) Write down the median commuting time for Town A. (1)
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- (b) Write down the median commuting time for Town B. (1)
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- (c) Compare the skewness of the two distributions, referring to the shape of each box plot. (2)

(Total for Question 6 is 4 marks)

- 7** Priya, a Year 11 student, wants to investigate the statement: 'Most staff at my part-time job have a short commute, but a few travel a long way.' She collects the commuting time, in minutes, of all 12 staff. State whether you would expect the resulting distribution of commuting times to be positively skewed or negatively skewed, give a reason referring to the mean and median, and suggest an appropriate average to use to summarise a 'typical' commuting time for this group, giving a reason.

(Total for Question 7 is 3 marks)

- 8** Two classes sat the same maths test, out of 80 marks.
Class A: lower quartile = 40, median = 55, upper quartile = 62.
Class B: lower quartile = 45, median = 55, upper quartile = 65.
Both classes have the same median score. Compare $Q_3 - Q_2$ with $Q_2 - Q_1$ for each class to determine the skew of each distribution, and comment on which class has a more symmetric spread of results.

(Total for Question 8 is 3 marks)

- 9** Two classes sat the same maths test, out of 60 marks. The table shows summary statistics for each class.

Class	Lower quartile	Median	Upper quartile
9A	28	40	44
9B	30	34	52

- (a) For Class 9A, work out median - lower quartile and upper quartile - median, and use these to state the type of skew shown. (2)

- (b) For Class 9B, work out median - lower quartile and upper quartile - median, and use these to state the type of skew shown. (2)

(Total for Question 9 is 4 marks)

- 10** Two data sets of delivery times have the same median value, but Data Set P is positively skewed and Data Set Q is negatively skewed. Explain how this is possible, and describe one difference you would expect to see between their box plots.

(Total for Question 10 is 3 marks)

Mark scheme · F04-30min Skewness by Inspection: 30-minute Pack

Question 1

- **B1** positively skewed cao
- **Answer: Positively skewed**

Question 2

- **B1** negatively skewed cao
- **Answer: Negatively skewed**

Question 3

- (i) **B1** True cao
- **(i) Answer: True**
- (ii) **B1** True cao
- **(ii) Answer: True**
- (iii) **B1** False cao
- **(iii) Answer: False**
- (iv) **B1** False cao
- **(iv) Answer: False**

Question 4

- (a) **B1** Negatively skewed cao
- **(a) Answer: Negatively skewed**
- (b) **B1** identifies $\text{mean} < \text{median} < \text{mode}$ ($14.2 < 15 < 16$), oe
- (b) **B1** correct interpretation: most pupils scored towards the top of the range, with a small tail of lower scores pulling the mean down (allow equivalent wording about spread either side of the median)
- **(b) Answer: Since $14.2 < 15 < 16$, most scores are bunched at the higher end, with a tail of lower scores pulling the mean down below the median and mode.**

Question 5

- **B1** median = 195,000 cao
- **B1** mean = 250,000 cao
- **B1** median is more representative, since the mean is pulled up a long way by the one large detached house oe
- **Answer: Median = £195,000, mean = £250,000; the median better represents a typical house price, since the mean is pulled up by the one much larger house.**

Question 6

- (a) **B1** 30 cao
- **(a) Answer: 30**
- (b) **B1** 18 cao
- **(b) Answer: 18**
- (c) **B1** Town A's box plot is symmetric (the median is equally spaced between the LQ and UQ / the two box halves are equal)
- (c) **B1** Town B's box plot is positively skewed (the median is much closer to the LQ than the UQ, so the upper commuting times are more spread out - a long tail towards the higher times)
- **(c) Answer: Town A is symmetric; Town B is positively skewed, with a tail towards the longer commuting times.**

Question 7

- **B1** positively skewed cao
- **B1** reason: the long tail from the few staff with a long commute pulls the mean above the median oe
- **B1** the median is more appropriate, since it is not affected by the few unusually long commutes oe
- **Answer: Positively skewed, because the few staff with a long commute create a tail towards higher values, pulling the mean above the median; the median is a more appropriate typical average, since it is not affected by these few long commutes.**

Question 8

- **M1** Class A: $Q3 - Q2 = 7$ and $Q2 - Q1 = 15$ (or equivalent working for either class)
- **A1** Class A is negatively skewed, since $Q2 - Q1$ (15) is greater than $Q3 - Q2$ (7)
- **B1** Class B has a symmetric (evenly spread) interquartile range, since $Q3 - Q2 = Q2 - Q1 = 10$
- **Answer: Class A: $Q3 - Q2 = 7$, $Q2 - Q1 = 15$, so negatively skewed. Class B: $Q3 - Q2 = 10$, $Q2 - Q1 = 10$, so symmetric. Class B has the more symmetric spread of results.**

Question 9

- (a) **M1** 12 and 4 (median-LQ=12, UQ-median=4), oe
- (a) **A1** Negative skew (the larger gap is below the median than above it) cao
- **(a) Answer: Negative skew**
- (b) **M1** 4 and 18 (median-LQ=4, UQ-median=18), oe
- (b) **A1** Positive skew (the larger gap is above the median than below it) cao
- **(b) Answer: Positive skew**

Question 10

- **B1** the median only measures the middle position of the data, so it says nothing about how the rest of the data is spread out; two data sets can share a median but have different spread above/below it
- **B1** for P (positive skew), the box plot would show a bigger gap between the median and the upper quartile than between the lower quartile and the median (upper half more spread out / tail towards higher times)
- **B1** for Q (negative skew), the box plot would show the opposite: a bigger gap between the lower quartile and the median than between the median and the upper quartile (lower half more spread out / tail towards lower times)
- **Answer: The median only fixes the middle position, not the spread, so two data sets can share it while differing in shape: P's box plot would have a bigger gap between median and UQ (tail to the right), while Q's box plot would have a bigger gap between LQ and median (tail to the left).**