# Overview

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Lesson Plan #1 Title: Ace it! Lesson Seven

Attached Supporting Documents for Plan #1:

Teacher's Manual and reproductions of student worksheets to support the following lesson objective:

- Multiply a decimal by a decimal with factors to the thousandths.

Lesson Plan #2 Title: Ace it! Lesson Twenty

Attached Supporting Documents for Plan #2:

Teacher's Manual and reproductions of student worksheets to support the following lesson objective:

- Write a ratio (fraction) as a percent and a percent as a ratio (fraction) with a denominator of 100.

Lesson Plan #3 Title: Ace it! Lesson Twenty-four

Attached Supporting Documents for Plan #3:

Teacher's Manual and reproductions of student worksheets to support the following lesson objective:

- Evaluate numerical expressions, using the order of operations.

**LESSON OBJECTIVE:**
Multiply a decimal by a decimal with factors to the thousandths.

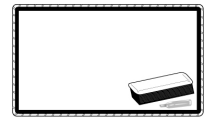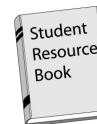| Introduction | Direct Skill Instruction and Guided Practice | Summary/Closure | Fact Practice |
|---|---|---|---|
| 5 mins. | 25 mins. | 10 mins. | 7 mins. |

**Lesson:**

- ❑ Student Resource Books: Student Resource Sheets (Lesson 7)
- ❑ Dry-erase boards and dry-erase markers

**Fact Practice:**
(Select one of these sets of materials for the Math Facts Games.)

- ❑ Individual Student Flashcards
- ❑ Buzz
- ❑ Math War or Salute!
    - • Playing cards
- ❑ Soccer Ball Facts
    - • Soccer ball
- ❑ Math Scramble
    - • Index cards, each with a number 0–9; cards with the operations
- ❑ BINGO
    - • Flashcards
    - • BINGO boards, and tokens or colored squares
- ❑ Around the World
    - • Triangle or regular flashcards

**Vocabulary Definitions:**
This lesson assumes that students know the following vocabulary words:

- • factor
- • product
- • whole number place values: tens, hundreds, thousands

**tenths** – The largest decimal place value; the first place to the right of the decimal point. 1 whole = 10 tenths. Example: In the number 1,234.567, the 5 is in the tenths place.

**hundredths** – The second largest decimal place value; the second place to the right of the decimal point. 1 whole = 100 hundredths. Example: In the number 1,234.567, the 6 is in the hundredths place.

**thousandths** – The third largest decimal place value; the third place to the right of the decimal point. 1 whole = 1,000 thousandths. Example: In the number 1,234.567, the 7 is in the thousandths place.

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**Welcome:**

3 mins.

Greet students by name and take attendance.

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**Introduction:**

5 mins.

### A. Access Prior Knowledge
NOTE: Write 5,347 on your board.

*When I point to a digit in the number on my board, everyone tell me the place value of the digit.*

- NOTE: Point to the digit 4. (4 tens.)

- NOTE: Point to the digit 7. (7 ones.)

- NOTE: Point to the digit 5. (5 thousands.)

- NOTE: Point to the digit 3. (3 hundreds.)

- *Everyone, when I say "equals" tell me the product.* NOTE: In quick succession ask a lot of multiplication fact questions to warm the class up for multiplying. For example: 6 x 3 equals, 5 x 7 equals, 9 x 4 equals, and 4 x 8 equals.

### B. Explain Connection to New Skill
*You already know how to multiply whole numbers and fractions. When you multiply decimals, you have to understand the place values on both sides of the decimal point.*

### C. State Lesson Objective
*In today's lesson, you will multiply a decimal by a decimal with factors to the* **thousandths**.

**F 7**

**Direct Skill Instruction and Guided Practice:**

25 mins. *In your Student Resource Book, below the Lesson Objective, you will see a Vocabulary Box that lists three vocabulary words and their definitions. Let's look at these words together.*

- *Raise a hand to read the definition of* **tenths.** (The largest decimal place value; the first place to the right of the decimal point.)

- *Raise a hand to read the definition of* **hundredths.** (The second largest decimal place value; the second place value to the right of the decimal point.)

- *Raise a hand to read the definition of* **thousandths.** (The third largest decimal place value; the third place value to the right of the decimal point.)

NOTE: Write 0.729 on your board.

*On the count of three, tell me the following:*

- *The digit whose place value is* **tenths.** *One, two, three.* (7)

- *The digit whose place value is* **hundredths.** *One, two, three.* (2)

- *The digit whose place value is* **thousandths.** *One, two, three.* (9)

NOTE: Write the numbers 4.351, 4.153, and 4.325 on your board.

- *Copy the numbers from my board onto your dry-erase board in order from least to greatest.* (4.153, 4.325, 4.351)

- *Raise a hand to tell us at what place value we look at first when comparing numbers.* (The place value farthest to the left of the decimal point.)

*Correct! In our list of numbers, all three numbers go only to the ones place.*

- *Raise a hand and tell us what you notice about the digits in the ones place in our three numbers.* (They are all the same, 4.)

- *Raise a hand to tell us what to do when the digits we compare to the left of the decimal are equal.* (Compare the digits in the first place to the right of the decimal.)

- *On the count of two, everyone tell me what place value is to the right of the ones place. One, two, three.* (Tenths.)

