

## ARE YOU A DAREDEVIL? 1

Students collect data about the number of group members who would participate in certain daredevil activities, then draw pictures and write statements using fractions and percents to describe the data. This lesson may take more than one class period.



### Mathematical Emphasis

*In this lesson, students*

- Illustrate the results of a survey.
- Make fraction and percent statements about a set of data.

*Students add to their understanding that*

- The same quantity can be represented in multiple ways.
- Questions about our world can be asked, and data about those questions can be collected, organized, and analyzed.

### Social Emphasis

*In this lesson, students*

- Share the work.
- Get all opinions before making a decision.
- Reach agreement.

*Students continue to*

- Develop group skills.
- Analyze the effect of behavior on others and on the group work.

**Group Size: 4**

### Teacher Materials

- 4 sentence strips (see Before the Lesson)
- Bulletin board space (see Before the Lesson)
- Transparency of “Are You a Daredevil?” group record sheet

### Student Materials

*Each group of four needs*

- “Are You a Daredevil?” group record sheet
- 4 sheets of drawing paper
- Crayons or markers

### Extension Materials

*Each student needs*

- Paper and a pencil



[Source: Number Power® Grade Five, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]



## Before the Lesson



- Write a different question on four sentence strips, such as those below, using daredevil activities of high interest to your students.

Would you like to surf?

Would you like to hang glide?

Would you like to skydive?

Would you like to drive a race car?

- Designate four bulletin board areas where groups can hang illustrations with their responses to these questions. Label each designated area with the appropriate sentence strip.

## Notes

## Teacher

Introduce the lesson by briefly discussing the daredevil activities students investigated in the previous lesson. Ask questions, such as:

**Q. Which daredevil activities did you find most interesting? Why?**

**Q. What did you learn about your classmates?**

Show the “Are You a Daredevil?” transparency, read the directions, and explain that students will

- Survey each group member to see if he or she would like to participate in the four activities.
- Keep a record of the number of “yes,” “no,” or “maybe” responses for each activity.
- Draw a picture to show how the group responded to each activity and write a statement using fractions and percents to describe how the group responded.
- Hang the pictures for each activity in the designated bulletin board areas.

## Students



[Source: *Number Power® Grade Five*, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]

## Notes

Provide sufficient time for a variety of illustrations and statements to be suggested. For example, if two people responded “yes,” one responded “no,” and one responded “maybe,” an illustration and statement that describes this information might be:



One out of four ( $1/4$ ) or 25% of the students would not like to skydive.

## Teacher

Model the activity by asking a group of four to share whether, if given the proper training, they would like to skydive. Record the responses (yes, no, and maybe) where all can see. After all four group members have responded, ask questions, such as:

**Q. How might we illustrate how this group responded?** (Sketch one suggestion where all can see.)

**Q. What statements can you make using fractions or percents that would describe how this group responded?** (Record the suggested statements where all can see.)

**Q. What is another way to describe this information?**

**Q. What fraction or percent describes the number of students in this group who responded “maybe” to skydiving?**

## Students



Observe groups and ask yourself the following questions:

- Q.** Do students understand that 25%, 50%, and 75% are equivalent to the fractions  $1/4$ ,  $2/4$ , and  $3/4$ ?
- Q.** Do students understand that two out of four or  $2/4$  is equivalent to  $1/2$ ?
- Q.** Do students understand that 100% is equivalent to  $4/4$ ,  $3/3$ , and one whole?
- Q.** How do students working in groups of three describe their group’s data? Do they understand that  $33\frac{1}{3}\%$  is equivalent to the fraction  $1/3$ ? That  $66\frac{2}{3}\%$  is equivalent to  $2/3$ ?

Observe groups working and, when appropriate, ask questions, such as:

- Q.** (Point to an activity.) **What is another way to describe how your group responded to this activity?**
- Q.** **How are you making sure that everyone in the group is giving their opinion?**
- Q.** **How are you making sure everyone agrees on the picture to draw and the statement to write?**

- In groups, students
  - 1.** Survey each other about the four daredevil activities and record the responses on the “Are You a Daredevil?” group record sheet.
  - 2.** Draw four pictures illustrating how the group responded to each activity and write four statements using fractions and percents to describe this data.
  - 3.** Hang the pictures in the designated areas.

