

E9.6 Cumulative frequency diagrams

Name: _____ Class: _____ Date: _____ **Total: 21 marks**

KEY WORDS cumulative frequency 累积频数 • cumulative frequency diagrams 累积频数图
• percentile 百分位数 • frequency 频数 • quartile 四分位数

Objective

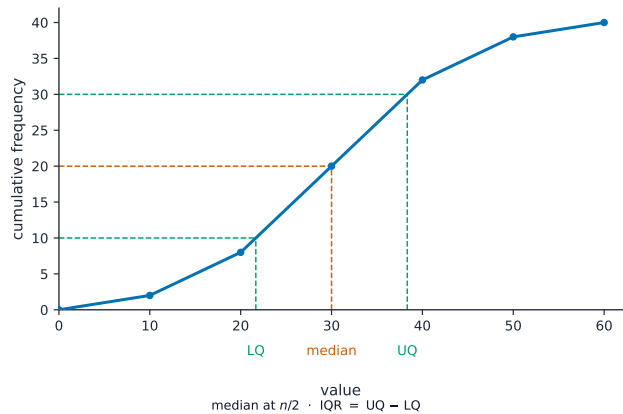
Build the skills to answer Extended exam questions on **cumulative frequency diagrams** 累积频数图 — the running total, and reading the **median, quartiles and percentiles** 中位数、四分位数、百分位数 from the curve.

You must be able to:

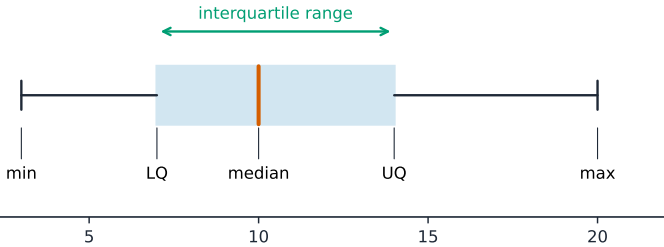
- complete a cumulative frequency table
- read the median and quartiles from a cumulative frequency curve
- find the interquartile range

1 Worked examples

■ Reading a cumulative frequency curve



The cumulative frequency is a running total



box-and-whisker: min • Q_1 • median • Q_3 • max • $IQR = Q_3 - Q_1$

Quartiles from the curve feed a box-and-whisker plot

- **Cumulative frequency** 累积频数: add each frequency to the running total; plot at the **upper** end of each class.
- **Median** at $\frac{1}{2}$ of the total; **LQ** at $\frac{1}{4}$; **UQ** at $\frac{3}{4}$.
- **IQR** = $UQ - LQ$.

Answer shapes: **M1** a correct method, **A1** the correct answer.

2 Practice

2.1 The frequencies of four classes are 5, 8, 10, 7. Write down the cumulative frequencies. [2]

2.2 A data set has a total cumulative frequency of 80. At what cumulative frequency do you read the median? [1]

2.3 At what cumulative frequency do you read the lower quartile if the total is 80? [1]

3 Exam-style questions

3.1 A cumulative frequency curve is drawn for 200 students' test marks.
(a) State the cumulative frequency at which you read the upper quartile. [1]

(b) From the curve, the lower quartile is 42 and the upper quartile is 63. Find the interquartile range. [2]

3.2 The cumulative frequencies 0, 6, 20, 45, 60 are given for five class boundaries. Find the total frequency, and the cumulative frequency used to read the median. [2]

3.3 The times, t minutes, taken by 80 students to finish a task are summarised below.

Time (t min)	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 50$
Frequency	6	18	30	20	6

(a) Complete a cumulative frequency table and draw the cumulative frequency diagram. [4]

(b) Use your diagram to estimate the median and the interquartile range. [4]

(c) Estimate how many students took longer than 35 minutes. [2]

(d) Explain why every value read from this diagram is an **estimate**. [2]