

6.1.99 Independent transfer: Foundation then Higher

Name: _____ Class: _____ Date: _____

KEY WORDS range • frequency density

<!-- Session 2 independent transfer -->

Objective

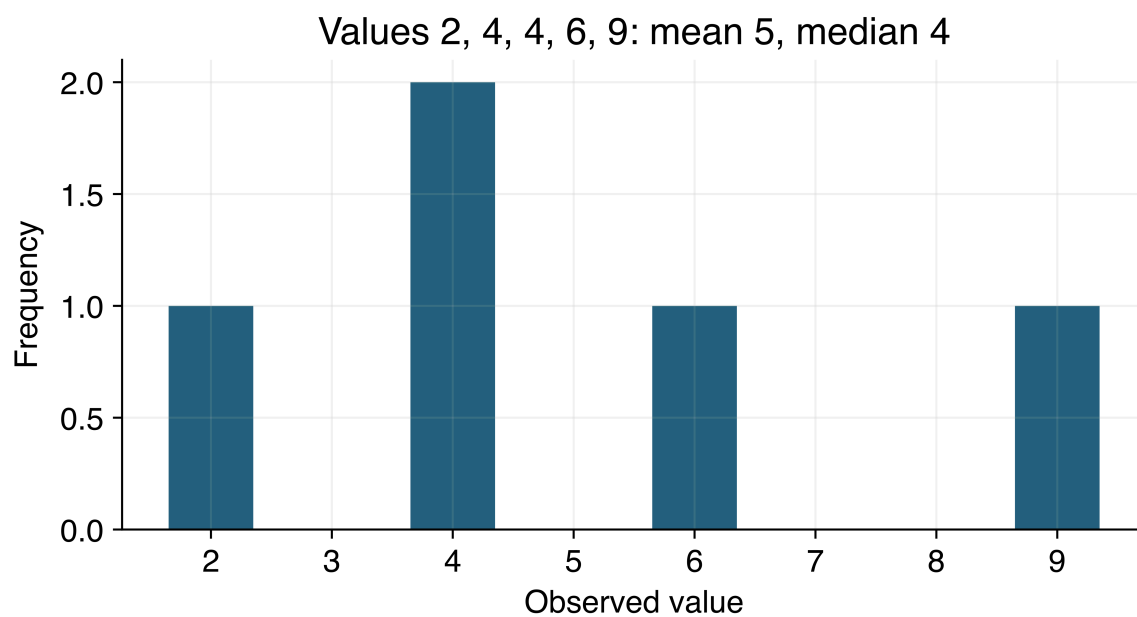
Apply this topic to unfamiliar Foundation and Higher problems; keep the two scopes distinct. Original questions and local marking guidance.

