

Introduction

In this section, the lessons focus on identifying place values, rounding decimals through hundredths, and performing operations of decimals and writing and solving problems with decimals.

These lessons form an outline for your ARI classes, but you are expected to add other lessons as needed to address the concepts and provide practice of the skills introduced in the *ARI Curriculum Companion*.

Some of the lessons cross grade levels, as indicated by the SOL numbers shown below. This is one method to help students connect the content from grade to grade and to accelerate.

Standards of Learning

The following Standards of Learning are addressed in this section:

- 5.1 The student, given a decimal through thousandths, will round to the nearest whole number, tenth, or hundredth.
- 5.2 The student will
 - a) recognize and name fractions in their equivalent decimal form and vice versa; and
- 5.5 The student will
 - a) find the sum, difference, product, and quotient of two numbers expressed as decimals through thousandths (divisors with only one nonzero digit); and
 - b) create and solve single-step and multistep practical problems involving decimals.
- 6.2 The student will
 - a) investigate and describe fractions, decimals, and percents as ratios;
 - b) identify a given fraction, decimal, or percent from a representation;
- 6.7 The student will solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of decimals.
- 7.1 The student will
 - a) investigate and describe the concept of negative exponents for powers of ten;
 - e) identify and describe absolute value for rational numbers.
- 8.3 The student will
 - a) solve practical problems involving rational numbers, percents, ratios, and proportions; and

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* SOL 5.1

Lesson Summary

Students round decimals through hundredths. (45 minutes)

Materials

Set of nine index cards, each with a numeral 1–9

Warm-up

1. Have each student draw four short lines on a sheet of paper with a decimal point between the second and third line (____ ____ . ____ ____); these represent the places of a 4-digit number. Tell students what these lines represent and that they are going to play a game with the object of creating the largest possible 4-digit number, using four numerals drawn from a set of cards. As you draw each numeral, students must decide on which of the four lines to write it—that is, where to place it in the 4-digit number. Once placed, the numeral may not be moved.
2. Shuffle the cards, draw one, announce the numeral, and display it for the students to see. Have students write the numeral on one of the four lines. When you draw the second card, remind them that they may not move the first numeral to a different place. Continue this procedure for a total of four digits.
3. Ask students for the numbers they created, display these on the board, and discuss which is the largest and why. Be sure to discuss how to arrange the four numerals into the largest possible 4-digit number and to discuss place values and strategy. Award one point to every student who created the largest number.
4. Play as many rounds of the game as needed to review sufficiently place values with whole numbers. For variety, change the object of the game to creating the smallest number, and/or move the location of the decimal point.

Lesson

1. Have the students continue playing the game from the warm-up, but add a new twist—the winner is the person who creates the largest possible number *when it is rounded*. Play a practice round with a 4-digit whole number, using the lines ____ , ____ ____ ____ . After all four digits have been placed, have the students round their number to the nearest hundred. Then ask who thinks he/she has the largest number. As students offer both their original numbers and their rounded numbers, write the numbers on the board. After deciding on the largest rounded number, lead a discussion about the strategies used for rounding. Use this discussion to help the students who need a review of how to round.
2. Have each student draw four new lines with a decimal point between the second and third line (____ ____ . ____ ____).
3. Have student continue playing the game, rounding their numbers to the nearest tenth. Have a brief discussion after each play to reinforce rounding procedures. For variety, move the location of the decimal point so that students round to the nearest hundredth.

Reflection

Have students write a response to question, “How do you round 45.64 to the nearest tenth?”

* SOL 5.2a

Lesson Summary

Students will develop an understanding of how to compare two fractions and their equivalent decimal representations.

Materials

Transparency of “Tower”
 Pencil and paper
 Calculators
 A copy of the handout “Building Towers” for each student

Lesson

1. *Initiating Activity:* Demonstrate to students on the overhead how to play the “Building Towers” game. Model the activity by playing the game with one of the students.

2. Rules of the game:

- The first player picks two different whole numbers from 0 to 99, say 2 and 3. The first player then divides the smaller number by the larger number, using the calculator ($2 \div 3 = .667$). He/she then records the fraction and its decimal equivalent on the top story of the tower.

$$\frac{2}{3} \approx .667$$

- The second player then builds the next-to-the-top story of the tower. The second story decimal needs to be greater than the decimal in the top story, but less than one. For example the second player picks 5 and 6, which makes the fraction $\frac{5}{6}$. Calculating the decimal equivalent produces .833. These numbers are recorded in the second story.

$$\frac{2}{3} \approx .667$$

$$\frac{5}{6} \approx .833$$

- The players continue taking turns and adding stories until one player cannot find a decimal that fits between the decimal of the last story and 1.
3. Pass out the handouts and calculators to the students then have them play the game with a partner.
4. *Closing Activity:* After all students have had an opportunity to play the game a few times, ask those with the tallest towers to share the strategies they used to win. Encourage the students to share different strategies to find what seems to be an efficient way to win. Record these on a chart for future play-offs.

