Mini-lesson #1 – Representative Sample (Data Unit)

You can collect data from a random sample of a given population and use that data to make inferences about the population as a whole. Inferences will be valid only if the sample is representative of the population.

A sample is **representative** if every number of the population has an equal chance of being included in the sample. Random sampling is the best way to produce a representative sample that will support valid inferences.

Scenario: Plains Middle School is considering the following locations for a Grade 7 field trip: science museum, state park, or a ballet company. The principal wants to survey a sample of students to find which location Grade 7 students would prefer.

Come up with some ideas on how the principal can survey students to determine which location to select:

From your ideas, what do you believe is necessary to acquire a valid representative sample?

Below is the data collected from two random samples of 100 students regarding student’s school lunch preference. Make at least two inferences based on the results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Student Sample | Hamburgers | Tacos | Pizza | Total |
| #1 | 12 | 14 | 74 | 100 |
| #2 | 12 | 11 | 77 | 100 |

Inference #1:

Inference #2:

Part A: The owners of the Casual Café and the Bountiful Bistro want to know more about the types of customers that dine at their restaurants. They each conduct a survey to find their customers’ ages and the price they would expect to pay for an entrée.

1. Suppose the owners took their samples by surveying the first fifteen women dressed in business attire. Do you think this sample is representative of the population? Explain.
2. Suppose the owners took their samples by surveying every fifth customer at lunch. Do you think this sample is representative of the population? Explain.
3. Describe a survey method that would give the restaurant owners a representative sample of the population. Explain how you decided on your method.

Part B: The table shows age data the owners gathered from a representative sample at each restaurant.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Casual Café | 34 | 41 | 45 | 67 | 23 | 19 | 45 | 34 | 32 | 35 | 34 | 56 | 63 | 23 | 25 |
| Bountiful Bistro | 29 | 17 | 23 | 18 | 14 | 28 | 21 | 24 |  |  |  |  |  |  |  |

1. a. What is the mean age for each restaurant’s customers?
2. What do the mean ages tell you about the customers that each restaurant attracts?
3. The owners are deciding how to advertise their restaurants. They want to advertise to the group of customers that they expect will want to dine with them. Give some recommendations to each owner about how and where they should advertise.

Part C: Diners at Casual Café can make their own sandwiches starting with 1 of 6 fillings.

Make-Your-Own Sandwiches

1. Roast Beef
2. Ham
3. Turkey
4. Grouper
5. Veggie
6. Hummus
7. If the sandwiches are randomly chosen, how many turkey sandwiches do you expect there will be in the next 10 sandwich orders? Explain how you found your answer.
8. Do an experiment to test your conclusion. Toss a number cube 10 times and record the outcomes in a table. Did the number of times you tossed a 3 match your prediction for the number of turkey sandwiches ordered? Explain why or why not.
9. How many turkey sandwiches would you expect out of the next 50 random sandwich orders? Do another experiment to test this conclusion. Toss a number cube 50 times and record the outcomes in a table
10. Repeat the experiment for another 50 tosses. Record the outcomes in a separate table.
11. Were the experiments’ outcomes closer to your predictions for 10 orders or for 50 orders? Explain why that might be so.

Follow-up:

1. A. Referring back to the scenario at the beginning of the lesson with the principal, which options suggested would provide good representative samples? Which options would not? Explain.

B. What is the best way to get a representative sample?

1. Tell whether the sampling method will result in a representative sample. Explain your reasoning.
2. Nicole is planning the games for a carnival for the first, second, and third graders at Bay Elementary School. To find out which games students would like to have, she asks 25 first graders during their lunch.
3. Alyssa is doing research for a report about the after-school activities of students at her school. She interviews every fifth student entering the gym after school.