*That's right! Ten with a "t-h" at the end. Look at our three numbers.*

- *When I snap my fingers, everyone tell me the digit that has the lowest value in the* **tenths** *place.* NOTE: Wait a few moments, then snap. (1)

*So we know that 4.153 is our least number because the other two numbers have digits in the* **tenths** *place that are greater than 1.*

- *On the count of three, everyone say the name of the place value that is to the right of the* **tenths** *place. 1, 2, 3.* (Hundredths.)

- *Look at our two remaining numbers, and hold up the correct number of fingers to show the smallest digit in the* **hundredths** *place.* (Students should hold up two fingers.)

- *Nod yes or no. Is 4.325 less than 4.351?* (Students should nod yes.)

- *Raise a hand to explain how you know.* (Because 2 is less than 5.)

*That leaves 4.351 as our greatest number.*

- *Let's read together the order of our numbers from least to greatest.* (Four and one hundred fifty-three thousandths, four and three hundred twenty-five thousandths, four and three hundred fifty-one thousandths.)

*Now we are going to solve some multiplication problems using decimals. You already know how to multiply numbers with many digits. We multiply decimals the same way. We just have to remember to put the decimal point in the correct place in the product.*

NOTE: Write this problem on the board: 2.15 x 6.04.

- *Raise a hand if you would like to come to my board to solve this problem. You may choose a partner who will write each step on the board as you say it. We'll put in the decimal point together when you are finished multiplying, so skip that final step for now.*

**F 7**

NOTE: Give assistance as needed to be sure the students are verbalizing and writing each step so the other students can understand the process. (First, multiply 2.15 by 4. Next, put in a placeholder and multiply 2.15 times 0. Third, put in two place holders and multiply 2.15 by 6; 129860.)

*Excellent job! Here are your tokens!*

*Now we have to put the decimal point in our answer. Look at our factors, 2.15 and 6.04. In these factors, there are a total of four digits to the right of the decimal point. That means we move the decimal point four places to the left of the last digit in our product.* NOTE: Write 129860 on your board and demonstrate the counting, placing the decimal point after the digit 2; 12.9860.

*A zero at the end of a number with a decimal can be dropped without changing the value of the number. So we can rewrite our answer as 12.986.*

NOTE: Write 0.8, 0.80, and 0.800 on your board.

- *Everyone point to the largest number.* (This is a trick question since they are all equal.)

- *Raise a hand to explain which of the three numbers is the greatest.* (They are all equal. All of these numbers have the same value, 8 tenths.)

- *On your dry-erase board, write 0.7 times 0.8.* NOTE: This is a good opportunity to point out to students that the correct way to write decimals less than 1 is to place a 0 to the left of the decimal point. (0.7 x 0.8)

- *Raise a hand to tell us the general rule for placing a decimal in a product.* (Count the number of digits to the right of the decimal in both factors. Put the decimal point that many places to the left of the last digit in the product.)

- *On your dry-erase board, solve the problem. Hold up your dry-erase board when you are finished.* (0.56)

NOTE: Write 0.006 x 1.3 on your board.

- *Copy this problem and work with a partner to solve it on your dry-erase board.* (0.0078)

*It's time to put your skills to work. Please turn to the Guided Practice section of Lesson Seven and complete the problems. We'll review the answers when everyone has finished.*

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**Summary/Closure:**

🕙 10 mins.

**A. Define Vocabulary Words**
*In your Student Resource Book, Lesson Seven, in the Summary/Closure section, there are some exercises dealing with today's vocabulary words. Take a few minutes to carefully complete these exercises.*

**B. Summarize What We Learned Today**
*Let's summarize the skills that we have been working on today. In your Student Resource Book, in the Summary/Closure section, write the rule for placement of the decimal point in the product of a multiplication problem. Next, write a sample problem multiplying a decimal by a decimal. Then, write complete sentences explaining how you placed the decimal point in your product.*

**C. Apply Skill**

*When I snap my fingers, tell me which of the following is greater:*

- *1 tenth or 10 ones?* <u>NOTE:</u> Wait a moment, then snap. (10 ones.)

- *1 hundred or 1 thousandth?* <u>NOTE:</u> Wait a moment, then snap. (1 hundred.)

- *1 hundredth or 1 thousandth?* <u>NOTE:</u> Wait a moment, then snap. (1 hundredth.)

<u>NOTE:</u> Write 7.05 x 36.1 on your board.

- *Everyone, whisper the number of places I should move the decimal in the product of these two numbers.* (Three.)
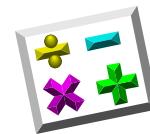
**F 7**

**Fact Practice:**

7 mins.     Operation:     Multiplication

Fact Activity: _____

**Count/Record Tokens:**

5 mins.     Count and record tokens in the Student Resource Book.

**Lesson Objective:** Multiply a decimal by a decimal with factors to the thousandths.

# Vocabulary Box

**tenths** – The largest decimal place value; the first place to the right of the decimal point. 1 whole = 10 tenths. Example: In the number 1,234.567, the 5 is in the tenths place.

**hundredths** – The second largest decimal place value; the second place to the right of the decimal point. 1 whole = 100 hundredths. Example: In the number 1,234.567, the 6 is in the hundredths place.

