

# Data Collection

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**Strand:** Probability and Statistics

**Topic:** Investigating forms of data collection

**Primary SOL:** 1.12 The student will

- a) Collect, organize, and represent various forms of data using tables, picture graphs, and object graphs; and
- b) Read and interpret data displayed in tables, picture graphs, and object graphs, using the vocabulary *more, less, fewer, greater than, less than, and equal to*.

**Related SOL:** 1.1ab, 1.2bc

## Materials

- Data Collection Project sheet
- Collecting Student Responses sheets (several options)
- Survey Question chart
- Cubes
- Sticky notes/mini sticky notes
- Chart paper
- Markers
- Dot stickers
- Pencils
- Crayons
- Large construction paper
- Tape

## Vocabulary

*chart, collect, data, equal to, fewer, greater than, interpret, less, less than, more, object graph, observations, picture graph, represent, survey, table, tally*

## Student/Teacher Actions: What should students be doing? What should teachers be doing?

*Note: Perform this activity only after students have had experiences with teacher-developed surveys. This lesson consists of three parts that will take more than one day to complete with students.*

### Part 1

1. Explain to students that you will be asking a question and will record their responses to the question. Review vocabulary with students explaining that when you ask someone a question and record their responses, it is called a *survey*. The information that we collect is called *data*.
2. Tell students that you are going to survey them with a question today and collect data from the students in the class. After the data is gathered, students will work with a partner on a way to represent the student responses to the survey.

3. Have students think about which type of shoes they would rather wear—tennis shoes or flip flops. Give students a few minutes to think about their choice. Tell them that they are going to collect data about whether they would rather wear tennis shoes or flip flops. Ask them how they could use cubes to keep track of the survey data.
4. Students may suggest that one color be used for tennis shoes and another be used for flip flops. Put cubes in the middle of each table and have students select the color for the shoe that they would rather wear, tennis shoes or flip flops.
5. After students have taken a cube, collect all of the cubes for students who would rather wear tennis shoes and connect them together. Collect all of the cubes for students who would rather wear flip flops and connect them into a tower. Place the towers of cubes on the ledge of the board or in the middle of a circle if gathered in an open area in the classroom.
6. Use sticky notes to label each group, tennis shoes and flip flops. Ask students the following questions to get them thinking about the data that they have collected: *“What do you notice about the data we have collected?” “What do the cube towers tell us?” “What do the numbers tell us about our class?” “Which type of shoe would students in our class rather wear? How do you know?” “How many students participated in all?” “How could we figure that out using the cubes towers?”*
7. During discussion with students, review that sometimes we can use tally marks to help us count. When we use **tally marks**, we make one line for each person but when we get to the fifth person, we make a diagonal line to slash the four lines, so that it represents five. Show the students how to represent the data for tennis shoes and flip flops with tally marks. Review how to count tally marks by ones and then by fives. Ask: *“What do the cubes and/or tallies tell us about the data?” “Can you think of an equation, or number sentence that goes with the data collected?”*
8. After discussing the data with students, explain that students will work with a partner to make a representation of the “Tennis Shoe or Flip Flop” data. Partners will have to show some way to represent what they discovered from the survey. Ask: *“How could you show the “Tennis Shoe or Flip Flop” data, so that someone who is not in this class could learn what we found out?” “Do you think we would get similar data if we asked this same question on a different day?” “What would happen if we did this survey with another class?”* Share several materials with the students that they can use, such as connecting cubes, mini sticky notes, dot labels, etc., and ask them how these may help them show the data.
9. Record students’ ideas on chart paper or on the board. (Students may suggest the following: drawing pictures of the shoes, using dots to represent the student votes for each category, drawing other symbols to represent the data.)
10. The partners will be able to choose the materials that they want to use; however, they need to represent the data we discovered clearly so others will understand it. Remind students to use the cube towers to remember how many students chose to wear tennis shoes and how many chose to wear flip flops. Make sure students understand the results from the data collected before setting them to work with their partner.

11. Place materials, writing utensils, sheets of paper, etc., in a central location for students to access.
12. Give students about 20–25 minutes to work with their partner. Observe partner pairs as they work. Here are some questions to consider: *Are students grouping the data that belongs together? Are students making representations that communicate the information from the survey clearly to others? Do students accurately count the number of students who chose tennis shoes and the number who chose flip flops?*
13. When partner pairs are finished with their representations of the data, display them in the room so everyone can see them. Facilitate a discussion about the representations with students. *What do you notice is similar in many of your representations? How are your representations of the data different? (Compare and contrast the student representations.) What is easy to see in \_\_\_\_\_'s representation? What makes the representation so clear?*
14. Highlight students' strategies used to represent the data, such as, lists, pictures, lines, groups, graphs, etc., during the student discussion.

## Part 2

1. Explain to students that they will be working with a partner to survey the class on a question of their choice. First, they will decide on a question that has only two possible responses. Then, they will ask the students in the class their survey question and record responses. Later, partner pairs will make a representation of the data they found out from their classmates.
2. Display a Survey Question Chart (see attached), discuss the types of questions, and brainstorm some questions with students that could fit under each question type. Some possible examples that they could use are listed on the chart attached to this lesson.
3. Give each student a partner and let them decide on a survey question to ask the rest of the class. Their question should only have two responses. Partners need to check with you to make sure their question and responses are reasonable.
4. Once students have decided upon their individual survey questions, gather the group together to discuss how they will collect data from their classmates, making sure that they ask everyone their survey question. Explain that they need to decide how they will keep track and record student responses to the survey question. Create a chart on paper/board with student ideas for recording responses (e.g., use a checklist, write names down and check off, use two different colored cubes for the responses).
5. In addition, discuss how students will make sure that they have asked everyone the survey question. List these ideas on the paper/board. When it appears that students understand how to plan their survey, set the partner pairs to work collecting data from peers. There are several ways that teachers could set this up. They could have just a few groups collecting data at a time while other students are in math stations. They could spread out data collection across the day, or all students could collect data at the same time. Choose the way that works best for your students.

