# Targeted Practice: Gabriella

Z-Scores & Normal Distributions

*Focus Skills: Z-score calculations, normal model, CR confidence*

**Performance Summary**

**MC Score:** 3/6 (50%) - Red
**Q04:** Not attempted - Gray
**Q06:** Not attempted - Gray
**Focus Areas:** Z-score calculations, normal model, CR confidence

## Your Learning Path

Hi Gabriella! Let's build your confidence with normal distributions and z-scores. I've created a step-by-step practice set that starts simple and builds up.

**Goal:** Master z-score calculations and feel confident attempting constructed response questions

## Practice Set (5 Items)

### Item 1: Z-Score Calculation (Starter)

**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.

**Step-by-step:**

1. Identify: $x = 49$, $\mu = 52$, $\sigma = 1.5$
2. Use formula: $z = (x - \mu)/\sigma$
3. Substitute: $z = (49 - 52)/1.5$
4. Calculate: $z = -3/1.5 =$ _____

**Answer:** $z =$ _____

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### Item 2: Understanding Z-Scores

**Topic:** Lesson 9 - Interpretation

**Question:** What does a z-score of $-2.0$ tell you?

Choose the best answer:

A) The value is 2 standard deviations below the mean

B) The value is 2 grams below the mean

C) The value is negative and therefore impossible

D) The value is 2% below the mean

**Answer:** _____
**Explanation:**

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### Item 3: Normal Proportion (Below)

**Topic:** Lesson 10 - Working with Normal Distributions
Using the same distribution ($\mu = 52$g, $\sigma = 1.5$g), and knowing $z = -2.0$ for a 49g bar:
**Question:** What proportion of chocolate bars weigh LESS than 49g?
**Steps:**

1. You already know $z = -2.0$ from Item 1
2. Look up $z = -2.0$ in Table A
3. Find: 0.0228
4. **This IS your proportion!**

**Answer:** About _____ % of chocolate bars weigh less than 49g

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### Item 4: Empirical Rule (Visual)

**Topic:** Lesson 8 - The Normal Model

Draw a simple bell curve and mark these values:

- Mean ($\mu = 52$g) in the center
- One standard deviation above ($52 + 1.5 = 53.5$g)
- One standard deviation below ($52 - 1.5 = 50.5$g)

**Question:** According to the empirical rule, what percentage of chocolate bars weigh between 50.5g and 53.5g?

**Hint:** This is $\pm 1$ standard deviation from the mean.

**Draw your bell curve here:**

**Answer:** _____ %

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### Item 5: Interpretation in Context

**Topic:** Lesson 10 - Working with Normal Distributions

**Question:** You calculated that 2.3% of chocolate bars weigh less than 49g. Write one complete sentence explaining what this means.

**Sentence:**

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## CR Starter: Build Your Confidence

You didn't attempt the constructed response questions on L10. Let's start with something simpler!

### Simple Histogram Task

**Given:** Chocolate bar weights are normally distributed with $\mu = 52$g and $\sigma = 1.5$g

**Task:** Draw a simple bell curve (histogram) showing this distribution.

**Include:**

1. Draw a bell/mound shape
2. Label the center ($\mu = 52$g)
3. Mark one standard deviation on each side:
   - Left: $52 - 1.5 = 50.5$g
   - Right: $52 + 1.5 = 53.5$g
4. Write one sentence: "The distribution is _____ with center at _____"

**Draw your histogram here:**

### Z-Score Formula Practice (Build to Q06)

**Given:** Reese's cups have $\mu = 48.5$g and $\sigma = 1.2$g

Fill in the blanks to practice the formula:

**For a 46g Reese's cup:**

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

$$z = \frac{\_\_\_\_\_ - \_\_\_\_\_}{\_\_\_\_\_}$$

$$z = \frac{\_\_\_\_\_}{\_\_\_\_\_}$$

$$z = \_\_\_\_\_$$

**For a 51g Reese's cup:**

$$z = \frac{\_\_\_\_\_ - \_\_\_\_\_}{\_\_\_\_\_}$$

$$z = \frac{\_\_\_\_\_}{\_\_\_\_\_}$$

$$z = \_\_\_\_\_$$

## Success Checklist

After completing this practice, you should be able to:

- Calculate z-scores using the formula (step-by-step)
- Understand what z-scores mean (distance from mean)
- Use Table A to find basic proportions
- Apply the empirical rule
- Draw and label a simple bell curve
- Interpret results in context

## Answer Key (Check After Attempting)

**Solutions**

**Item 1:** $z = (49 - 52)/1.5 = -3/1.5 = -2.0$

**Item 2:** A - The value is 2 standard deviations below the mean

**Item 3:** Look up $z = -2.0$ in Table A $\rightarrow$ 0.0228 $\rightarrow$ About 2.3% of chocolate bars weigh less than 49g

**Item 4:** 68% (This is the empirical rule: 68% fall within $\pm 1\sigma$)

**Item 5:** "About 2.3% of chocolate bars in this population weigh less than 49 grams." (or similar)

**CR Starter:**

- Your bell curve should be mound-shaped
- Center labeled 52g
- Sides labeled 50.5g (left) and 53.5g (right)
- Sentence: "The distribution is symmetric/bell-shaped with center at 52g"

**Z-Score Formula Practice:**

- For 46g: $z = (46 - 48.5)/1.2 = -2.5/1.2 = -2.08$
- For 51g: $z = (51 - 48.5)/1.2 = 2.5/1.2 = 2.08$

## Next Steps

1. **Complete this practice** - work through each item slowly
2. **Check your answers** - learn from any mistakes
3. **Show your CR starter** to your teacher - get feedback!
4. **Try Q04 and Q06** - you're ready now!

*Remember: Constructed response questions aren't about being perfect.*
*They're about showing your thinking. You've got this!*

## Confidence Builder

**Why you can do this:**

- You got 50% of MC correct - that's a solid foundation
- The questions you missed are all about z-scores - a VERY learnable skill

- CR questions let you show partial understanding and earn partial credit
- With practice, z-scores become automatic!

**Next time:** Attempt ALL questions, even if you're not 100% sure. Partial credit > no credit!