**thousandths** – The third largest decimal place value; the third place to the right of the decimal point. 1 whole = 1,000 thousandths. Example: In the number 1,234.567, the 7 is in the thousandths place.

# Guided Practice

Directions: Complete the following practice problems. Your teacher will review the answers. Make sure that you show all your work.

**I.**  Order the decimals from least to greatest. You may work with a partner.

   1. 0.016,   0.008,   0.0103               *(0.008, 0.0103, 0.016)*

   2. 0.82,   0.81,   0.082,   1.82          *(0.082, 0.81, 0.82, 1.82)*

   3. 5.144,   5.14,   5.114,   5.1149       *(5.114, 5.1149, 5.14, 5.144)*

**F 7**

**II.**  Work with a partner to find each product. Double-check your decimal placement in the answer.

   1. 0.18 x 0.4                *(0.072)*

   2. 0.01 x 1.3                *(0.013)*

   3. 12.45 x 0.6               *(7.47)*

**III.** Work independently to find each product. Double-check your decimal placement in the answer.

    1. 8.02 x 21.5       *(172.43)*

    2. 4.07 x 36.3       *(147.741)*

    3. 21.4 x 0.3       *(6.42)*

## Summary/Closure

### A. Vocabulary Words

<u>Directions</u>: Fill in the boxes with the correct place value terms to the right of the decimal point.

| Thousands | Hundreds | Tens | Ones | Decimal Point | *(Tenths)* | *(Hundredths)* | *(Thousandths)* |
|-----------|----------|------|------|---------------|------------|----------------|-----------------|
|           |          |      |      | ■             |            |                |                 |

### B. Summarize What We Learned Today

1. Write the rule for placement of the decimal point in a product of a multiplication problem.

   *(Possible response: The number of decimal places in the product is equal to the sum of the number of decimal places in the factors.)*

2. Write a sample problem multiplying a decimal by a decimal. Then write complete sentences explaining how you placed the decimal point in your product. *(Answers will vary.)*

**Lesson Objective:** Multiply a decimal by a decimal with factors to the thousandths.

## Vocabulary Box

**tenths** – The largest decimal place value; the first place to the right of the decimal point. 1 whole = 10 tenths. Example: In the number 1,234.567, the 5 is in the tenths place.

**hundredths** – The second largest decimal place value; the second place to the right of the decimal point. 1 whole = 100 hundredths. Example: In the number 1,234.567, the 6 is in the hundredths place.

**thousandths** – The third largest decimal place value; the third place to the right of the decimal point. 1 whole = 1,000 thousandths. Example: In the number 1,234.567, the 7 is in the thousandths place.

## Guided Practice

Directions: Complete the following practice problems. Your teacher will review the answers. Make sure that you show all your work.

**I.** Order the decimals from least to greatest. You may work with a partner.

1. 0.016,   0.008,   0.0103

2. 0.82,   0.81,   0.082,   1.82

3. 5.144,   5.14,   5.114,   5.1149

**II.** Work with a partner to find each product. Double-check your decimal placement in the answer.

1. 0.18 x 0.4

2. 0.01 x 1.3

3. 12.45 x 0.6

**III.** Work independently to find each product. Double-check your decimal placement in the answer.

1. 8.02 x 21.5

2. 4.07 x 36.3

3. 21.4 x 0.3

## Summary/Closure

### A. Vocabulary Words

Directions: Fill in the boxes with the correct place value terms to the right of the decimal point.

| Thousands | Hundreds | Tens | Ones | Decimal Point | | | |
|-----------|----------|------|------|---------------|--|--|--|
| | | | | ∎ | | | |

### B. Summarize What We Learned Today

1. Write the rule for placement of the decimal point in a product of a multiplication problem.

2. Write a sample problem multiplying a decimal by a decimal. Then write complete sentences explaining how you placed the decimal point in your product.

## lesson twenty

**LESSON OBJECTIVE:**
Write a ratio (fraction) as a percent and a percent as a ratio (fraction) with a denominator of 100.

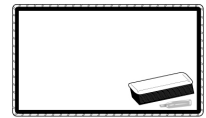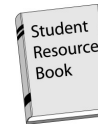| Introduction | Direct Skill Instruction and Guided Practice | Summary/Closure | Fact Practice |
|:---:|:---:|:---:|:---:|
| 5 mins. | 25 mins. | 10 mins. | 7 mins. |

**Lesson:**
- ❑ Student Resource Books: Student Resource Sheets (Lesson 20)
- ❑ Dry-erase boards and dry-erase markers

**Fact Practice:**
(Select one of these sets of materials for the Math Facts Games.)

- ❑ Individual Student Flashcards
- ❑ Buzz
- ❑ Math War or Salute!
    - • Playing cards
- ❑ Soccer Ball Facts
    - • Soccer ball
- ❑ Math Scramble
    - • Index cards, each with a number 0–9; cards with the operations
- ❑ BINGO
    - • Flashcards
    - • BINGO boards, and tokens or colored squares
- ❑ Around the World
    - • Triangle or regular flashcards

**Vocabulary Definitions:**
This lesson assumes that students know the following vocabulary words:

- • equivalent fractions
- • lowest terms or simplest form
- • decimal

**ratio** – A pair of numbers that compares different types of units. A ratio is often expressed as a fraction.  Examples: $\frac{7}{10}$ , or 7 out of 10, of the class are girls. The ratio of brown to black pairs of shoes is 1:3, or 1 to 3.