1 Key knowledge and worked examples

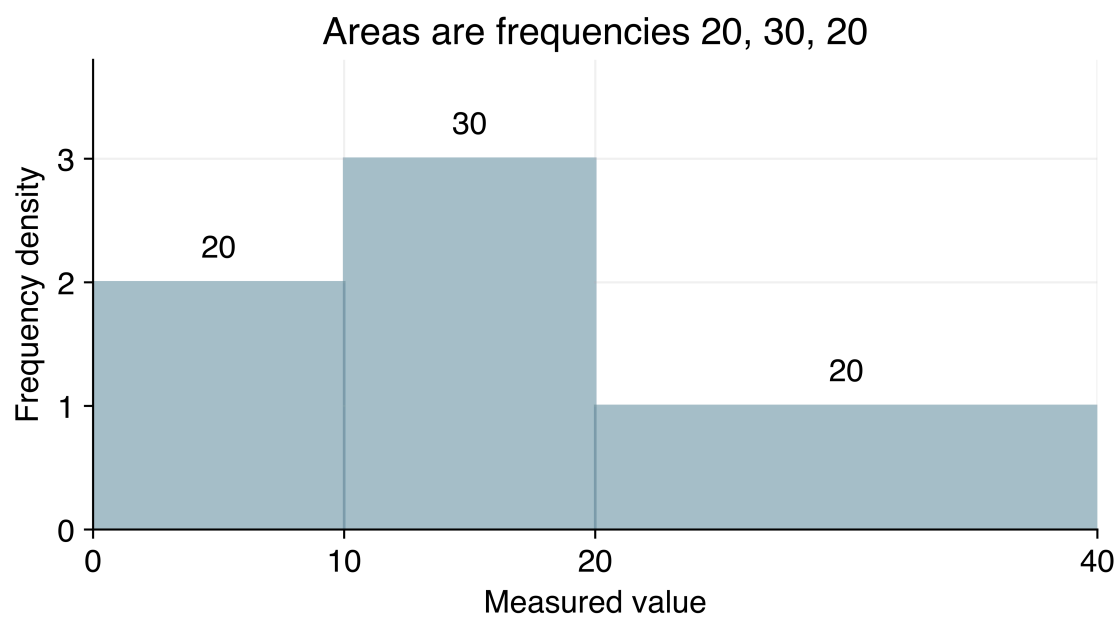
A combined mean is total sum divided by total frequency. More voluntary responses do not by themselves remove selection bias. In a histogram, height is frequency divided by class width, so area is frequency. Grouped means use midpoint estimates because the original within-class values are unknown.

For 2,4,4,6,9, total=25 and count=5, so mean=5. The central value is 4, so median=4. The range is 9-2=7. Explain both a typical value and the spread.

For classes $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ with frequencies 20,30,20, widths are 10,10,20 and densities 2,3,1. The last two bars have different heights but areas 30 and 20. Cumulative points are (0,0),(10,20),(20,50),(40,70). The median is at cumulative count 35; a straight-line estimate in the second class gives $10 + (35-20)/30 \times 10 = 15$. Q1 is at 17.5 and Q3 at 52.5, giving corresponding interpolated estimates 8.75 and 22.5. Class midpoints 5,15,30 give estimated mean $(100+450+600)/70 \approx 16.43$. A sketch that joins upper boundaries with a smooth curve can give slightly different readings, so use the stated precision and graph.



Prerequisite example; use the transfer task's own data.



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2 Practice

2.1 Foundation: A sample contains ten values with mean 6 and fifteen values with mean 10. Find the combined mean. A voluntary online survey suggests 70% of respondents cycle; explain why a much larger voluntary response need not establish that 70% of the whole school cycles.

3 Exam-style questions

3.1 Higher: Grouped continuous data have classes $0 \leq t < 10$, $10 \leq t < 30$, $30 \leq t < 35$, with frequencies 8,12,10. Give histogram heights, cumulative frequencies and an estimated mean. Explain why the estimates cannot recover every original observation.

Solutions

2.1 The totals are 60 and 150, so combined mean is $\bar{x} = (10 \cdot 6 + 15 \cdot 10)/(10 + 15) = 210/25 = 8.4$. Weight each group mean by its size. A voluntary survey can overrepresent people interested in cycling and miss nonrespondents. More responses reduce some random variation but do not automatically remove selection bias. State the target population and how students could be selected before generalising.

3.1 Class widths are 10,20,5. Frequency density is frequency divided by width, giving 0.8,0.6,2; bar areas return 8,12,10. Cumulative frequencies at upper class boundaries 10,30,35 are 8,20,30, starting from (0,0). Midpoints 5,20,32.5 give estimated total $8(5) + 12(20) + 10(32.5) = 605$, hence estimated mean $605/30 = 121/6$, about 20.17. Within-class positions are unknown; the midpoint model estimates their total. Height alone is not frequency when widths differ, and a cumulative curve depends on an interpolation assumption between boundaries.

Local guidance: select and explain the relationship; calculate every requested result; check units, scope, conditions and completeness. These are authored classroom criteria.