[Source: Number Power® Grade Five, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]

Notes	Teacher	Students
<p>You may want to do this part of the lesson in the next class period.</p>	<p>Explain that the classroom has become a museum and that groups will take a "Museum Walk" to look at all the illustrations. Have students suggest how they might stroll around the room without disturbing others. At each bulletin board, have students discuss the illustration and whether the statements agree with the illustrations.</p>	
	<p>As students view other groups' illustrations, ask questions, such as:</p> <p><b>Q. (Point to one of the illustrations.) What do you find interesting about this group's illustration? Did your group respond the same way? Explain.</b></p> <p><b>Q. Do any groups show that 100% of their members responded the same way to an activity? Explain. How many students out of the group responded the same way? Explain.</b></p> <p><b>Q. Do any groups show the 0% of the students in their group responded "yes" to an activity? Explain.</b></p>	 <p>In groups, students walk around the room, view the illustrations, and read and discuss the statements.</p>
<div data-bbox="112 1507 496 1776" style="border: 1px solid black; padding: 10px; width: fit-content;"> <p style="text-align: center;"><b>Mathematical Emphasis</b></p> <p>The same quantity can be represented in multiple ways.</p> </div>	<p>Ask students to return to their seats. First in groups, then as a class, discuss questions, such as:</p> <p><b>Q. What questions do you want to ask about another group's illustrations?</b></p> <p><b>Q. What did you like about another group's illustrations?</b></p> <p><b>Q. Did any groups respond the same way? Explain.</b></p> <p><b>Q. (Point to one of the illustrations and read the statement aloud.) What other statements using fractions or percents can you make to show how this group responded to this activity?</b></p>	

[Source: Number Power® Grade Five, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]

Notes	Teacher A.181	Students
<p><b>Social Emphasis</b></p> <p>Analyze the effect of behavior on others and on the group work.</p>	<p>Write these statements where all can see and discuss them. Ask students to explain why they agree or disagree.</p> <p>Help groups reflect on the lesson by asking questions, such as:</p> <p><b>Q. What did you like about how your group worked together?</b></p> <p><b>Q. What were some problems you had? How did the problems make you feel? Did you solve the problems? How?</b></p> <p>Collect and save the “Are You a Daredevil?” group record sheets to use in Lesson 3.</p>	



**For Groups That Finish Early**

**For the Next Day**

**Extensions**

- Have individual students write about how their groups determined the fraction or percent statements they wrote on their illustrations.
- Begin the “Numbers Around Us” bulletin board activity described in the Overview, p.128.
- Continue with the next lesson, “Are You a Daredevil? 2”.

[Source: Number Power® Grade Five, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]



## ARE YOU A DAREDEVIL? 2

Students collect, organize, and analyze data from the previous lesson. Students then decide on the number of people each group will need to survey in order for the class to survey one hundred people.



### Mathematical Emphasis

*In this lesson, students*

- Compute informally.
- Make estimates.

*Students add to their understanding that*

- Rational numbers can be described or quantified in relation to an established whole.
- Making a reasonable estimate requires gathering and using information.
- Questions about our world can be asked, and data about those questions can be collected, organized, and analyzed.

### Social Emphasis

*In this lesson, students*

- Explain their thinking.
- Listen to others.
- Get all opinions before making a decision.

*Students continue to*

- Develop group skills
- Analyze why it is important to be fair, caring, and responsible.
- Analyze the effect of behavior on others and on the group work.

**Group Size: 4**

### Teacher Materials

- 4 large class charts (see Before the Lesson)
- Markers
- Students' group record sheets (from Lesson 2; see Before the Lesson)

