Statistics and Data Displays

Lesson 1 Questions That Anticipate Variability

Standards 6.SP.A.1

Learning target I can recognize a statistical question and the expected variability.

Materials Grid paper, rulers, colored pencils, data tables.

Lesson Flow 50 Minutes

0–5 Activate prior knowledge. Read the learning target. Ask students what they already know about questions that anticipate variability. Use a quick model or estimate to make their starting ideas visible.

5–17 Teach and model. A statistical question anticipates different answers in a collection of data. Name the group, the measured attribute, and the expected variation. A question about one fixed fact is not statistical. Work through the two examples on the attached instruction page. Have students name the first step before showing it.

17–22 Guided practice. Revisit worked Example 2 with its solution covered. Students propose the next step and explain why it is valid; uncover and compare with the worked solution.

22–45 Independent classwork. Assign the attached 10 questions in order. Check items 1–3 for entry-level understanding, 4–6 for connected procedures, 7–8 for representation and explanation, and 9–10 for application or justification. Ask students to use the instruction-page notes area or extra grids for longer work.

45–50 Check understanding. Use classwork question 10 as an exit discussion: Critique: “A question is statistical whenever it contains numbers.” Give a counterexample and a corrected rule. Compare the result with the answer key and ask a student to defend the method.

Support and Extension

Support Model item 1 together with the listed tools, then have students attempt item 2 independently. Watch sorting before finding medians, quartile conventions, counting every observation once, and mean versus variability.

Extension Ask students to solve a final item another way, draw a second representation, or create a related problem with a checked answer.

Next step Record which students can explain the target independently. Begin the next teaching session with a brief correction for any recurring error.

Name _____ Date _____

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Learn and Discuss

A statistical question anticipates different answers in a collection of data. Name the group, the measured attribute, and the expected variation. A question about one fixed fact is not statistical.

Example 1 Is “How many centimeters are in one meter?” statistical? Explain.
Solution No; one fixed conversion, 100 cm.. Look for a collection of data and anticipated variation; identify the population and variable.
Example 2 A survey asks “Is our school nice?” Improve it to collect numerical data with expected variation.
Solution Example: On a 1 to 5 scale, how do students in our class rate the school library? Ratings vary among students; the numerical scale must be defined.. Look for a collection of data and anticipated variation; identify the population and variable.

Classwork Show Your Work

Complete the 10 problems on the following page. Refer to the examples, draw models, and check your results.

My Notes or Second Method

Lesson 1 Questions That Anticipate Variability

Name _____ Show calculations, models, and units.

1. Is “How many pages did each student read last night?” statistical? Explain.

2. Is “How many centimeters are in one meter?” statistical? Explain.

3. Is “What are the heights of the plants in our garden?” statistical? Explain.

4. Identify the group, attribute, and units in: How many minutes do students in our class sleep each night?

5. Rewrite “How long is my pencil?” as a statistical question.

6. A student asks only one person’s age once. Explain why “How old is this person today?” is not statistical.

7. Write a statistical question about travel to school. Name the group, attribute, units, and why answers may vary.

8. A survey asks “Is our school nice?” Improve it to collect numerical data with expected variation.

9. Plan a class investigation of daily water use. Write a statistical question, identify a unit, and describe how to collect comparable data.

10. Critique: “A question is statistical whenever it contains numbers.” Give a counterexample and a corrected rule.

Questions That Anticipate Variability

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1. Yes; pages read vary across students.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

2. No; one fixed conversion, 100 cm.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

3. Yes; plant heights vary.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

4. Group: class; attribute: sleep duration; units: minutes.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

5. Example: What are the lengths in centimeters of the pencils in our classroom?
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

6. It seeks one fixed value, rather than anticipating variation in a data collection.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

7. Example: How many minutes do students in our class take to reach school? Group: class; travel time in minutes varies with routes and travel methods.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

8. Example: On a 1 to 5 scale, how do students in our class rate the school library? Ratings vary among students; the numerical scale must be defined.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

9. Example: How many liters of water do students in our class drink in one day? Record each student’s total over the same 24-hour period in liters; amounts can differ.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.

10. Counterexample: How many sides does a triangle have? It has a fixed answer. A statistical question anticipates variability in a collection of data.
Reasoning Look for a collection of data and anticipated variation; identify the population and variable.