

Name: Kay Hour: \_\_\_\_\_ Date: \_\_\_\_\_

## Learning Targets

- Identify an appropriate point estimator and calculate the value of a point estimate.
- Interpret a confidence interval in context.
- Determine the point estimate and margin of error from a confidence interval.
- Use a confidence interval to make a decision about the value of a parameter.

## Lesson 8.1: Day 1: Guess the Mystery Mean



Today, you will be making your best guess at the mean of the midterm exam scores by creating a confidence interval (point estimate  $\pm$  margin of error). The group who creates a confidence interval with the smallest margin of error that still captures the true mean exam score will win a prize!

1. Mrs. Cowells will give you a random sample of 5 scores. Record the 5 scores and then find the mean.

Scores: \_\_\_\_\_

Mean: \_\_\_\_\_. This is your point estimate for the true mean.

2. Identify the population, parameter, sample, and statistic.

Population: All AP Midterm Scores

Parameter:  $\mu \rightarrow$  true mean score

Sample: 5 midterm scores

Statistic:  $\bar{x} \rightarrow$  mean score of a sample of 5 midterm scores

3. Now you are going to change your *point estimate* into an interval of values by adding and subtracting the same number from your *point estimate* (the number you add and subtract is called your **margin of error**.) What margin of error will you choose? Why?

4. Write your interval that you think contains the true mean midterm exam score.

5. How confident do you feel that your interval captures the true mean? Answer with a percentage.

$$PE = \frac{A+B}{2}$$

6. One of the groups got (71, 79) as their interval. What was their point estimate? What was their margin of error?

$$P.E. = \frac{79+71}{2} = 75$$

$$M.O.E. = \frac{79-71}{2} = 4 \quad \left. \vphantom{\frac{79-71}{2}} \right\} M.O.E. = \frac{B-A}{2}$$

7. Mrs. Cowells claims that the true mean exam score is 84. Does your interval support or deny this claim? Why?

or Yes, 84 is within my interval.  
 No, 84 is not within my interval.

### Lesson 8.1 Day 1 - The Idea of a Confidence Interval

#### Important ideas:

##### L.T. #1 Point Estimate

Statistic that provides a reasonable guess about the population parameter.

$\hat{p}$  estimates  $p$   
 $\bar{x}$  estimates  $\mu$

##### L.T. #2 Confidence Intervals

Confidence Interval = Point Estimate  $\pm$  Margin of Error

For Confidence Interval (A, B)

$$P.E. = \frac{A+B}{2} \quad M.O.E. = \frac{B-A}{2}$$

Interpretation: We are \_\_\_\_\_ % confident that the interval from A to B captures the true parameter of context.

##### L.T. #3 Decisions

A confidence interval gives Plausible Values.

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## Check Your Understanding

The Pew Research Center and *Smithsonian* magazine recently quizzed a random sample of 1006 U.S. adults on their knowledge of science. One of the questions asked, "Which gas makes up most of the Earth's atmosphere: hydrogen, nitrogen, carbon dioxide, or oxygen?" A 95% confidence interval for the proportion who would correctly answer nitrogen is 0.175 to 0.225.

1. Interpret the confidence interval.

We are 95% confident that the interval from 0.175 to 0.225 captures the true proportion of U.S. adults who would correctly answer.

2. Calculate the point estimate and the margin of error.

$$P.E. = \frac{0.175 + 0.225}{2} = 0.20 \quad M.E. = \frac{.225 - .175}{2} = .025$$

3. If people guess one of the four choices at random, about 25% should get the answer correct. Does this interval provide convincing evidence that less than 25% of all U.S. adults would answer this question correctly? Explain your reasoning. (0.175, 0.225)

All of the plausible values in the 95% confidence interval are less than 25%. Therefore the interval does give convincing evidence that less than 25% of all U.S. adults would answer correctly.