### Student Materials

*Each group of four needs*

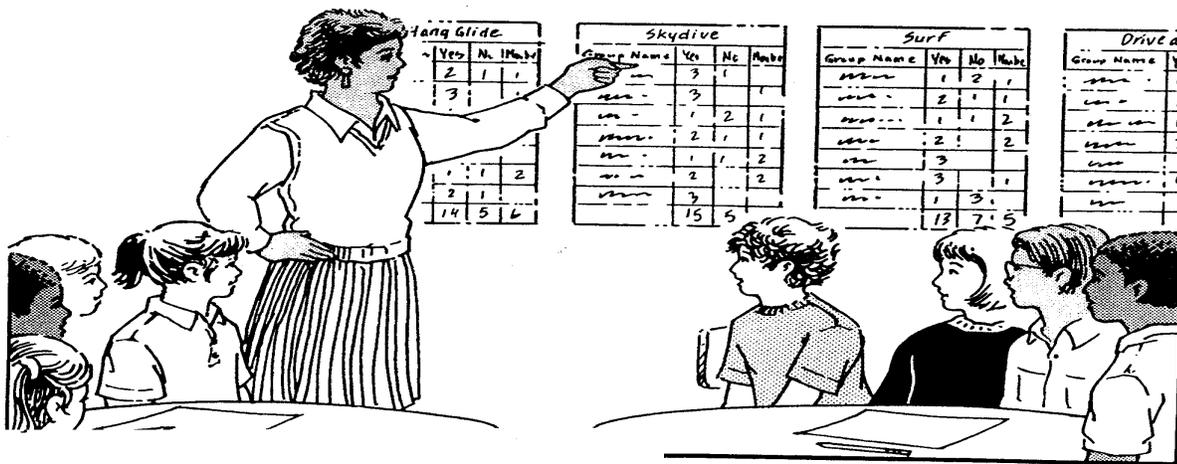
- Paper and a pencil

### Extension Materials

- 4 large class survey charts (see Extensions)
- Markers

*Each student needs*

- Paper and a pencil



[Source: *Number Power® Grade Five*, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]



## Notes

## Teacher

## Students

Direct students' attention to the charts. First in groups, then as a class, discuss the data. Ask questions, such as:

- Q. What do you notice about the data? Are there any surprises? Explain.**
- Q. What might you learn from the charts about the students in our class?**
- Q. What statements can you make about the number of students who respond "yes," "no," "maybe" to each activity?**
- Q. If we did not know the number of students in our class, how might we use the charts to determine that information?**

Wonder aloud about what percent of the class would like to try one of the four activities. Ask groups to estimate the percentage of the class that would like to try each activity, to record their estimates, and to write about how they made them.

Facilitate a discussion about how groups might make sure that everyone's opinion is heard and considered. Discuss questions, such as:

- Q. How did you include everyone when you worked together in previous lessons? If you had difficulty including everyone, how might you include everyone this time?**
- Q. Why is it important when you work with others to make sure everyone's opinion is heard and considered?**



### Social Emphasis

Analyze why it is important to be fair, caring, and responsible.

[Source: Number Power® Grade Five, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]

## Notes



Observe groups and ask yourself questions such as:

- Q.** What strategies do students use to estimate a percentage of a set? (For example, students might reason that there are 31 students in class, 11 students would like to hang glide, and 11 is about  $\frac{1}{3}$  of 31, so about 33% would like to hang glide.)

Also, observe how groups interact. Note positive interactions and any problems you might discuss when the class reflects on the lesson.

### Mathematical Emphasis

Making a reasonable estimate requires gathering and using information.

A cooperative structure such as "Heads Together" (see p. xii [Refer to the original source.]) can provide opportunities for all students to be involved in the discussion.

## Teacher

Observe groups working and, when appropriate, ask questions, such as:

- Q.** (Point to an estimate.) **Why do you think this estimate makes sense?**
- Q.** **How are you including everyone?**

Have several groups share their estimates and strategies for finding them. Ask students to explain why they agree or disagree. Then, discuss questions, such as:

- Q.** (Point to one of the activity charts.) **Would more or less than  $33\frac{1}{3}\%$  of the class want to try this activity? How do you know?**
- Q.** (Point to one of the activity charts.) **Would more or less than  $66\frac{2}{3}\%$  of the class want to try this activity? How do you know?**
- Q.** **We have [31] students in our class. If [31] students would like to [skydive], what percentage of the class is that? Explain.**
- Wonder aloud what the results might be if the class asked 100 people (adults and children) if they would like to try these same four activities. Ask:
- Q.** **If the class surveys 100 people, do you think the results will be similar to our class' results? Why?**

## Students

In groups, students

1. Analyze the data on the four class charts and estimate the percentage of the class that would like to try each daredevil activity.
2. Record their estimates and write about how they made the estimates.