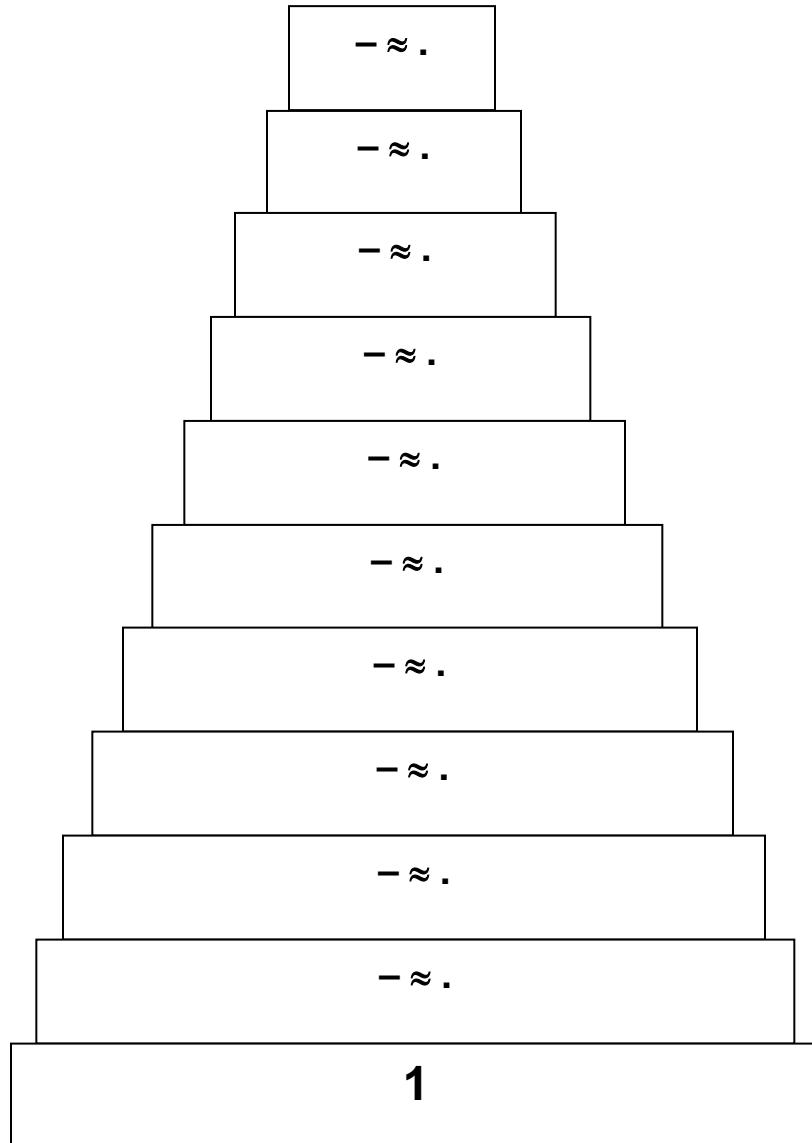
Reflection

During the activity, observe students as you walk around the room and check for understanding. At the end of the activity, students may record individual observations in their math journals. Students may record the rules of the game and take a copy of the handout to practice with a partner at home. The next day students may share the strategies the partner at home used.

Follow-up/Extensions

Extend the level of difficulty of the game by using a combination of double and single digits in creating the fractions. Have the students share if any new strategies are developed.

Building Towers



* SOL 5.5b, 6.7, 8.3a

Lesson Summary

Students solve problems involving decimals, verbalize their strategies, and write problems.

Materials

Overhead, Elmo™, or LCD projector (optional)

Background

In the “Exploring Whole Numbers” section of this *ARI Curriculum Companion*, there are several lessons that focus on solving problems by identifying strategies. Those lessons can and should be repeated here, substituting problems that include decimals, because they focus student attention on how to deal with a word problem.

See the streaming video clip on “Multi-Step Problem Solving,” located in the set of Instructional Videos for Teachers found on the DOE Web site at

<http://www.doe.virginia.gov/instruction/mathematics/resources/videos/index.shtml#>.

Warm-up

1. Display the following problem with a projector, or write it on the board:

Cody was paid \$15.00 for washing his mother’s car. He spent \$5.75 on a movie, \$1.50 on candy, and \$2.00 for a soda. Now he wants to buy a CD on sale for \$7.99. How much more money does he need?

2. Walk the class through the problem, step-by-step. Explain that this is a “multi-step problem,” which means you need to perform several operations in sequence to arrive at the answer. Have the students identify the steps, both in the solution and in the wording of the problem itself, that make this a multi-step problem.
3. If necessary, have students solve another similar multi-step problem involving decimals.