**percent** – A fraction or ratio in which the denominator is assumed to be 100. The symbol % is used for percent. Example: His test score was 90% because he answered 90 out of 100 questions correctly.

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**Welcome:**

⏱ 3 mins.

Greet students by name and take attendance.

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**Introduction:**

⏱ 5 mins.

### A. Access Prior Knowledge
*Everyone, work on your dry-erase board.*

- *Write the decimal 0.25 as a fraction with 100 as the denominator.*
  $(\dfrac{25}{100})$

- *Write the decimal 0.50 as a fraction with 100 as the denominator.*
  $(\dfrac{50}{100})$

- *Write the decimal 0.75 as a fraction with 100 as the denominator.*
  $(\dfrac{75}{100})$

### B. Explain Connection to New Skill
*You already know how to write a decimal as a fraction using 100 as the denominator. You also know how to write fractions in lowest terms.*

- *On your dry-erase board, write* $\dfrac{25}{100}$ *in simplest form.* $(\dfrac{1}{4})$

### C. State Lesson Objective
*During today's lesson, you will learn how to write a* **ratio** *(fraction) as a* **percent** *and a* **percent** *as a* **ratio** *(fraction) with a denominator of 100.*

**F 20**

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**Direct Skill Instruction and Guided Practice:**

25 mins.   *In your Student Resource Book, below the Lesson Objective, you will see a Vocabulary Box that lists two vocabulary words and their definitions. Let's look at these words together.*

- *Raise a hand to tell us the definition of* **ratio.** (A pair of numbers that compares different types of units.)

**Ratios** *are often expressed as fractions.* <u>NOTE:</u> Write $\frac{7}{10}$ on your board and explain that we read it as 7 out of 10 when discussing ratios. You may want to point out that this ratio also can be written as 7:10, but for today's lesson, all ratios will be expressed as fractions.

- *Raise a hand to tell us the definition of* **percent.** (A fraction or ratio in which the denominator is assumed to be 100.)

*We are going to use decimal paper, in your Student Resource Book, to help us see fractions as* **ratios** *and* **percents.**

- *On your decimal paper, in the first box with 10 lines, lightly shade 4 rows with a pencil.* (Four rows correctly shaded.)

- *Raise a hand to tell us what fraction of this box is shaded. Use 10 as the denominator, since we are working with 10 rows.* ($\frac{4}{10}$)

<u>NOTE:</u> Write $\frac{4}{10}$ on your board. *You just shaded 4 out of 10 rows. So the* **ratio** *of shaded rows to total rows is 4 to 10.*

- *Raise a hand and tell us what fraction of rows is not shaded.* ($\frac{6}{10}$)

<u>NOTE:</u> Write $\frac{6}{10}$ on your board. *Six out of 10 rows are not shaded, so the* **ratio** *of the rows that are not shaded to total rows is 6 to10.*

- *On the count of three, everyone tell me how many squares are in the second box on your decimal paper. One, two, three.* (100)

- *On your decimal paper, shade 4 rows in this second box.* (Four rows, or 40 squares, correctly shaded.)

- *When I snap my fingers, everyone tell me how many squares are shaded.* <u>NOTE:</u> Wait a few moments, then snap. (40)

- *On your dry-erase board, write the* **ratio** *of shaded squares to total squares. Express your* **ratio** *as a fraction.* ($\frac{40}{100}$) <u>NOTE:</u> Check students' dry-erase boards.

*When we have a* **ratio** *with 100 as the denominator, we can write the* **ratio** *as a* **percent.** *Look at your decimal paper. Compare the tenths box and the hundredths box.*

- *Nod yes if they are shaded equally.* (Students should nod yes.)

- *Show "thumbs up" if you think* $\frac{4}{10}$ *and* $\frac{40}{100}$ *are equivalent fractions or* **ratios.** (Students should put their thumbs up.)

*Correct! Our* **ratios,** $\frac{4}{10}$ *and* $\frac{40}{100}$, *are equivalent. Let's write these* **ratios** *as* **percents.** *Remember, a* **percent** *is a fraction or* **ratio** *in which the denominator is assumed to be 100. One of our equivalent* **ratios** *already has 100 as the denominator.* <u>NOTE:</u> Write $\frac{40}{100}$ on your board.

- *On the count of three, everyone tell me what* $\frac{40}{100}$ *is expressed as a* **percent.** *One, two, three.* (40%)

- *So what is* $\frac{4}{10}$ *expressed as a* **percent**? *Raise a hand to answer.* (40%)

<u>NOTE:</u> On your board, write $\frac{40}{100} = 40\%$; $\frac{4}{10} = 40\%$

*You shaded 40% of both boxes on your decimal paper.*

*Let's look at the areas of the two boxes that are not shaded.*

- *Show a "thumbs up" if your two areas look equal.* (Thumbs should be up.)

**F 20**

- *Raise a hand if you would like to come to my board to write the equivalent* **ratios** *of the areas that are not shaded.* ($\frac{6}{10} = \frac{60}{100}$)

*Good job! Here's your token.*

- *Everyone whisper the answer. What is the* **percent** *value of these two equivalent fractions?* (60%)

<u>NOTE:</u> Write $\frac{4}{10}$ on your board. *Let's say we want to write this* **ratio** *as a* **percent**. *We know that* **percent** *is a fraction or* **ratio** *in which the denominator is assumed to be 100, so the first thing we need to do is write an equivalent* **ratio** *with 100 as the denominator.*

<u>NOTE:</u> Write $\frac{4}{5} = \frac{}{100}$ on your board.

