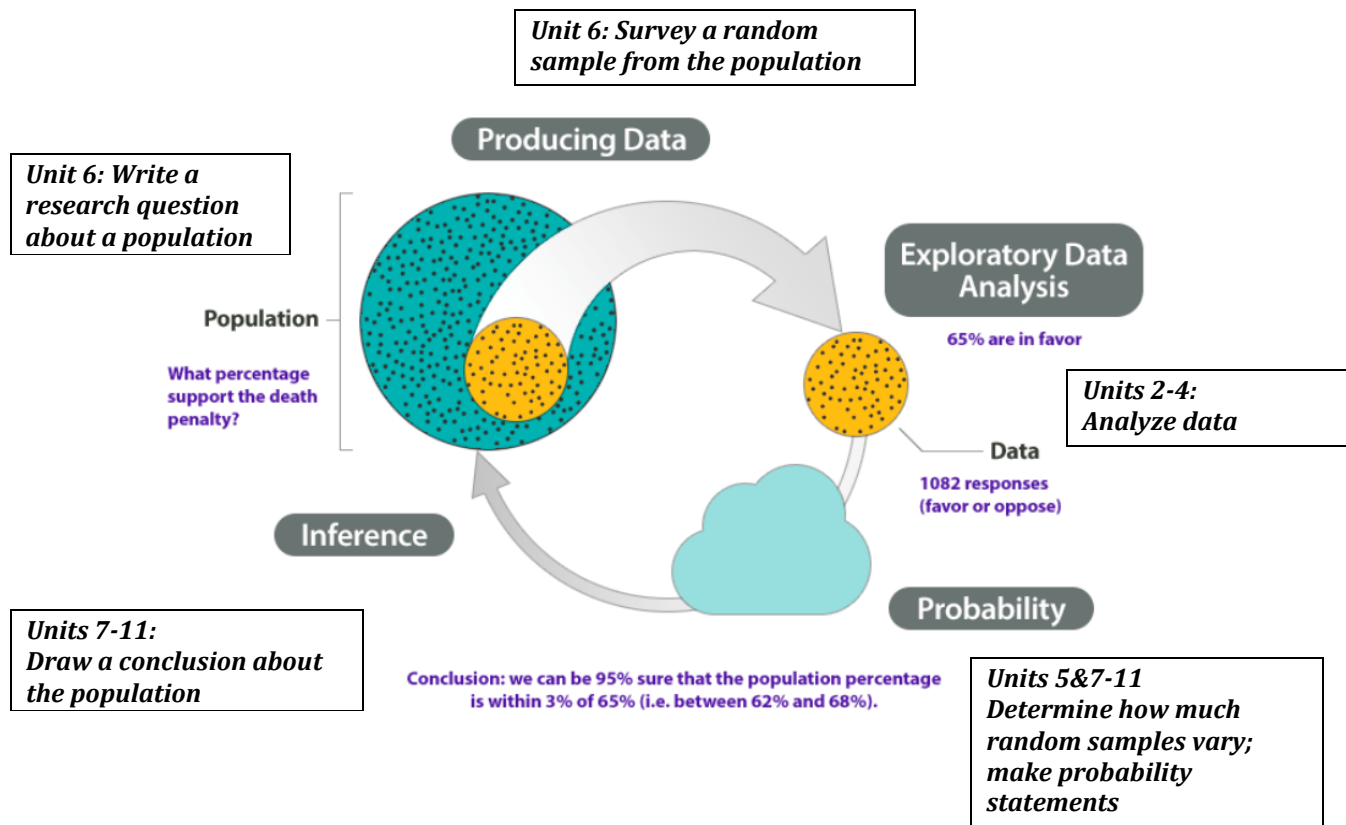**Learning Goals:**
- Use simulation and probability to draw conclusions based on data.
- Describe the sampling distribution for sample proportions and use it to identify unusual (and more common) sample results.

Overview:

1) Use the diagram to describe the process of statistical investigation.

Unit 6: Survey a random sample from the population

Unit 6: Write a research question about a population

Units 2-4: Analyze data

Units 7-11: Draw a conclusion about the population

Units 5&7-11 Determine how much random samples vary; make probability statements

Introduction to this activity[1]

Before we can draw inferences about a large population, we need understand how samples relate to the population and how much samples will vary. To do this, we will view our class as a population and try to determine the percentage of our class that has a cat.

This is of course artificial because our population is very small. If we really wanted to know the percentage of our class with cats, we would just take a census of the entire population and find out! But our goal is to examine how random samples from this population behave so that we can begin to understand how much

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[1] This activity is adapted from a workshop presentation by Beth Flynn.

variability occurs in random samples. This will help us estimate the amount of error we expect in random samples when estimating a population proportion.

Questions to answer during the demonstration

2) Make a dotplot of the distribution of sample proportions based on the random samples from your class. Make a title for your graph and label the axis with a description of what the numbers represent.

|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|

0   0.1   0.2   0.3   0.4   0.5   0.6   0.7   0.8   0.9   1.0
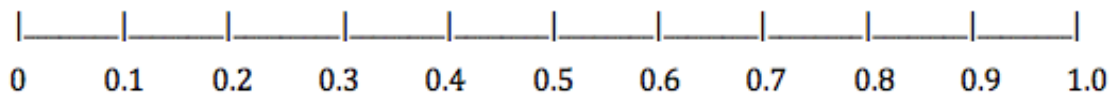
3) What does each dot represent in the dotplot?

4) Describe the distribution of sample proportions (shape, center, spread).

5) What is the mean and SD of the distribution? What do these numbers tell us?

6) What are typical sample proportions in this distribution? Why do you think so?

7) What sample proportions are unlikely? Why do you think so?

8) Given the samples we have collected so far, what do you think is the proportion of all students in our population that have a cat? In other words, what is your estimate for the population proportion? Why do you think so?

9) How accurate do you think your estimate of the population proportion is based on the variability we see in our random samples? How much error is there on average in these samples?

10) Since we have such a small population, let's take a census. What is the actual population proportion that has a cat?

11) How much error was there in our estimate of the population proportion? Why did this error occur?