6. Provide students with materials for collecting data in a central location which they can access (checklist of student names, T-chart for collecting signatures for student responses, cubes, dot stickers, clipboards, etc.)
7. Observe students while they are working. Here are some questions to consider: *Do students understand the question they are asking, and can they explain it to others? Do they have a plan for collecting responses for everyone in the class? How are students keeping track of who has responded and who has not? How do students handle absent students?*
8. Have students check in with you after they have finished collecting responses from their classmates.

### Part 3

1. Explain that they will be making a representation of the data they collected from their survey. Discuss the following questions with students: *“What is a representation?” “What are some ways you could show your data so that others could understand what you found out?”* If it doesn’t come up in discussion, suggest to students that they could construct a graph of the data they collected. Refer back to the ways that they represented the data from the “Tennis Shoe or Flip Flop” survey.
2. Have students work with their partner to construct a representation of their data. They can choose which materials they want to use from the ones you provide.
3. Observe students while they are working. *What did they find out from their survey? How are they thinking about representing their information? Does their representation show the data clearly so that someone not in the class would understand? What do they want others to learn from their representation? Are students using appropriate types of graphs? Are they able to create a graph? Do they understand how to interpret the data in the graph? Does their representation match the data that they collected from the survey?* Encourage students to add titles and labels to their representations to help explain the data they collected.
4. When representations for partner pairs are complete, display the students’ work. Take turns having partners share their representations and what it tells us about their survey question. Have them describe the results of their survey question. Ask: *“What was your question?” “What did you find out?” “What are two interesting things about the data you collected?” “What surprised you?” “How did you display your data?”* Encourage mathematical communication by assisting students in using words such as *more, less, fewer, greater than, less than, and equal to*. Let others ask any questions that they have about the representations.

### Assessment

- **Questions**
  - Why do we collect data? What are some times when we have collected and used data in our classroom?
  - What were the results of your survey? Was there anything that surprised you about your results? Can you write a number sentence, using data from your graph?

- How can you create a word problem for another person to solve, using the data on your graph?
- **Journal/writing prompts**
  - Write your survey question. Describe your data collection by telling how many people you surveyed and how you kept track of your data. Describe what you did with the data you collected—how you organized it.
  - Draw a picture graph that shows the results of your survey. Write about the results of your survey, using at least three of these words: *more, less, fewer, greater than, less than, equal to*.
  - Explain why people use graphs. Describe at least one good thing about a graph.
  - Think about the different types of graphs/representations you have seen. Draw a picture of some of the graphs you have seen in our classroom or in our school.
- **Other Assessments**
  - Have students exchange graphs and describe the results shown, using the targeted vocabulary.
  - Have students survey family members and create a graph to represent their data. Students could share their survey results with their classmates during math talks.
  - Bring in examples of graphs from newspapers or magazines to share and discuss so students can see how graphs are used in our everyday world.
  - Use computer applications that allow students to create tables, object graphs, and picture graphs.

### **Extensions and Connections (for all students)**

- Have students use linking cubes to construct their own classroom object graph each day to represent the number of students bringing lunch and the number buying lunch.
- Students could also construct a daily attendance graph of the number of students present and the number absent. Interpret and discuss the data during morning meeting/calendar time.
- Graphing the daily weather and/or temperature allows a natural connection to science.
- Have students go on a graph hunt in the school to find other classrooms and/or hallways where graphs are displayed. Discuss the graphs with students.

### **Strategies for Differentiation**

- Some students may need help in making a plan. Consider selecting a method to record that you know will work well for these students, and help them get started by collecting a few responses together.
- Give students a choice on how they would like to represent their data (table, object graph, or picture graph).
- Include words/pictures of a table, picture graph, and object graph on a mathematics word wall.
- Provide sentence frames for students that need help interpreting data.

- Provide grid paper to assist students in lining up columns/rows for graphs.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

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## Survey Question Chart

**Do you \_\_\_\_\_ or \_\_\_\_\_?**

Examples:

- Do you buy lunch or pack lunch?
- Do you ride a bus to school or a car to school?

**Would you rather \_\_\_\_\_ or \_\_\_\_\_?**

Examples:

- Would you rather eat ice cream or brownies?
- Would you rather play tag or kickball?

**Which is harder for you \_\_\_\_\_ or \_\_\_\_\_?**

Examples:

- Which is harder for you: tying your shoes or doing a cartwheel?
- Which is harder for you: swimming or riding a bike?

**Which do you like better \_\_\_\_\_ or \_\_\_\_\_?**

Examples:

- Which do you like better: pizza or chicken nuggets?
- Which do you like better: summer or winter?

**Are you \_\_\_\_\_ or \_\_\_\_\_?**

Examples:

- Are you creative or athletic?
- Are you quiet or talkative?
- Are you right-handed or left-handed?

## Data Collection Project

Name \_\_\_\_\_

My partner is:

### Step 1: Plan of Action



1. The survey question we want to ask is:

2. The 2 answer choices for our survey are:

Choice 1

Choice 2

### Step 2: Collecting Data



3. Who will ask the question?

4. Who will record student responses?

How will you record student responses?



How will you make sure that you asked everyone?







### Collecting Student Responses (Option 2)



Our Survey Question is:

Category	Tally Marks	Total Number

### Collecting Student Responses (Option 2)



Our Survey Question is:

Category	Tally Marks	Total Number

### Collecting Student Responses Sheet (Option 3)

Student Name	Choice