



H20-test Skewness: Test Pack

EDEXCEL 1ST0 · Calculator allowed · about 20 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 For each statement about skewness, write down whether it is True or False.

(i) In a symmetric distribution, the mean, median and mode are approximately equal. (1)

(ii) A distribution is positively skewed when it has a long tail towards the higher (right-hand) values. (1)

(iii) If a distribution is negatively skewed, then the mean is greater than the median. (1)

(iv) The quartile coefficient of skewness can take negative values as well as positive values. (1)

(Total for Question 1 is 4 marks)

2 The annual salaries of the 9 employees at a small company are: £24,000, £25,000, £26,000, £27,000, £28,000, £29,000, £30,000, £31,000 and £104,000 (the company owner).

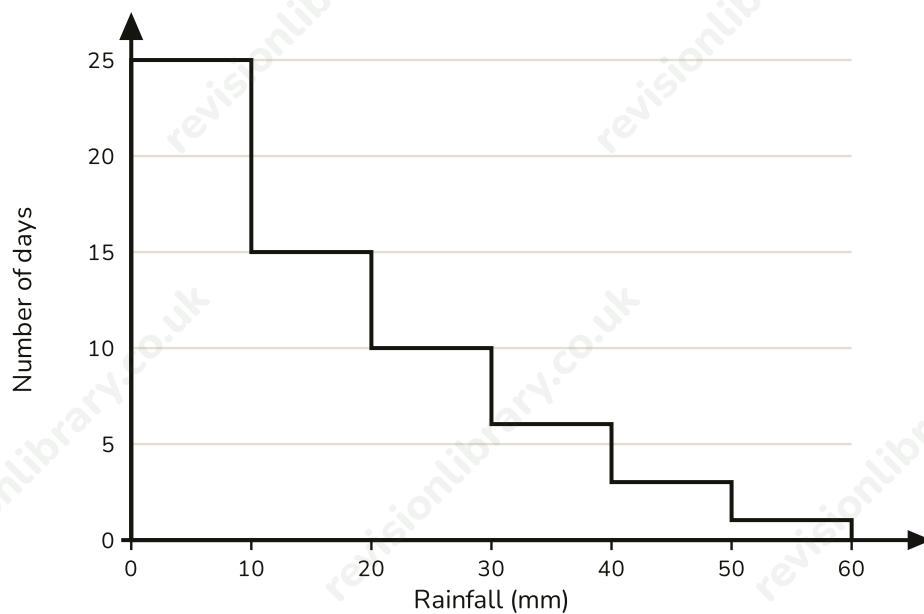
(a) Work out the mean salary. (2)

(b) Write down the median salary. (1)

(c) Explain, with reference to your answers, why the median is considered a more resistant (robust) measure of average than the mean for this data set. (2)

(Total for Question 2 is 5 marks)

- 3** The histogram shows the rainfall, in mm, recorded on each of 60 days during a rainy season.



- (a) State whether the distribution of rainfall amounts is symmetric, positively skewed or negatively skewed. (1)
- (b) Give two features of the histogram that support your answer to part (a). (2)
- (c) State whether the mean rainfall would be greater than, less than, or about equal to the median rainfall. Give a reason for your answer. (2)

(Total for Question 3 is 5 marks)

- 4 The table shows summary statistics for the exam results (out of 100) of two schools.

School	Lower quartile (Q1)	Median (Q2)	Upper quartile (Q3)
A	45	58	62
B	40	58	90

The quartile coefficient of skewness is given by $SK = (Q1 + Q3 - 2Q2) / (Q3 - Q1)$.

- (a) Calculate SK for School A. (2)

- (b) Calculate SK for School B. (2)

- (c) Compare the two schools' distributions of exam results, referring to both the sign and the size of SK. (2)

(Total for Question 4 is 6 marks)

Mark scheme · H20-test Skewness: Test Pack

Question 1

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

Question 2

- (a) **M1** $24+25+26+27+28+29+30+31+104 (=324, \text{ in } \text{£}000\text{s}), \text{ oe divided by } 9$
- (a) **A1** $\text{£}36,000 \text{ cao}$
- (a) **Answer: $\text{£}36,000$**
- (b) **B1** $\text{£}28,000 \text{ cao}$
- (b) **Answer: $\text{£}28,000$**
- (c) **B1** the mean is affected by the size of an extreme value (the owner's $\text{£}104,000$ salary pulls it upward), while the median only depends on the middle value's position, not its size
- (c) **B1** the median ($\text{£}28,000$) better represents a typical employee's salary, since the mean ($\text{£}36,000$) is higher than 8 of the 9 salaries
- (c) **Answer: The owner's $\text{£}104,000$ salary is an extreme value that raises the mean to $\text{£}36,000$, which is higher than eight of the nine salaries; the median ($\text{£}28,000$) is unaffected by its size and better reflects a typical salary.**

Question 3

- (a) **B1** Positively skewed cao
- (a) **Answer: Positively skewed**
- (b) **B1** the tallest bar (peak, frequency 25) is in the lowest class (0-10 mm)
- (b) **B1** frequencies decrease gradually across the remaining five classes, giving a long tail stretching towards the higher rainfall values
- (b) **Answer: The peak is at 0-10 mm, near the low end, and frequencies decline gradually across the higher classes, giving a tail towards the wetter days.**
- (c) **B1** Greater than the median
- (c) **B1** the small number of days with much higher rainfall (the long tail) pulls the mean upward, while the median is unaffected by how far these extreme values are from the centre
- (c) **Answer: Greater than the median**

Question 4

- (a) **M1** $45 + 62 - 2(58) (= -9), \text{ oe divided by } (62-45)$
- (a) **A1** $-0.53 \text{ cao (awrt } -0.53)$
- (a) **Answer: -0.53**
- (b) **M1** $40 + 90 - 2(58) (=14), \text{ oe divided by } (90-40)$
- (b) **A1** 0.28 cao
- (b) **Answer: 0.28**
- (c) **B1** School A has negative SK (-0.53), showing negative skew - the lower marks are more spread out than the higher marks; School B has positive SK (0.28), showing positive skew - the higher marks are more spread out
- (c) **B1** School A's distribution is more skewed than School B's, since the size of SK for A (0.53) is greater than for B (0.28)
- (c) **Answer: School A is negatively skewed, School B is positively skewed, and School A shows the stronger skew since $0.53 > 0.28$.**