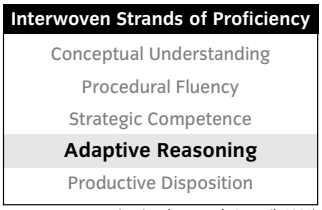


(National Research Council, 2001)

COMMUNICATION IN MATH

Adaptive reasoning refers to the capacity to think logically about the relationships among concepts and situations (NRC, 2001, p. 129). In order for students to develop adaptive reasoning, they need many opportunities to practice communication in math. Many research studies support this idea.

> Through communication, ideas become objects of reflection, refinement, discussion, and amendment. . . .When students are challenged to think and reason about mathematics and to communicate the results of their thinking to others orally or in writing, they learn to be clear and convincing. Listening to others' explanations gives students opportunities to develop their own understandings (NCTM, 2000, p. 59).

> Students who are involved in discussions in which they justify solutions—especially in the face of disagreement—will gain better mathematical understanding as they work to convince their peers about differing points of view (Hatano and Inagaki, 1991).

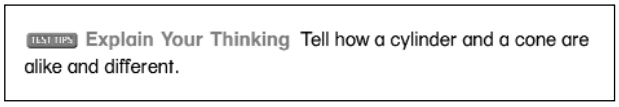
> Because mathematics is so often conveyed in symbols, oral and written communication about mathematical ideas is not always recognized as an important part of mathematics education. Students do not necessarily talk about mathematics naturally; teachers need to help them learn how to do so (Cobb, Wood, and Yackel, 1994).

Writing in mathematics can also help students consolidate their thinking because it requires them to reflect on their work and clarify their thoughts about the ideas developed in the lesson (NCTM, 2000, p. 60).

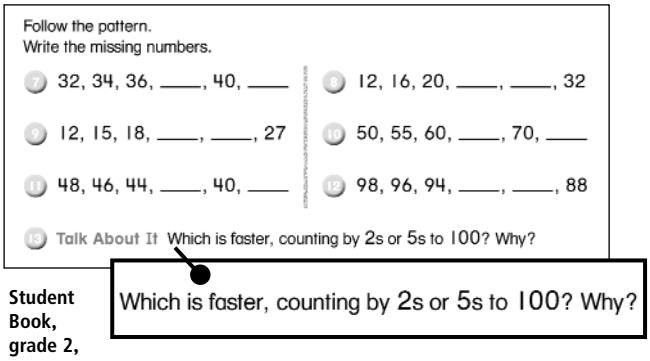
Students need opportunities to test their ideas on the basis of shared knowledge in the mathematical community of the classroom to see whether they can be understood and if they are sufficiently convincing. When such ideas are worked out in public, students can profit from being part of the discussion, and the teacher can monitor their learning (Lampert, 1990).

Houghton Mifflin Math provides numerous opportunities for students to write about math and then discuss their ideas. Thought-provoking questions are included throughout the program.

- **Explain Your Thinking** questions are included at the end of Guided Practice sets.
- **Talk About It • Write About It** questions occur at the end of hands-on activities.
- **Explain and Analyze** questions appear in practice sections.
- **Math Conversations** provide opportunities for students to use new vocabulary.
- **Write About It** questions occur on pretests and chapter tests.


TEST TIPS **Explain Your Thinking** Tell how a cylinder and a cone are alike and different.

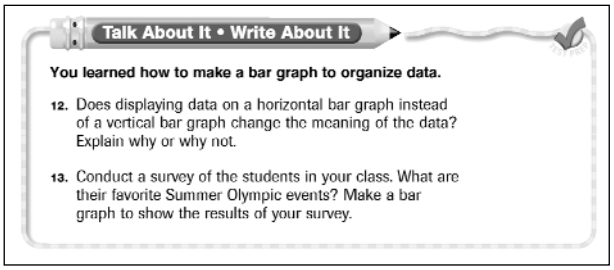
Student Book, grade 1, page 195


Follow the pattern.
Write the missing numbers.

