

Data Analysis — Practice Set I

Ratios, Rates, Percentages and One-Variable Data: Easy to Medium

6 Questions | Full Solutions | Mistake-Pattern Analysis

Question 1 [EASY]

A recipe calls for 2 cups of flour for every 3 cups of sugar. If a baker uses 9 cups of sugar, how many cups of flour are needed?

(Student-produced response)

Algebraic: Set up the proportion $\frac{2}{3} = \frac{x}{9}$. Since 9 is 3 times 3, $x = 2 \times 3 = 6$.

Desmos: Graph $y = (\frac{2}{3})x$ and trace to $x = 9$ to read the flour amount.

Faster path: Algebraic, scaling the ratio directly is faster than graphing a single proportional relationship.

Mistake: **Concept gap**: student sets up the proportion upside down, computing $\frac{3}{2} \times 9$ instead of $\frac{2}{3} \times 9$.

Question 2 [EASY]

A shirt originally priced at \$40 is discounted by 25%. What is the sale price?

- A) \$10
- B) \$15
- C) \$30
- D) \$35

Algebraic: A 25% discount leaves 75% of the price: $40 \times 0.75 = 30$.

Desmos: Graph $y = 40(1 - x)$ and trace to $x = 0.25$.

Faster path: Algebraic, multiplying by the remaining percentage directly is faster than graphing.

Mistake: **Concept gap**: student computes only the discount amount ($40 \times 0.25 = 10$) and stops there instead of subtracting it from the original price, choosing option A.

Question 3 [MEDIUM]

A car travels 180 miles in 3 hours. What is its rate in miles per hour?

(Student-produced response)

Algebraic: Rate = distance / time = $180/3 = 60$.

Desmos: Not useful, this is a single division.

Faster path: Algebraic, always, for a direct rate calculation.

Mistake: **Concept gap**: student divides 3 by 180 instead of 180 by 3, inverting the rate.

Question 4 [EASY]

What is the median of the data set 4, 7, 7, 9, 12, 15?

(Student-produced response)

Algebraic: With 6 values already sorted, the median is the average of the 3rd and 4th values: $(7 + 9)/2 = 8$.

Desmos: Enter the data into a Desmos table and use the median() function to compute it directly.

Faster path: Algebraic, for a data set this small. Typing six values into a table takes about as long as averaging the two middle values by hand.

Mistake: **Concept gap**: student reports the middle value by position incorrectly, picking 9 (the 4th value alone) instead of averaging the two middle values for an even-sized data set.

Question 5 [MEDIUM]

What is the mode of the data set 2, 4, 4, 6, 8, 8, 8, 10?

(Student-produced response)

Algebraic: The value 8 appears three times, more than any other value, so the mode is 8.

Desmos: Enter the data into a Desmos table and use a frequency count to confirm which value repeats most.

Faster path: Algebraic, for a list this short. Counting repeats by eye is faster than setting up a table.

Mistake: **Concept gap**: student reports the value that appears to be in the "middle" of the list visually instead of the value with the highest frequency.

Question 6 [MEDIUM]

Five test scores are 70, 75, 80, 85, and 90. What is the mean?

(Student-produced response)

Algebraic: Mean = $(70 + 75 + 80 + 85 + 90)/5 = 400/5 = 80$.

Desmos: Enter the five values into a Desmos table and use the mean() function.

Faster path: Algebraic, for five evenly spaced values. Recognizing the symmetry (80 is the middle value) gives the mean instantly without even adding.

Mistake: **Pacing error**: student adds all five values correctly but then re-adds them a second time to "double check" an already-correct sum before dividing.