Targeted Practice: Janelle

Z-Scores & Normal Distributions

Focus Skills: Z-score calculations, normal proportions

Performance Summary

MC Score: 3/6 (50%) - Red
Q04 Score: 3/4 (75%) - Yellow
Strengths: Good CR effort and reasoning
Focus Areas: Z-score calculations, normal distribution properties

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Your Learning Path

Hi Janelle! You showed excellent effort on the histogram question (Q04), scoring 75%. This tells me you understand how to interpret distributions. Now let's strengthen your multiple choice skills, especially with z-scores and the normal model.

Goal: Master z-score calculations and normal proportions

Practice Set (5 Items)

Item 1: Z-Score Calculation

Topic: Lesson 9 - Z-scores and Standardization

The weights of chocolate bars are normally distributed with mean $\mu = 52$g and standard deviation $\sigma = 1.5$g.

Question: Calculate the z-score for a chocolate bar weighing 49g.

Formula Reminder:

$$z = \frac{x - \mu}{\sigma}$$

Show your work:

Item 2: Normal Proportion (Below)

Topic: Lesson 10 - Working with Normal Distributions

Using the same distribution ($\mu = 52$g, $\sigma = 1.5$g):

Question: What proportion of chocolate bars weigh LESS than 49g?

Steps:

1. Calculate z-score (you did this in Item 1!)

2. Look up z in Table A

3. The table value IS your proportion

   Answer:

Item 3: Normal Proportion (Above)

Topic: Lesson 10 - Working with Normal Distributions

Question: What proportion of chocolate bars weigh MORE than 55g?

Steps:

1. Calculate $z = (55 - 52)/1.5 = $ _____

2. Look up z in Table A: _____

3. For "more than": $1 - $ (table value) $= $ _____

   Answer:

Item 4: Empirical Rule Application

Topic: Lesson 8 - The Normal Model
The weights are still normally distributed with $\mu = 52$g and $\sigma = 1.5$g.
Question: Between what two weights do the middle 95% of chocolate bars fall?
Hint: Empirical Rule says 95% fall within ± 2 standard deviations of the mean.
Answer:

Item 5: Interpretation in Context

Topic: Lesson 10 - Working with Normal Distributions
You found that 2.3% of chocolate bars weigh more than 55g.
Question: Write one sentence explaining what this means in the context of chocolate bar weights.
Answer:

Q06 Scaffold: Z-Score Practice (Bonus)

You didn't attempt Q06 on L10. Let's build up to it!

Q06 Simplified Version

Given: Reese's cups have $\mu = 48.5$g and $\sigma = 1.2$g
Part A: Calculate z-score for 46g

$$z = \frac{x - \mu}{\sigma} = \frac{46 - \underline{\hspace{1cm}}}{\underline{\hspace{1cm}}} = \underline{\hspace{1cm}}$$

Part B: Calculate z-score for 51g

$$z = \frac{51 - \underline{\hspace{1cm}}}{\underline{\hspace{1cm}}} = \underline{\hspace{1cm}}$$

Part C: What proportion fall BETWEEN 46g and 51g?
Strategy:

1. Find proportion below 51g: _____

2. Find proportion below 46g: _____

3. Subtract: (proportion below 51g) - (proportion below 46g) = _____

Success Checklist

After completing this practice, you should be able to:

    Calculate z-scores using the formula

    Use Table A to find proportions below a z-score

    Find proportions above by subtracting from 1

    Apply the empirical rule (68-95-99.7)

    Interpret statistical results in context

Answer Key (Check After Attempting)

Solutions

Item 1: $z = (49 - 52)/1.5 = -2.0$

Item 2: $z = -2.0 \rightarrow$ Table A shows $0.0228 \approx 2.3\%$

Item 3: $z = 2.0 \rightarrow$ Table A shows $0.9772 \rightarrow$ Above $= 1 - 0.9772 = 0.0228 \approx 2.3\%$

Item 4: $\mu \pm 2\sigma = 52 \pm 2(1.5) = 52 \pm 3 \rightarrow$ Between 49g and 55g

Item 5: "About 2.3% of chocolate bars weigh more than 55 grams." (or similar)

Q06 Scaffold:

- Part A: $z = (46 - 48.5)/1.2 = -2.08$

- Part B: $z = (51 - 48.5)/1.2 = 2.08$

- Part C: $0.9812 - 0.0188 = 0.9624 \approx 96\%$

Next Steps

1. **Complete this practice** - take your time and show all work

2. **Check your answers** - understand any mistakes

3. **See your teacher** - get feedback on Q06 scaffold

4. **Retake opportunity** - show your improved skills!

You're already showing strong CR reasoning (75% on Q04).
Once you nail z-scores, you'll be in great shape!