7. 32, 34, 36, ____, 40, ____
8. 12, 16, 20, ____, ____, 32
9. 12, 15, 18, ____, ____, 27
10. 50, 55, 60, ____, 70, ____
11. 48, 46, 44, ____, 40, ____
12. 98, 96, 94, ____, ____, 88
13. **Talk About It** Which is faster, counting by 2s or 5s to 100? Why?

Which is faster, counting by 2s or 5s to 100? Why?

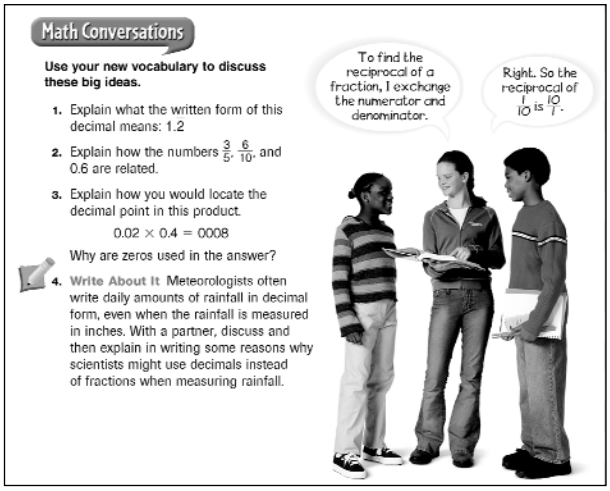
Student Book, grade 2, page 145


Talk About It • Write About It

You learned how to make a bar graph to organize data.

12. Does displaying data on a horizontal bar graph instead of a vertical bar graph change the meaning of the data? Explain why or why not.
13. Conduct a survey of the students in your class. What are their favorite Summer Olympic events? Make a bar graph to show the results of your survey.

Student Book, grade 3, page 166


Math Conversations

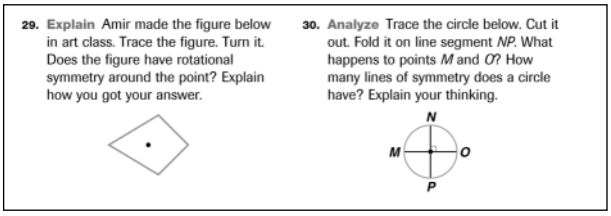
Use your new vocabulary to discuss these big ideas.

1. Explain what the written form of this decimal means: 1.2
2. Explain how the numbers $\frac{3}{5}$, $\frac{6}{10}$, and 0.6 are related.
3. Explain how you would locate the decimal point in this product.
   $0.02 \times 0.4 = 0008$
   Why are zeros used in the answer?
4. **Write About It** Meteorologists often write daily amounts of rainfall in decimal form, even when the rainfall is measured in inches. With a partner, discuss and then explain in writing some reasons why scientists might use decimals instead of fractions when measuring rainfall.

To find the reciprocal of a fraction, I exchange the numerator and denominator.

Right. So the reciprocal of $\frac{1}{10}$ is $\frac{10}{1}$.

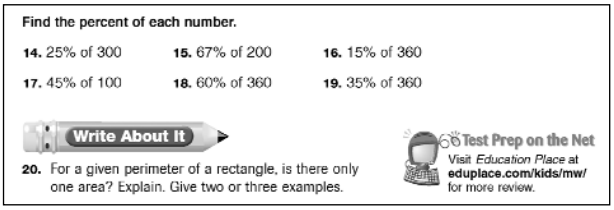
Student Book, grade 5, page 385


29. **Explain** Amir made the figure below in art class. Trace the figure. Turn it. Does the figure have rotational symmetry around the point? Explain how you got your answer.

30. **Analyze** Trace the circle below. Cut it out. Fold it on line segment *NP*. What happens to points *M* and *O*? How many lines of symmetry does a circle have? Explain your thinking.

N M O P

Student Book, grade 4, page 443


Find the percent of each number.

14. 25% of 300
15. 67% of 200
16. 15% of 360
17. 45% of 100
18. 60% of 360
19. 35% of 360

Write About It

20. For a given perimeter of a rectangle, is there only one area? Explain. Give two or three examples.

Test Prep on the Net
Visit *Education Place* at **eduplace.com/kids/mw/** for more review.

Student Book, grade 6, page 525