[Source: *Number Power® Grade Five*, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]

**Notes**

**Teacher**

**Students**

Provide sufficient time for groups to explore this problem.

In case the class does not survey 100 people, you may want to survey several people in order to contribute data if needed in Lesson 4.

**Social Emphasis**

Analyze the effect of behavior on others and on the group work.

**Q. About what percent of the 100 people do you think will want to [hang glide]? Why do you think that?**

Explain that for homework the class will survey 100 people to see if they would like to try the four daredevil activities, keeping a record of the number of people who respond “yes,” “no,” or “maybe” to each activity. Explain that students can survey family members, friends, and students from other classes. Ask:

**Q. How many people might each group need to survey for the class to survey a total of 100 people?**

First as a group, then as a class, decide the number of people each group will survey. Have groups decide the number of people each student in their group will survey and how they will keep an accurate record of responses. Have several groups share how they decided to record their responses.

Help students reflect on their group work. Ask groups to discuss what they think did not go well, and how that made them feel. Have students discuss what they might do differently the next time they work together. Ask if any group would like to share what they discussed.

If appropriate, share some of your observations of the positive interactions and the problems you noted as groups worked.

Before Lesson 4, have students collect the survey data and record the data on four class survey charts (see Extensions for the Next Day).



[Source: Number Power® Grade Five, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]



## Survey Says . . . !

Students use a grid divided into one hundred parts to explore percents and to help them analyze and describe the data from the class survey of 100 people. This lesson may take more than one class period.



### Mathematical Emphasis

*In this lesson, students*

- Compute percentages.
- Describe data in various ways.

*Students add to their understanding that*

- Rational numbers can be described or quantified in relation to an established whole.
- Questions about our world can be asked, and data about those questions can be collected, organized, and analyzed.

### Social Emphasis

*In this lesson, students*

- Explain their thinking.
- Check for understanding.

*Students continue to*

- Develop group skills
- Analyze the effect of behavior on others and on the group work.

**Group Size: 2**

### Teacher Materials

- Class survey charts (from Lesson 3 Extensions)
- Transparency of the 10-by-10 Grid
- Baggie of 100 beans (see Before the Lesson)

### Student Materials

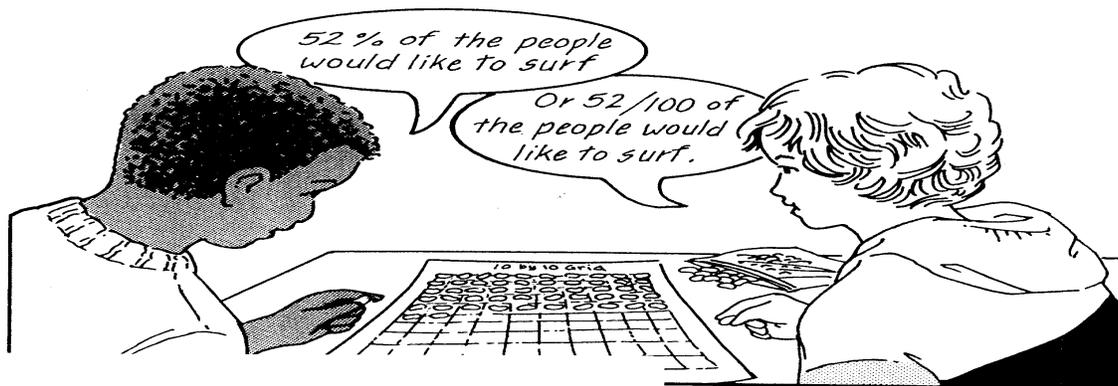
*Each pair needs*

- Access to 10-by-10 Grid and beans (see Before the Lesson)
- Paper and a pencil

### Extension Materials

*Each pair needs*

- Access to 10-by-10 Grid and beans
- Calculator
- "Survey Says...! Extension" group record sheet
- Paper and a pencil



[Source: [Number Power® Grade Five](#), Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, [www.devstu.org](http://www.devstu.org), 1999]



## Before the Lesson

- Put 200 beans in a baggie for each pair and 100 beans in a baggie for yourself.