Lesson

1. Have students work in pairs to create a multi-step word problem involving decimals and to write the multi-step solution. Have each pair prepare to present their problem visually to the class, using either a projector or the board.
2. Have each pair present their problem visually to the class. Be sure they allow enough time for the class to solve the problem.
3. Have each pair explain the multi-step solution to the class.

Consider having one or two student presentations per class period over the next several classes, or devote one or two classes to this student-led method of solving multi-step word problems involving decimals.

Reflection

At the end of each class containing one or more of the above student presentations, hold a class discussion on problem-solving tips or strategies that were learned from the presentations.

* SOL 8.3a

Lesson Summary

Students practice solving practical problems involving fractions and converting fractions to decimals. (45 minutes)

Materials

Copies of the attached worksheets

Vocabulary

discount. A percent of the original price.

Warm-up

Distribute copies of the “Percents to Decimals Warm-up” worksheet. Review the procedure if needed, and then allow students time to complete the problems. Review the answers with the students.

Lesson

4. Distribute copies of the "A Problem Involving a Discount" worksheet. Discuss with students how best to approach a word problem such as this one. Review the list of steps to take, which was created by the class in the previous lesson.
5. Work through the steps in the problem with the students, emphasizing the importance of the steps that are being taken, not just the solution to this particular problem. Informally assess the students to find out whether they need additional help with this task.
6. Distribute copies of the "More Problems Involving Discounts" worksheet, and, based on your informal assessment, allow students to solve the problems in pairs or individually. Provide assistance as needed.

Reflection

Have students write 10 numbers as percents and their decimal equivalents.

Name: _____

Percents to Decimals Warm-up

Write these percents as decimals.

1. 20% _____

2. 35% _____

3. 97% _____

4. 50% _____

5. 75% _____

Name: **ANSWER KEY**

Percents to Decimals Warm-up

Write these percents as decimals.

1. 20% .20

2. 35% .35

3. 97% .97

4. 50% .50

5. 75% .75

Name: _____

A Problem Involving a Discount

A store is selling flat-screen TVs for one-third of the original price. How much money is the discount on a \$600 flat-screen TV?

1. Explain how you would find the sale price.

2. Explain how you would find the amount of the discount.

3. Show how you would solve this problem, and write the answer in the space provided.

The discount is \$ _____.

Name: ANSWER KEY

A Problem Involving a Discount

A store is selling flat-screen TVs for one-third of the original price. How much money is the discount on a \$600 flat-screen TV?

1. Explain how you would find the sale price.

Find 1/3 of \$600.

2. Explain how you would find the amount of the discount.

Subtract the cost of the TV from the original price or find 2/3 of \$600.

3. Show how you would solve this problem, and write the answer in the space provided.

$$\frac{1}{3} \times 600 = \frac{600}{3} = 200$$

$$\underline{600 - 200 = 400}$$

The discount is \$400.

Another way:

1. TV sells for 1/3.
2. The discount is 2/3 ($3/3 - 1/3 = 2/3$)
3. $2/3 \times 600 = \$400.$

Name: _____

More Problems Involving Discounts

Show the steps for solving each of the following problems, and write the answer in the space provided.

1. During a sale, a skateboard is reduced by 50%. If the original price was \$70, what is the discounted price?

The discount price is \$ _____

2. Ford Trucks is having a GIANT sale! All trucks are 20% off. The original price of a truck is \$14,000. What is the discount?

The discount is \$ _____

3. Aunt Karin always gives Jessica \$10 for her birthday. Next year, she plans to give Jessica 20% more than she usually gives. How much will Jessica get for her birthday next year?

Jessica will get \$ _____ for her birthday next year.

4. A pair of shoes costs \$109 at Sneaker Outlet. At the Labor Day sale, they are 20% off. What is the sale price of the shoes?

The sale price of the shoes is \$ _____

Name: ANSWER KEY

More Problems Involving Discounts

Show the steps for solving each of the following problems, and write the answer in the space provided.

1. During a sale, a skateboard is reduced by 50%. If the original price was \$70, what is the discounted price?

$$\underline{.50 \times 70 = 35}$$

$$\underline{70 - 35 = 35}$$

The discount price is \$35.00.

2. Ford Trucks is having a GIANT sale! All trucks are 20% off. The original price of a truck is \$14,000. What is the discount?

$$\underline{14,000 \times .20 = 2,800}$$

The discount is \$2,800.

3. Aunt Karin always gives Jessica \$10 for her birthday. Next year, she plans to give Jessica 20% more than she usually gives. How much will Jessica get for her birthday next year?

$$\underline{.20 \times 10 = 2}$$

$$\underline{10 + 2 = 12}$$

Jessica will get \$12 for her birthday next year.

4. A pair of shoes costs \$109 at Footlocker. At the Labor Day sale, they are 20% off. What is the sale price of the shoes?

$$\underline{.20 \times 109 = 21.80}$$

$$\underline{109 - 21.80 = 78.20}$$

The sale price of the shoes is \$78.20.