Statistics and probability

OxfordAQA International GCSE Mathematics 9260 unit 3.4: statistics, Core and Extension

The recall list

Family	Recall
histogram	density $= \frac{\text{frequency}}{\text{width}}$; area is frequency
cumulative frequency	plot at the upper boundary; median at $\frac{n}{2}$
grouped mean	$\frac{\sum fx}{\sum f}$ with midpoints
spread	IQR $= Q_3 - Q_1$

Completing a two-way table

Data, tables and charts

Qualitative categorises, discrete counts, continuous measures - grouped or ungrouped. Extract from tables by reading headers first, quoting units.

Two-way tables cross-tabulate: cells sum to row and column totals (30 students, 18 cricket, 15 tennis, 7 both: cells 11, 7, 8, 4). Chart choice by data type - bars, dual bars, pie, lines, scatter; the Core bank also has stem-and-leaf, tally, pictograms, frequency polygons and equal-width histograms.

A pie chart is a fraction of 360°

> 14 of 40 choose apples: $14/40 \times 360° = 126°$

- Angle = fraction $\times$ 360°.
- Angles add to 360°.

Unequal widths: area is frequency

Extension diagrams

Unequal histograms: height is frequency density (widths 2, 3, 5, 10, 15 holding 5, 12, 18, 14, 9 give heights 2.5, 4, 3.6, 1.4, 0.6) and the AREA is the frequency - the 1E specimen marks exactly this.

Cumulative frequency plots at UPPER boundaries (the 1E correction); box plots show the five-number summary with the box spanning the IQR. 60 workers with totals 6, 17, 27, 42, 60 at 10-30 hours: median 21, quartiles 14.1 and 25.8, IQR 11.7.

Worked: an estimated mean

1. **Midpoints** 2, 6, 10, 16 with frequencies 5, 8, 4, 3
2. **Total** $\sum fx = 10 + 48 + 40 + 48 = 146$
3. **Mean** $146 \div 20 = 7.3$ kg

Decision

Modal class $4 < m \leq 8$: density 2 is highest

Reading a cumulative frequency curve

60 workers: median 21 h, IQR $25.8 - 14.1 = 11.7$ h

- Plot at upper boundaries.
- Draw the reading lines.

Compare an average and a spread

A works longer ($21 > 17$) and less consistently ($11.7 > 6$)

- Median for the average.
- IQR for the spread.

Check yourself

Question	**Answer**
Frequency 12, width 3: height?	density 4
CF points go where?	upper class boundaries
9 of 30 in a pie chart?	108°
Mean of 2, 4, 4, 6, 9?	5
Two comparisons?	median and IQR