## Notes

Post the four class survey charts with the survey of 100 people.

## Teacher

Divide groups of four into pairs. Introduce the lesson by asking students to share what they found out when they surveyed people about the daredevil activities. Ask questions, such as:

**Q. Did people enjoy thinking about the daredevil activities and whether they would like to try them? Had any of the people already tried some of the activities before? Explain.**

**Q. Are you surprised by the way people responded to any of the activities? Why?**

Show the 10-by-10 Grid transparency and have students establish how many parts the grid has. Explain that *percent* means parts per hundred when a whole is divided into 100 parts and that the grid is a model for percent. Show the baggie of 100 beans and ask:

**Q. How could we use the 100 beans and the 10-by-10 Grid to help us find the percentages of each response to the survey?**

Point to the first square and ask the following questions:

**Q. (Place a bean in the square.) If the grid represents the whole set or 100% and one person of the 100 people surveyed said they wanted to [hang glide], what percent of the 100 people does this bean represent? (Write "1%" where all can see.)**

**Q. What fractional part of the whole set of 100 people does this bean represent? (Write " $\frac{1}{100}$ ".)**

## Students



[Source: [Number Power® Grade Five](#), Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, [www.devstu.org](http://www.devstu.org), 1999]

## A.191

### Notes

Have pairs use the 10-by-10 Grid transparency to explain their thinking to the class.

### Teacher

Explain that the decimal 0.01 ("one hundredth") is another way to express 1% or  $\frac{1}{100}$ . (Write "0.01".)

Continue using the grid and beans, while students, first in pairs, then as a class, discuss questions, such as:

**Q.** (Point to the bean on the grid.) **If twenty times this number of people said they wanted to [hang glide], how many people would that be? How do you know?** (Place 19 more beans on the grid.)

**Q.** **How might you express that 20 out of 100 people would like to [hang glide] as a percent? As a fraction?** (Write "20 out of 100 people can be expressed as 20% and  $\frac{20}{100}$ .")

**Q.** **How do we express 20% as a decimal? (Write "0.2".) Looking at the grid, why do you think 0.2 is read as two tenths? How is 0.2 related to  $\frac{20}{100}$ , and 20%?**

**Q.** **Is 0.2 related to any other fractions besides  $\frac{20}{100}$ ?** (Establish with students that 0.2 can be written as  $\frac{2}{10}$  as well as  $\frac{20}{100}$ . Write "20/100 and 2/10 can be expressed as 0.2.") (100 out of 100 people)

**Q.** **If 100% of the 100 people surveyed said they would not like to [hang glide], how many people responded "no" to [hang gliding]?** (100 out of 100 people)

Choose one daredevil activity (skydiving, for example) and have students discuss ways to describe the number of "yes," "no," and "maybe" responses compared to the total number of responses on the class chart. First in pairs, then as a class, discuss question, such as:

### Students



[Source: [Number Power® Grade Five](#), Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, [www.devstu.org](http://www.devstu.org), 1999]

## A.192

Notes	Teacher	Students
<p>For example, if 38 out of 100 people surveyed responded “yes” to skydiving, students might describe that information in several ways:</p> <ul style="list-style-type: none"> <li>▪ 38 out of 100 people surveyed said “yes.”</li> <li>▪ We know that 38 out of 100 people can be expressed as a fraction, so <math>\frac{38}{100}</math> responded “yes.”</li> <li>▪ We used the 10-by-10 Grid and found that 38 people out of 100 is 38% of the people.</li> </ul>	<p><b>Q. How can you describe the number of [“yes”] responses in relation to the whole?</b> (Write the suggestions where all can see.) <b>What is another way to describe the [“yes”] responses?</b> (Write the suggestions.)</p> <p>Explain that pairs will choose one of the other daredevil activities and record ways to describe the data using fractions and percents.</p>	<p style="text-align: center;">●● ●● ●● ●●</p>
<div style="display: flex; align-items: center; margin-bottom: 10px;">  <p>Pairs may choose to use a 10-by-10 Grid and 100 beans to help them determine the fractions and percents. Explain that each baggie contains 200 beans, so pairs will have to count out 100 beans. (Pairs will need 200 beans later in this lesson.)</p> </div> <p>As you observe pairs, ask yourself questions, such as:</p> <p><b>Q.</b> Do students describe the data in a variety of ways? How?</p> <p><b>Q.</b> Do partners help each other understand the relationships? If so, how?</p>	<p>Observe pairs working and, when appropriate, ask questions, such as:</p> <p><b>Q.</b> (Point to the data.) <b>Is there another way to describe this data? Is there another way to describe this data using a fraction? Using a percent?</b></p> <p><b>Q.</b> <b>How are you making sure you both understand? What are you doing if you do not understand? Is that helpful? Why?</b></p>	<p>●● In pairs, students</p> <ol style="list-style-type: none"> <li>1. Discuss the data for one daredevil activity.</li> <li>2. Describe the number of “yes,” “no,” and “maybe” responses in several ways.</li> </ol>