- *Raise a hand to tell me what number times 5 equals 100.* (20)

- *Raise a hand to tell me what 4 times 20 equals.* (80)

- *On your dry-erase board, use this information to write a* **ratio** *equivalent to* $\frac{4}{5}$, *with 100 as the denominator.* ($\frac{80}{100}$)

<u>NOTE:</u> Finish the equivalent ratio on your board by writing 80 in the numerator position.

- *Everyone whisper the answer. What is* $\frac{80}{100}$ *expressed as a* **percent**? (80%)

- *On the count of three, tell me what* $\frac{4}{5}$ *is, as a* **percent**. *One, two, three.* (80%)

*Now you know how to write a* **ratio** *as a* **percent**. *Let's try writing a* **percent** *as a* **ratio** *with 100 as the denominator.*

- *Raise a hand to tell me what the expression 50% means.* (Possible response: It means 50 out of 100.) <u>NOTE:</u> If students struggle with this question, refer them to the definition of percent in the Vocabulary Box.

*Look at the second box on your decimal paper that is 40% shaded.*

- *Raise a hand to tell me how many total squares you would have to shade, in order to shade 50% of this box. Remember, there are 100 total squares.* (50)

*That's correct! You would have to shade 50 total squares out of 100 squares.*

- *On your dry-erase board, write the fraction or **ratio** for 50% using 100 as the denominator.* ($\frac{50}{100}$)

*Excellent! We can use this information to find another **ratio** that is equal to 50%.*

- *Write the fraction $\frac{50}{100}$ in simplest form.* ($\frac{1}{2}$)

NOTE: On your board, write $\frac{50}{100}$ = 50%; $\frac{50}{100}$ = $\frac{1}{2}$

*We know that $\frac{50}{100}$ equals 50%. We also know that $\frac{50}{100}$ equals $\frac{1}{2}$. So we know that $\frac{1}{2}$ equals 50%.* NOTE: Write $\frac{1}{2}$ = 50% on your board.

*Equivalent fractions or **ratios** will always have the same **percent** value.*

- *On your dry-erase board, write what the **ratio** would be if 90%, or 90 out of 100, of the squares in the hundredths box were shaded. Use 100 as the denominator.* ($\frac{90}{100}$)

- *Now write that **ratio** in simplest form.* ($\frac{9}{10}$)

- *Now write $\frac{9}{10}$ as a **percent**.* (90%)

NOTE: Write 20% on your board.

F 20

- *On your dry-erase board, write 20% expressed as a* **ratio** *with a denominator of 100.* $(\frac{20}{100})$

- *Now write the* **ratio** *20 to 100 in simplest form on your dry-erase board.* $(\frac{1}{5})$

- *On the count of three, everyone tell me what* $\frac{1}{5}$ *equals as a* **percent**. *One, two, three.* (20%)

*Great job today! In your Student Resource Book, Lesson Twenty, please complete the problems in the Guided Practice section. We'll review the answers when everyone is finished.*

**Summary/Closure:**

⏱ 10 mins. **A.  Define Vocabulary Words**

*In your Student Resource Book, Lesson Twenty, in the Summary/Closure section, there are some questions on today's vocabulary words. Take a few minutes to answer each question.*

**B.  Summarize What We Learned Today**

*Let's summarize the skill that we have been working on today. In your Student Resource Book, in the Summary/Closure section, write your own word problem with a* **ratio** *as an answer. Then, explain how to write that answer as a* **percent***. Next, write a word problem with a* **percent** *as the answer. Finally, explain how to write that answer as a* **ratio** *with 100 as the denominator.* <u>NOTE:</u> Encourage students to be creative with the word problems they write. Remind them to include the answer to each problem.

**C.  Apply Skill**
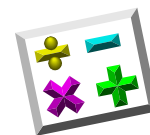*Work on your dry-erase board.*

- *Write 78 out of 100 as a* **percent***.* (78%)

- *Write 92% as a* **ratio** *with 100 as the denominator.* ($\frac{92}{100}$)

- *Write 18 out of 100 as a* **percent***.* (18%)

- *Write 81% as a* **ratio***.* ($\frac{81}{100}$)

- *Write* $\frac{1}{4}$ *as a* **percent***.* (25%)

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**Fact Practice:**

⏱ 7 mins.    Operation:    Multiplication and Division Mixed

Fact Activity: _____

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**Count/Record Tokens:**

⏱ 5 mins.    Count and record tokens in the Student Resource Book.

**F 20**

**Lesson Objective:** Write a ratio (fraction) as a percent and a percent as a ratio (fraction) with a denominator of 100.

## Vocabulary Box

**ratio** – A pair of numbers that compares different types of units. A ratio is often expressed as a fraction.  Examples: $\frac{7}{10}$ , or 7 out of 10, of the class are girls. The ratio of brown to black pairs of shoes is 1:3, or 1 to 3.

**percent** – A fraction or ratio in which the denominator is assumed to be 100. The symbol % is used for percent. Example: His test score was 90% because he answered 90 out of 100 questions correctly.

