HIGHER ONLY

HIGHER TIER

Name ..... Class .....

S3: Histograms and cumulative frequency

Interpret and reason with histograms and cumulative frequency graphs

20 marks · 25 minutes · Calculator allowed

1) Explain why histograms with unequal class widths use frequency density.

.....

.....

[Question 1: 2 marks]

2) A histogram bar has width 5 and frequency density 4. Show that it represents 20 items.

[Question 2: 1 marks]

3) Kim says the tallest bar in a histogram with unequal widths always has the most data. Explain her mistake.

.....

.....

[Question 3: 2 marks]

4) Explain why cumulative frequency is plotted at the upper class boundary.

.....

.....

[Question 4: 2 marks]

5) A cumulative frequency graph shows 80 values. Explain why the median is read at a cumulative frequency of 40.

.....

[Question 5: 1 marks]

6) Explain why a median read from a cumulative frequency graph is only an estimate.

.....

.....

[Question 6: 2 marks]

7) The lower quartile is 18 and the upper quartile is 34. Show that the interquartile range is 16 and explain what it measures.

.....

.....

[Question 7: 2 marks]

8) Class $20 < x \leqslant 30$ has frequency density 2.4 and class $30 < x \leqslant 50$ has frequency density 1.2. Show that both classes have frequency 24.

[Question 8: 2 marks]

---

9) Explain why there are no gaps between the bars of a histogram.

.....

.....

[Question 9: 2 marks]

---

10) Which is more useful for comparing the spread of two sets of continuous data: quartiles from cumulative frequency graphs or the heights of histogram bars? Explain.

.....

.....

[Question 10: 2 marks]

---

11) Explain why it is the area, not the height, of a histogram bar that represents frequency.

.....

.....

[Question 11: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Explanation	Wider classes would look too big (C1); density makes area represent frequency (C1).
2	Shown	5×4 (C1).
3	Explanation	A narrow tall bar can have less area than a wide short bar (C2).
4	Explanation	Cumulative frequency counts all values up to the end of each class (C2).
5	Explanation	Halfway through the data (C1).
6	Explanation	Data are grouped and the curve is drawn by hand (C2).
7	Shown	$34 - 18$ (M1); the spread of the middle 50% (C1).
8	Shown	2.4×10 and 1.2×20 (M1); C1.
9	Explanation	Data are continuous (C2).
10	Quartiles	The IQR gives a numerical measure of spread (C2).
11	Explanation	With unequal widths, height alone ignores the width (C2).