[Source: [Number Power® Grade Five](#), Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, [www.devstu.org](http://www.devstu.org), 1999]

## A.193

## Notes

### Mathematical Emphasis

Rational numbers are described or quantified in relation to an established whole.

Provide sufficient time for pairs to explore these questions. Pairs may find it helpful to use a 10-by-10 Grid and 200 beans to help them explore these questions.

A student might say, "50 is half of 100, so I took half of 32 and that is 16, so 16 people would say 'yes' out of 50." Other students might divide 50 beans equally on the 10-by-10 Grid so that each bean shares two squares, then count 32 squares with 16 beans.

## Teacher

Ask pairs to share how they described the data. Ask students to explain why they agree or disagree. Have the class establish the percentage each response is of the whole and record each percentage on the class charts. Ask questions, such as:

- Q. What information do the results of the survey tell us about the 100 people surveyed?**
- Q. We found that [about 20%] of our class would like to [surf]. How does that compare with the results of this survey? Explain.**
- Q. If [80%] of the people surveyed said "yes" to [surfing], could [25%] have said "no"? Why?**
- Q. [68%] of 100 people surveyed would like to [drive a race car]. If 200 people had been surveyed and [68%] of them would like to [drive a race car], how many people would that be? Why do you think that?**
- Q. (Point to one of the class charts.) How would the totals change for this activity if 200 people were surveyed and the same percentages resulted? Why do you think that?**
- Q. [32%] of 100 people surveyed would not like to [drive a race car]. If 50 people had been surveyed and [32%] of them would not like to [drive a race car], how many people would that be? Why do you think that? Why is it important to know how many people were surveyed?**
- Q. If 5 people represented the whole, would 1% of 5 be more than 1 or less than 1? Why do you think so?**

Have partners reflect on their work together by asking them to discuss what they did in this lesson that helped them work well. Discuss any problems partners may have had and have the class suggest possible solutions to these problems.

## Students



[Source: [Number Power® Grade Five](#), Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, www.devstu.org, 1999]

## Notes

## Teacher

To help students continue to develop their understanding of percents and decimals, have pairs investigate the activities in Extensions before going on to the next lesson.