## Guided Practice

Directions: You will complete the following practice problems. Then your teacher will review the answers. Make sure that you show all your work.

**I.** Work with a partner to write each ratio as a percent.

1. $\dfrac{20}{100}$   *(20%)*

2. $\dfrac{75}{100}$   *(75%)*

3. $\dfrac{2}{5}$   *(40%)*

4. $\dfrac{7}{20}$   *(35%)*

# lesson twenty – teacher resource sheet

**II.** Work with a partner to write each percent as a ratio with 100 as the denominator. Then write your answer in simplest form.

1. 28%    $(\dfrac{28}{100} = \dfrac{7}{25})$

2. 40%    $(\dfrac{40}{100} = \dfrac{2}{5})$

3. 68%    $(\dfrac{68}{100} = \dfrac{17}{25})$

4. 35%    $(\dfrac{35}{100} = \dfrac{7}{20})$

**III.** Work independently to answer each question.

1. What is $\dfrac{8}{10}$ written as a percent? *(80%)*

2. What is $\dfrac{3}{5}$ written as a percent? *(60%)*

3. What is 42% written as a ratio with 100 as the denominator? $(\dfrac{42}{100})$

## Summary/Closure

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### A. Vocabulary Words

Directions: Fill in the blanks with a term from our lesson today.

1. A pair of numbers that compares different types of units, as in a fraction, is called a _____. *(ratio)*

2. A fraction or ratio in which the denominator is assumed to be 100 is a _____. *(percent)*

### B. Summarize What We Learned Today

Write your own word problem with a ratio as an answer. Then, explain how to write that answer as a percent. Next, write a word problem with a percent as the answer. Finally, explain how to write that answer as a ratio with 100 as the denominator.
*(Answers will vary.)*

**Lesson Objective:** Write a ratio (fraction) as a percent and a percent as a ratio (fraction) with a denominator of 100.

## Vocabulary Box

**ratio** – A pair of numbers that compares different types of units. A ratio is often expressed as a fraction.  Examples: $\frac{7}{10}$ , or 7 out of 10, of the class are girls. The ratio of brown to black pairs of shoes is 1:3, or 1 to 3.

**percent** – A fraction or ratio in which the denominator is assumed to be 100. The symbol % is used for percent. Example: His test score was 90% because he answered 90 out of 100 questions correctly.

## Guided Practice

Directions: You will complete the following practice problems. Then your teacher will review the answers. Make sure that you show all your work.

**I.** Work with a partner to write each ratio as a percent.

1. $\dfrac{20}{100}$

2. $\dfrac{75}{100}$

3. $\dfrac{2}{5}$

4. $\dfrac{7}{20}$

**II.** Work with a partner to write each percent as a ratio with 100 as the denominator. Then write your answer in simplest form.

    1. 28%

    2. 40%

    3. 68%

    4. 35%

**III.** Work independently to answer each question.

    1. What is $\dfrac{8}{10}$ written as a percent?

    2. What is $\dfrac{3}{5}$ written as a percent?

    3. What is 42% written as a ratio with 100 as the denominator?

## Summary/Closure

### A. Vocabulary Words

<u>Directions</u>: Fill in the blanks with a term from our lesson today.

1. A pair of numbers that compares different types of units, as in a fraction, is called a
   _____.

2. A fraction or ratio in which the denominator is assumed to be 100 is a
   _____.

### B. Summarize What We Learned Today

Write your own word problem with a ratio as an answer. Then, explain how to write that answer as a percent. Next, write a word problem with a percent as the answer. Finally, explain how to write that answer as a ratio with 100 as the denominator.

F 20

# lesson twenty-four

**LESSON OBJECTIVE:**
Evaluate numerical expressions, using the order of operations.

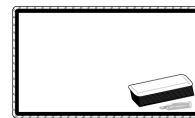| **Introduction** | **Direct Skill Instruction and Guided Practice** | **Summary/Closure** | **Fact Practice** |
|---|---|---|---|
| 5 mins. | 25 mins. | 10 mins. | 7 mins. |

**Lesson:**
- ❑ Student Resource Books: Student Resource Sheets (Lesson 24)
- ❑ Dry-erase boards and dry-erase markers

**Fact Practice:**
(Select one of these sets of materials for the Math Facts Games.)

- ❑ Individual Student Flashcards
- ❑ Buzz
- ❑ Math War or Salute!
    - • Playing cards
- ❑ Soccer Ball Facts
    - • Soccer ball
- ❑ Math Scramble
    - • Index cards, each with a number 0–9; cards with the operations
- ❑ BINGO
    - • Flashcards
    - • BINGO boards, and tokens or colored squares
- ❑ Around the World
    - • Triangle or regular flashcards

**Vocabulary Definitions:**
This lesson assumes that students know the following vocabulary words:

- • operations
- • multiplication/division
- • addition/subtraction

**exponent** – A number that indicates the operation of repeated multiplication. Example: In $4^3 = 4 \times 4 \times 4 = 64$, 3 is the exponent.

**base** – A number multiplied by itself the number of times shown by an exponent. Example: In $4^3 = 4 \times 4 \times 4 = 64$, 4 is the base.

**power** – A number produced by raising a base to an exponent. Example:
In $4^3 = 4 \times 4 \times 4 = 64$, 64 is the third power of 4.

