Comparing the Results of a Survey

Objectives
To guide the organization and tabulation of survey data; and to introduce the use of percents to compare quantities expressed as fractions with unlike denominators.

1. **Teaching the Lesson**

   **Key Concepts and Skills**
   - Use a calculator to convert fractions to percents.  
     [Number and Numeration Goal 5]
   - Compare fractions with unlike denominators.  
     [Number and Numeration Goal 6]
   - Create a table and tally chart.  
     [Data and Chance Goal 1]
   - Analyze survey results and make predictions based on collected data.  
     [Data and Chance Goal 2]

   **Key Activities**
   Students tabulate the results from the trivia survey distributed in Lesson 9-1. For each survey question, they write a fraction to express the number of Yes answers as a part of the total number of answers. Then they convert each fraction to a percent.

   **Materials**
   - Math Journal 2, p. 261
   - Study Links 9-1 (Math Masters, p. 280) and 9-5
   - Transparency of Math Masters, p. 290 (optional)
   - Calculator
   - Slate

2. **Ongoing Learning & Practice**

   **Solving Number Stories with Multiplication and Division**
   Math Journal 2, pp. 261A and 261B
   Students solve multiplication and division number stories about gardening.

   **Math Boxes 9-6**
   Math Journal 2, p. 262
   Students practice and maintain skills through Math Box problems.

   **Ongoing Assessment:**
   - **Recognizing Student Achievement**
     Use Math Boxes, Problem 4.  
     [Operations and Computation Goal 7]

   **Study Link 9-6**
   Math Masters, p. 291
   Students practice and maintain skills through Study Link activities.

3. **Differentiation Options**

   **READINESS**
   Comparing Estimates for the “Fraction-of” a Collection
   Math Masters, p. 292
   Students estimate the number of trapezoids in a collection of pattern blocks and compare estimates.

   **ENRICHMENT**
   Graphing Survey Results
   Math Journal 2, p. 261
   Math Masters, p. 403
   Students make a side-by-side (double) bar graph of the class survey results.

   **EXTRA PRACTICE**
   Taking a 50-Facts Test
   Math Masters, pp. 410 and 414; p. 416
   Students take a 50-facts test. They use a line graph to record individual and optional class scores.

4. **Advance Preparation**
   For the optional Readiness activity in Part 3, gather a large collection of pattern blocks and place them in a clear container.


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750 Unit 9 Fractions, Decimals, and Percents
Getting Started

Math Masters, p. 280

1 Teaching the Lesson

Math Message Follow-Up

Go over the answers. 29%, 73%, 71%, 4% Ask volunteers to show what they did to rename the fractions as percents. Make sure that both methods are presented:

- Using the percent key on a calculator
- Dividing the numerator by the denominator and multiplying by 100

Tell students that in this lesson they will rename the fractions from the Trivia Survey as percents.

Making a Prediction Based on Individual Survey Data

(Math Masters, p. 280)

Have students make some rough guesses about people’s behavior based on their survey results. Ask: Do you think it is more likely that a person will

- read a book or go to a movie?
- eat breakfast or eat at a fast-food restaurant?
- like liver or like Mondays?

Take a vote and record the results on the board.

Study Link Master

Conduct the survey below. The results will be used in Lessons 9-6.

First ask at least five people to answer the following survey questions. You can ask family members, relatives, neighbors, and friends.

- BE CAREFUL! You will not ask every person every question. Pay attention to the instructions that go with each question.
- Record each answer with a tally mark in the Yes or No column.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is Monday your favorite day? (Ask everyone younger than 20.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have you gone to the movies in the last month? (Ask everyone older than 8.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Did you eat breakfast today? (Ask everyone over 25.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Do you keep a map in your car? (Ask everyone who owns a car.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Did you eat at a fast-food restaurant yesterday? (Ask everyone.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Did you read a book during the last month? (Ask everyone over 20.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Are you more than 1 meter tall? (Ask everyone over 20.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Do you like liver? (Ask everyone.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Answers vary.

Math Masters, p. 280
### Tabulating Survey Results for the Whole Class

(Math Journal 2, p. 261; Math Masters, pp. 280 and 290)

Tell students that they will use the results of all the surveys to check their guesses. The first step is to combine the results from all the surveys. The goal is to create a chart that shows the total number of Yes and No answers to each question for the whole class.

Ask for suggestions on how to do this most efficiently. One possibility is to divide the class into small groups of four or five. For each question on the survey, have the students in each group find the total number of Yes answers and the total number of No answers for their group. Each group can then report its totals. You or a student volunteer can add these as they are reported. Finally, record the total number of Yes and the total number of No answers to each question on the transparency of Math Masters, page 290.

Students copy the results in the Yes and No columns on page 261 in their journals. They add the Yes and No results and record the sums in the Total column. These are the total numbers of people who answered the survey questions.

