Name: _____ Hour: _____ Date: _____

Guess the Mystery Proportion

Mrs. Gallas wants to implement a new reward system. When a student does something great, they randomly pick a bead from the bead jar. If the bead is red, they get a piece of candy. If not, they don't win a prize. The question is, what are the chances that a student chooses a red bead? Each group will get a sample of beads and will create a **confidence interval** to estimate the true proportion of red beads. The group with the smallest interval that captures the true proportion wins a prize!

1. You will select a random sample of 20 beads from the jar. Calculate the proportion of beads that are red (write this as a decimal).

Example:

Proportion red: $\hat{p} = 7/20 = .35$ This is your ***point estimate*** for the true proportion of red beads.

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

Population: All beads in the jar

Parameter: ? $p \rightarrow$ true prop. red beads

Sample: 20 beads from the jar

Statistic: $\hat{p} = 0.35 \rightarrow$ Point Estimate

3. Now you are going to change your point estimate into an interval of values by adding and subtracting some value from your point estimate (the number you add and subtract is called your ***margin of error***). You can choose any amount to add and subtract, but remember, the smallest interval that captures the truth is the winner. What margin of error do you want to use? Why?

$\pm .10$, that's only 2 more red beads which seems possible

4. Use your point estimate and chosen margin of error to write an interval that you think contains the true proportion of red beads.

$0.35 \pm 0.10 = 0.25$ to 0.45.

Point Estimate $\pm$ Margin of Error

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

90%

"We are 90% confident that the interval from 0.25 to .45 captures the true proportion of red beads in the jar."

6. One of the groups got (0.27, 0.33) as their interval. What was their point estimate? What was their margin of error?

For interval (A, B): $PE = \frac{A+B}{2}$, $ME = \frac{B-A}{2}$

Point Estimate $= \frac{0.27+0.33}{2} = 0.30$ Margin of Error $= \frac{0.33-0.27}{2} = 0.03$

7. One group claims that the true proportion of red beads 0.25. Does your interval support or deny this claim? Why?

Yes, my interval contained 0.25.

Confidence Intervals contain all plausible values.

Name: _____ Hour: _____ Date: _____

The Idea of a Confidence Interval

Important ideas:

LT#1 Point Estimate:
A statistic that provides a reasonable estimate about the population parameter.
Pt. Est → Parameter
$\hat{p}$ → p
$\bar{x}$ → μ

LT #2 & 3
For interval (A, B)
Point Est. = $\frac{A+B}{2}$ margin of error = $\frac{B-A}{2}$
"We are ___% confident that interval from A to B captures the true parameter context."

LT#4 Decisions:
Confidence intervals contain a plausible values.

Check Your Understanding

A random sample of 100 adults are asked if they pay for monthly subscriptions that they do not use, like a magazine, app, or online program simply. Many do, because they have never taken the time to cancel the subscription. A 95% confidence interval for the proportion of adults who to pay for subscriptions they do not use is 0.352 to 0.548.

a. Interpret the confidence interval.

We are 95% confident that the interval from 0.352 to 0.548 captures the true proportion of adults who pay for subscriptions they do not use.

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

Point Est = $\frac{0.352+0.548}{2}$ = 0.45

margin of Error = $\frac{0.548-0.352}{2}$ = 0.098

c. Based upon this survey, a reporter claims that a majority (above 50%) of adults continue to pay for monthly subscriptions they do not use. Use the confidence interval to evaluate this claim.

Because our interval contains values that are both above & below 0.5, we cannot say for sure that the majority of adults pay for subscriptions that they don't use.

We do not have convincing evidence to support the claim.