**Welcome:**

3 mins.

Greet students by name and take attendance.

**Introduction:**

5 mins.

**A. Access Prior Knowledge**
*Let's quickly review some basic operations that you have done in the past.*

*On your dry-erase board, solve each problem.*

- *7 x 12*      (84)

- *23 – 15*      (8)

- *5 × 0.5*      (2.5)

- $\frac{3}{4} \times 8$      (6)

- *45 ÷ 3*      (15)

**B. Explain Connection to New Skill**
*You already know how to add, subtract, multiply, and divide whole numbers, fractions, and decimals. Sometimes math expressions have more than one of these operations.*

**C. State Lesson Objective**
*In today's lesson, you will evaluate numerical expressions, using the order of operations.*

# lesson twenty-four

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**Direct Skill Instruction and Guided Practice:**

25 mins. *Before we get into the order of operations, let's take a few minutes to learn some new vocabulary.*

*In your Student Resource Book, below the Lesson Objective for Lesson Twenty-Four, you will see a Vocabulary Box that lists three words.*

- *Raise a hand to tell us the meaning of* **exponent**. (A number that indicates the operation of repeated multiplication.)

- *Raise a hand to tell us the meaning of* **base**. (A number multiplied by itself the number of times shown by an exponent.)

- *Raise a hand to tell us what a* **power** *refers to.* (A number produced by raising a base to an exponent.)

*As you can see from the examples, the words are all related.* <u>NOTE:</u> Write $7^2$ on your board. *Let's evaluate the expression on my board.*

*Work on your dry-erase board.*

- *Copy the expression.* ($7^2$)

- *Circle the* **base**. (7 circled.)

- *Underline the* **exponent**. (2 underlined.)

*The* **exponent** *tells us to multiply 7 times 7.* <u>NOTE:</u> Write $7^2 = 7 \times 7$

- *On the count of three, everyone tell me the value of this numerical expression. One, two, three.* (49)

*Let's try another numerical expression with an* **exponent**. <u>NOTE:</u> Write $3^4$ on your board.

- *On the count of three, everyone tell me the* **base**. *One, two, three.* (3)

- *Everyone whisper the answer. What is the* **exponent**? (4)

- *Everyone whisper the answer. What number is written over and over?* (3)

- *Everyone show me on your fingers how many threes to multiply.* (4) <u>NOTE:</u> Write 3 x 3 x 3 x 3 on your board.

- *Find the fourth* **power** *of 3 on your dry-erase board.* (81)

- *Solve this problem on your dry-erase boards.* <u>NOTE:</u> Write: $102 - 2 \times 3^2$

- *Raise a hand to share your answer.* <u>NOTE:</u> Take multiple responses. If the students respond with both 84, the correct answer, and 900, found from working left to right, that will help in understanding the order of operations. Getting multiple answers for this problem prompts the reason why we have a set order of operations.

*When we evaluate expressions that have more than one operation, we have to follow a specific order. To remember the order, we use a special word.* <u>NOTE:</u> Write PEMDAS on your board. As you explain each letter, write the key information on your board for students to copy.

*Please turn to the Guided Practice section of your Student Resource Book for Lesson Twenty-Four. As I explain what PEMDAS means, take careful notes from my board.*

*The P stands for parentheses. That means we must do any operations that appear within grouping symbols first.*

*The E stands for* **exponents***. The next step is to apply all of the* **exponents** *in the problem.*

*The M stands for multiplication, and the D stands for division. You perform these operations at the same time, in order from left to right.*

*It is important to remember that M and D go together. Don't do all of the multiplication, then all of the division.*

*The last letters also go together. The A stands for addition and the S for subtraction. The last step is to perform these operations from left to right.*

*There are several ways of remembering the order of operations. Some people use the phrase, "Please excuse my dear Aunt Sally."* <u>NOTE:</u> Write this phrase on your board, underlining the first letter of each word.

*Not all problems will have all the operations, so just skip any step that does not apply. For example, if a problem does not have an* **exponent**, *just skip the step for E in PEMDAS.*

*Let's see how the order of operations works by trying a problem together.* <u>NOTE:</u> Write $(12 + 2) \times 3^3$ .

*The problem on my board contains three operations. We have to multiply, add, and find the third* **power** *of 3.*

- *Raise a hand to tell me which operation we should do first. Explain your answer.* (Perform addition because it is in parentheses.)

*That's correct! We rewrite the problem each time we perform a step.*

- *On your dry-erase board, complete the addition and rewrite the problem. Hold up your dry-erase board when you are finished.* $(14 \times 3^3)$ <u>NOTE:</u> You may need to explain that the parentheses are eliminated once the operation within them is completed.

- *Raise a hand to tell me the next step. Explain your answer.* (Find 3 to the third power, because E is next in PEMDAS.)

*Excellent! Remember, 3 to the third* **power** *means 3 times 3 times 3.*

- *On your dry-erase board, find the value of 3 to the third* **power** *and rewrite the problem.* $(14 \times 27)$

- *On the count of three, everyone tell me the last operation we need to perform. One, two, three.* (Multiplication.)

- *Complete the problem on your dry-erase board.* (378)

- *When I snap my fingers, everyone tell me the answer to this problem.* <u>NOTE:</u> Wait a moment, then snap. (378)

*Great job everyone! Let's try another problem together.* <u>NOTE:</u> Write $10 \div 2 \times 5 + 16$ on your board.

