Unit 8, Lesson 2

Statistical Questions

Let's look more closely at data and the questions they can help to answer.

2.1 Pencils on A Plot

1. Measure your pencil to the nearest $\frac{1}{4}$-inch. Then, plot your measurement on the class dot plot.
2. What is the difference between the longest and shortest pencil lengths in the class?

3. What is the most common pencil length?

4. Find the difference in lengths between the most common length and the shortest pencil.

2.2 What's in the Data?

Ten sixth-grade students at a school were each asked five survey questions. Their answers to each question are shown here.

Data Set A	0	1	1	3	0	0	0	2	1	1
Data Set B	12	12	12	12	12	12	12	12	12	12
Data Set C	6	5	7	6	4	5	3	4	6	8
Data Set D	6	6	6	6	6	6	6	6	6	6
Data Set E	3	7	9	11	6	4	2	16	6	10

1. Here are the five survey questions. Match each question to a data set that could represent the students' answers. Explain your reasoning.
    - Question 1: Flip a coin 10 times. How many heads did you get?
    - Question 2: How many books did you read in the last year?
    - Question 3: What grade are you in?
    - Question 4: How many dogs and cats do you have?
    - Question 5: How many inches are in 1 foot?

2. How are survey Questions 3 and 5 different from the other questions?

2.3 What Makes a Statistical Question?

These three questions are examples of **statistical questions**:

- What is the most common color of the cars in the school parking lot?
- What percentage of students in the school have a cell phone?
- Which kind of literature—fiction or nonfiction—is more popular among students in the school?

These three questions are not examples of **statistical questions**:

- What color is the principal's car?
- Does Elena have a cell phone?
- What kind of literature—fiction or nonfiction—does Diego prefer?

1. Study the examples and non-examples. Discuss with your partner:
   a. How are the three statistical questions alike? What do they have in common?

   b. How are the three non-statistical questions alike? What do they have in common?

   c. How can you find answers to the statistical questions? How about answers to non-statistical questions?

   d. What makes a question a statistical question?

Pause here for a class discussion.

2. Read each question. Think about the data you might collect to answer it and whether you expect to see **variability** in the data. Complete each blank with "Yes" or "No."

   a. How many cups of water do my classmates drink each day?

      - Is variability expected in the data? _____
      - Is the question statistical? _____

   b. Where in town does our math teacher live?

      - Is variability expected in the data? _____
      - Is the question statistical? _____

   c. How many minutes does it take students in my class to get ready for school in the morning?

      - Is variability expected in the data? _____
      - Is the question statistical? _____

   d. How many minutes of recess do sixth-grade students have each day?

      - Is variability expected in the data? _____
      - Is the question statistical? _____

   e. Do all students in my class know what month it is?

      - Is variability expected in the data? _____
      - Is the question statistical? _____

2.4 Card Sort: Sifting for Statistical Questions

Your teacher will give you a set of cards. Each card contains a question.

Sort the cards into two groups based on whether it is a statistical question or not. Be prepared to explain how you know where each question belongs.

Are you ready for more?

Tyler and Han are discussing the question, "Which sixth-grade student lives the farthest from school?"

- Tyler says, "I don't think the question is a statistical question. There is only one person who lives the farthest from school, so there would not be variability in the data we collect."
- Han says: "I think it is a statistical question. To answer the question, we wouldn't actually be asking everyone, 'Which student lives the farthest from school?' We would have to ask each student how far away from school they live, and we can expect their responses to have variability."

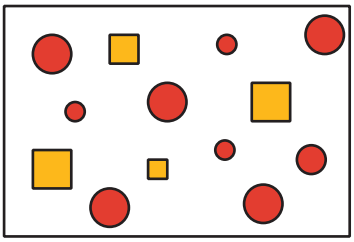
Do you agree with either one of them? Explain your reasoning.

Lesson 2 Summary

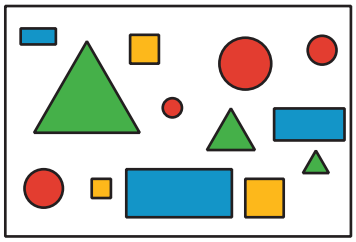
We often collect data to answer questions about something. The data we collect may show **variability**, which means the data values are not all the same.

Some data sets have more variability than others. Here are two sets of figures.

A



B



Set A has more figures with the same shape, color, or size. Set B shows more figures with different shapes, colors, or sizes, so Set B has greater variability than Set A.

Both numerical and categorical data can show variability. Numerical sets can contain different numbers, and categorical sets can contain different categories or types.

When a question can be answered only by using data, and we expect that data to have variability, we call it a **statistical question**. Here are some examples.

- Who is the most popular musical artist at your school?
- When do students in your class typically eat dinner?
- Which classroom in your school has the most books?

To answer the question about books, we may need to count all of the books in each classroom of a school. The data we collect would likely show variability because we would expect each classroom to have a different number of books.

In contrast, the question "How many books are in your classroom?" is not a statistical question. It would only require one person to count the books to get the answer, so there is no variability. Likewise, if we ask all of the students at a school where they go to school, that question is not a statistical question because the responses will all be the same.