## Students



### For Groups That Finish Early

## Extensions

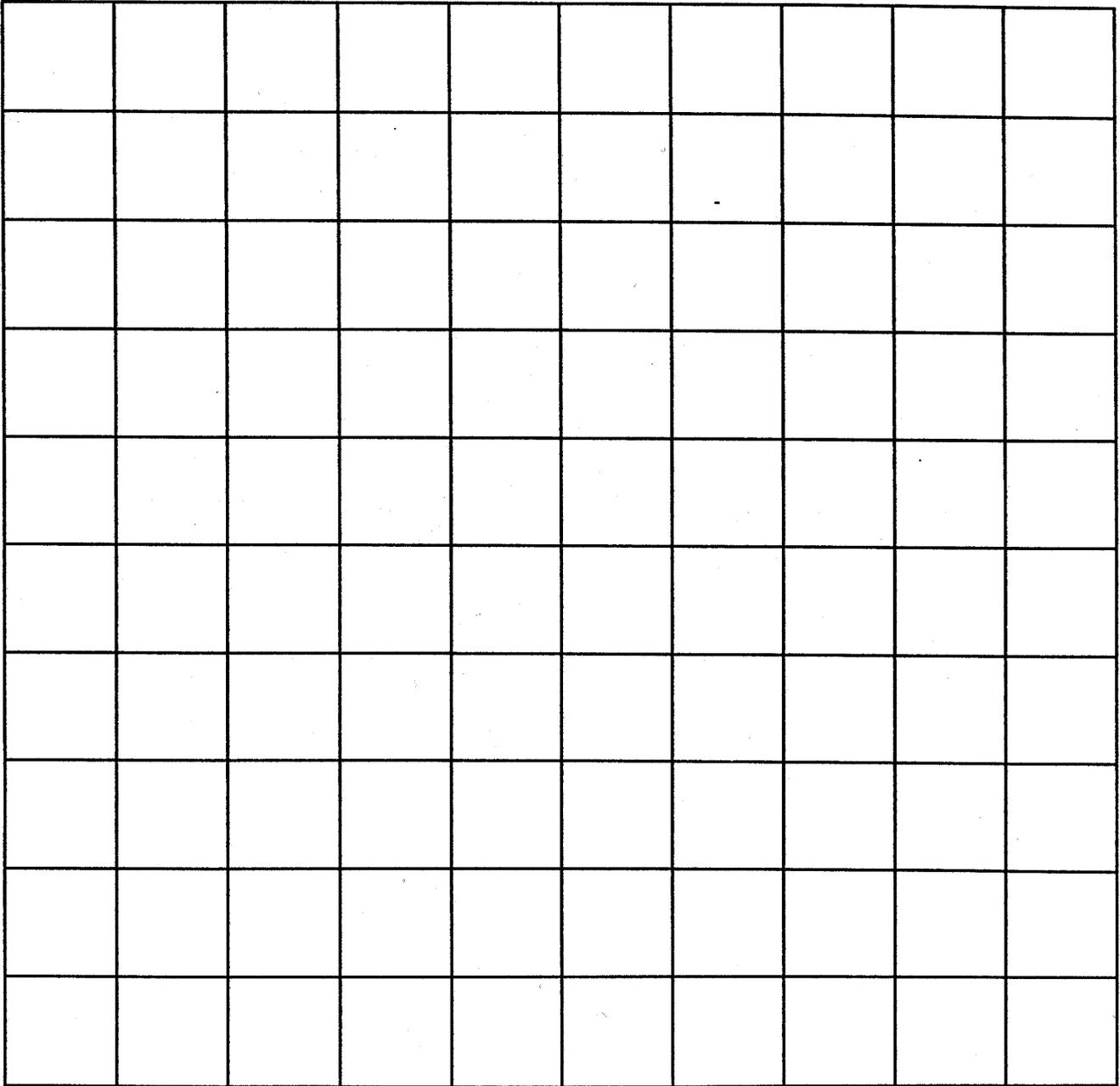
- Have pairs use 50 beans and a 10-by-10 Grid to explore how they might determine 1%, 10%, 25%, 50%, and 75% of 50 people.

### For the Next Day

- Post the completed class survey charts from Lesson 4 where all can see. Distribute a calculator to each pair. Have pairs choose one activity and use their calculator to determine the decimal notation for each percentage on the class survey chart. If needed, remind students how to use the calculator to convert a fraction to a decimal. (For example, if 60 out of 100 people said they would like to skydive, students enter  $\boxed{6}\boxed{0}$ , press  $\boxed{\div}$ , enter  $\boxed{1}\boxed{0}\boxed{0}$ , and press  $\boxed{=}$ .) Have several pairs share their results. Write the decimals and their percent and fraction equivalents where all can see. Help students read the decimals.
- Have pairs complete the "Survey Says...! Extension" group record sheet. Students may need to use beans and a 10-by-10 Grid to solve the problems. As a class, discuss the results and the strategies students used to solve the problems.

[Source: [Number Power® Grade Five](#), Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, [www.devstu.org](http://www.devstu.org), 1999]

# 10-by-10 Grid



[Source: Number Power® Grade Five, Shaila Regan, Marji Freeman, Julie Wellington Contestable, and Laurel Robertson, Developmental Studies Center, [www.devstu.org](http://www.devstu.org), 1999]