*Take a moment to look at the problem on my board. As you can see, we can skip the first two steps in PEMDAS. The problem does not contain parentheses or* **exponents**.

- *Raise a hand to tell me our first step.* (Divide 10 by 2.)

- *Copy the problem and complete that step on your dry-erase board.* (5 × 5 + 16)

- *Raise a hand to tell me our next step.* (Multiply 5 times 5.)

- *Raise a hand to tell me our final step.* (Add 16.)

- *Complete the problem on your dry-erase board. Hold up your dry-erase board when you are finished.* (41)

*Good work today! In your Student Resource Book, complete the problems in the Guided Practice section for Lesson Twenty-Four.*

**Summary/Closure:**

10 mins.

### A. Define Vocabulary Words
*In your Student Resource Book, Lesson Twenty-Four, in the Summary/Closure section, identify the* **base**, **exponent**, *and* **power** *in the given problem.*

### B. Summarize What We Learned Today
*Let's summarize the skills that we have been working on today. In your Student Resource Book, in the Summary/Closure section, explain the order of operations using PEMDAS. Restate the rules for order of operations in complete sentences. The explanation will be your reference sheet when you need to remember how to do these types of problems in the future.*

### C. Apply Skill

*On your dry-erase board, solve the problems written on my board.*
NOTE: Write the following problems on your board:

- $15 - 1 \times 8$      (7)

- $3 + (7 - 2^2)$      (6)

- $25 + 9 \div 3 - 1$      (27)

**Fact Practice:**

7 mins.    Operation:    Multiplication

Fact Activity: _____

**Count/Record Tokens:**

5 mins.    Count and record tokens in the Student Resource Book.

**Lesson Objective:** Evaluate numerical expressions, using the order of operations.

# Vocabulary Box

**exponent** – A number that indicates the operation of repeated multiplication.
Example: In $4^3 = 4 \times 4 \times 4 = 64$, 3 is the exponent.

**base** – A number multiplied by itself the number of times shown by an exponent.
Example: In $4^3 = 4 \times 4 \times 4 = 64$, 4 is the base.

**power** – A number produced by raising a base to an exponent. Example:
In $4^3 = 4 \times 4 \times 4 = 64$, 64 is the third power of 4.

# Guided Practice

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**PEMDAS**

P *(Complete all operations in parentheses first.)*

E *(Evaluate all exponents.)*

M/D *(Multiply and/or divide in order from left to right.)*

A/S *(Add and/or subtract in order from left to right.)*

---

Directions: Complete the following practice problems, using the order of operations, or PEMDAS. Your teacher will review the answers. Show all your work.

**I.** Work with a partner to solve each problem.

    1.   $4 + (2 \times 3)$          *(10)*

    2.   $8 + 12 \div 3$          *(12)*

    3.   $6 + 4^3$            *(70)*

4. $20 - \left(11 - 3^2\right) \times 5$     *(10)*

5. $40 - 5 \times 6$     *(10)*

**II.** Work independently to solve each problem.

1. $3^3 - 5 \div 5$     *(26)*

2. $7 \times (6 - 2)$     *(28)*

3. $5^3 - 5^2 \div 5$     *(120)*

 **Summary/Closure**

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## A. Vocabulary Words

<u>Directions</u>: Identify the parts of the given problem.

$$6^4 = 1,296$$

exponent: *(4)*

base: *(6)*

the fourth power of 6: *(1,296)*

## B. Summarize What We Learned Today

Write a fun sentence such as, "Please excuse my dear Aunt Sally", to help remember the device PEMDAS! Then underline the first letter of each word and write the operation that it represents. (Answers will vary.)

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**Lesson Objective:** Evaluate numerical expressions, using the order of operations.

## Vocabulary Box

**exponent** – A number that indicates the operation of repeated multiplication. Example: In $4^3 = 4 \times 4 \times 4 = 64$, 3 is the exponent.

**base** – A number multiplied by itself the number of times shown by an exponent. Example: In $4^3 = 4 \times 4 \times 4 = 64$, 4 is the base.

**power** – A number produced by raising a base to an exponent. Example: In $4^3 = 4 \times 4 \times 4 = 64$, 64 is the third power of 4.

## Guided Practice

**PEMDAS**

P_____

E _____

M/D _____

A/S _____

Directions: Complete the following practice problems, using the order of operations, or PEMDAS. Your teacher will review the answers. Show all your work.

**I.** Work with a partner to solve each problem.

    1.    $4 + (2 \times 3)$

    2.    $8 + 12 \div 3$

    3.    $6 + 4^3$

4. $20 - \left(11 - 3^2\right) \times 5$

5. $40 - 5 \times 6$

**II.** Work independently to solve each problem.

1. $3^3 - 5 \div 5$

2. $7 \times (6 - 2)$

3. $5^3 - 5^2 \div 5$

 **Summary/Closure**

**A. Vocabulary Words**

<u>Directions</u>: Identify the parts of the given problem.

$$6^4 = 1,296$$

exponent:

base:

the fourth power of 6:

**B. Summarize What We Learned Today**

Write a fun sentence such as, "Please excuse my dear Aunt Sally," to help remember the device PEMDAS! Then underline the first letter of each word and write the operation that it represents.