Next, students record the Yes answers as a fraction of the total number of answers in the Yes Total column. If necessary, help them complete the Yes Total column for the first two rows of the chart. At this point, the classroom chart might look as follows:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
<th>Yes Total</th>
<th>% Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Monday</td>
<td>18</td>
<td>45</td>
<td>63</td>
<td>18/63</td>
<td>29%</td>
</tr>
<tr>
<td>2. movies</td>
<td>57</td>
<td>21</td>
<td>78</td>
<td>57/78</td>
<td>74%</td>
</tr>
</tbody>
</table>

### Analyzing the Survey Results

(Math Journal 2, p. 261)

Have students analyze the survey results so far. Ask: Do you think it is more likely that a person will

- read a book or go to a movie?
- eat breakfast or eat at a fast-food restaurant?
- like liver or like Mondays?
Some students might argue that you need to simply compare the Yes answers.

**Example:**

Suppose that 45 out of 50 people interviewed read a book and that 57 out of 78 people saw a movie last month.

- Is it correct to conclude that because more people saw a movie than read a book, people are more likely to go to the movies than to read a book?
- Does the total number of people interviewed need to be taken into account?

This discussion is **crucial** to understanding why percents are useful. Students should see that it is difficult to compare quantities that are expressed as fractions with unlike denominators. Explain that this is why we rename fractions with unlike denominators as fractions that have the same denominator. The denominator 100—used in percents—is especially useful, because in our base-ten system, it is easy to rename such fractions as decimals and percents.

Once students understand why it is helpful to rename the fraction of Yes answers as percents, have them use their calculators to fill in the ‘% Yes’ column. Ask them to round the answers to the nearest whole percent. Students’ completed charts should resemble your classroom chart, which might look like this:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
<th>% Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Monday</td>
<td>18</td>
<td>45</td>
<td>63</td>
<td>29%</td>
</tr>
<tr>
<td>2. movies</td>
<td>57</td>
<td>21</td>
<td>78</td>
<td>73%</td>
</tr>
</tbody>
</table>

Have partners use their completed table to answer Problem 2 at the bottom of journal page 261.

### Adjusting the Activity

Have students combine the trivia survey data from all of the fourth-grade classes in the school. Discuss why % Yes estimates based on the combined data are more reliable than estimates based on the data collected by any single classroom.

**AUDITORY** • **KINESTHETIC** • **TACTILE** • **VISUAL**

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**Math Journal 2, p. 261A**

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**Math Journal 2, p. 261B**

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**Lesson 9-6**
2 Ongoing Learning & Practice

▶ Solving Number Stories with Multiplication and Division
(Math Journal 2, pp. 261A and 261B)

Students solve multiplication and division number stories about gardening. Some problems involve multistep calculations and interpreting remainders. Students write a number model with an unknown, solve the problem, and then write a summary number model.

▶ Math Boxes 9-6
(Math Journal 2, p. 262)

Mixed Practice Math Boxes in this lesson are paired with Math Boxes in Lesson 9-8. The skill in Problem 6 previews Unit 10 content.

Ongoing Assessment: Recognizing Student Achievement

Use Math Boxes, Problem 4 to assess students’ ability to interpret a map scale. Students are making adequate progress if they are able to solve Problems 4a–4c. Some students may be able to solve Problems 4d and 4e, which involve fractions of inches.

[Operations and Computation Goal 7]

▶ Study Link 9-6
(Math Masters, p. 291)

Home Connection Students use percents to compare quantities expressed as fractions with unlike denominators.

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**Math Boxes 9-6**

(Home Connection: p. 291)

- **Problem 4**: Students solve multiplication and division number stories about gardening. Some problems involve multistep calculations and interpreting remainders. Students write a number model with an unknown, solve the problem, and then write a summary number model.

- **Mixed Practice**: Math Boxes in this lesson are paired with Math Boxes in Lesson 9-8. The skill in Problem 6 previews Unit 10 content.

- **Ongoing Assessment**: Use Math Boxes, Problem 4 to assess students’ ability to interpret a map scale. Students are making adequate progress if they are able to solve Problems 4a–4c. Some students may be able to solve Problems 4d and 4e, which involve fractions of inches.

- **Home Connection**: Students use percents to compare quantities expressed as fractions with unlike denominators.
Differentiation Options

Comparing Estimates for the “Fraction-of” a Collection
(Math Masters, p. 292)

To explore the comparison of quantities expressed as fractions with unlike denominators using a concrete model, have students compare estimates for the number of red trapezoids in a collection of pattern blocks.

Have students share their strategies for making comparisons. Discuss how finding nearby “easy” fractions or converting to decimals could help them compare their estimates. Ask why estimates with different denominators cannot be compared directly.

Graphing Survey Results
(Math Journal 2, p. 261; Math Masters, p. 403)

To apply students’ ability to represent data, have them graph the results of the class survey on centimeter grid paper (Math Masters, page 403). You might suggest that students use a side-by-side (double) bar graph. For example:

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Monday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. movies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graph of survey results:

- 1. Monday
- 2. movies

Graphing Survey Results

Taking a 50-Facts Test
(Math Masters, pp. 410, 414, and 416)

See Lesson 3-4 for details regarding the administration of a 50-facts test and the recording and graphing of individual and optional class results.