Oak Meadow

8

Prealgebra

Teacher Manual

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Lesson

3

Sections 1.6 and 1.7

ASSIGNMENT CHECKLIST

- ☐ Read section 1.6 and complete the selected problems.
- ☐ Read section 1.7 and complete the selected problems.
- ☐ Choose one of the following activities to complete:
  - Activity A: Mid-Chapter Review—Operations on Whole Numbers
  - Activity B: Visual Models—The Division Algorithm
  - Activity C: Error Analysis—Order of Operations

Learning Objectives

Use the table below to track how your skills are developing over time and to identify skills that need more work as you progress through this lesson.

Skills	Notes
Divide whole numbers using long division	
Find the average of a list of numbers	
Use exponential notation to represent repeated factors	
Evaluate expressions with exponents	
Apply the order of operations to simplify expressions	
Find the area of a square	

Lesson Introduction

In lesson 3, you will begin to learn about exponents and how they represent repeated multiplication. You will divide whole numbers using long division and begin statistical concepts as you learn how to calculate the average of a list of numbers. Most notably, you will learn the order of operations, a critical skill for simplifying expressions. Finally, you will learn the geometric concept of finding the area of a square. You will have the opportunity to explore these concepts through problem sets, visual models, or error analysis in this lesson's activities.

Exercise Sets

1. Read section 1.6, "Dividing Whole Numbers" (52), and then complete the following problems in Exercise Set 1.6.
    - 1–17 odd
    - 41–49 odd
    - 69–77 odd
    - 89–95 odd
2. Read section 1.7, "Exponents and Order of Operations" (68), and then complete the following problems in Exercise Set 1.7.
    - 1–7 odd
    - 13–31 odd
    - 41–57 odd
    - 77–89 odd

Activities

Choose one of the following activities to complete:

- Activity A: Mid-Chapter Review—Operations on Whole Numbers
- Activity B: Visual Models—The Division Algorithm
- Activity C: Error Analysis—Order of Operations

Note: Many of the activities in this course contain reflection questions. You may choose to answer these questions in writing, as an audio recording, or as a video recording. Regardless of the method, make sure you thoroughly explain your answers. Please consult with your teacher if you have questions about how to submit audio or video recordings.

Activities can be assessed according to the criteria in the rubric below.

Skill	Criteria	Notes
Problem-Solving and Precision	Work is clear, organized, and detailed. Appropriate symbols, labels, units, and terminology are used.	
Reasoning and Explaining	Symbols, words, and diagrams are interpreted with mathematical meaning. Prior knowledge is integrated into reasoning.	
Modeling and Using Tools	Models, tools, and strategies are used to simplify, explain, give structure, and/or communicate a problem-solving strategy and a solution.	
Seeing Structure and Generalizing	Structures and patterns are identified and extended to make generalizations and/or connections to prior learning.	

Activity A: Mid-Chapter Review—Operations on Whole Numbers

Complete the following problems in the mid-chapter review on page 66 in your textbook:

- 1–19 odd
- 27
- 33–45 odd

Show all your work. Self-check your answers, and make thorough corrections to any problems you missed.

Students should submit their completed work, showing all their steps and evidence that they have checked and corrected their answers.

Activity B: Visual Models—The Division Algorithm

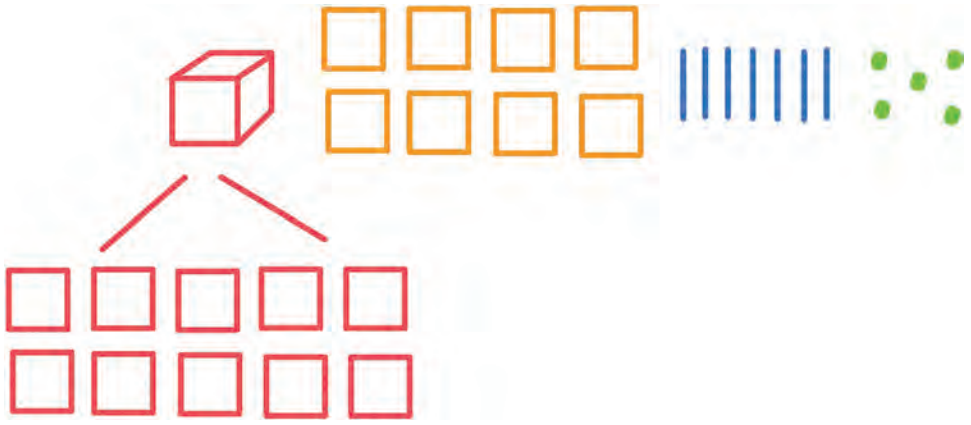
Let's explore a visual representation of the process of division.

We will complete the division problem 1,875 ÷ 8.

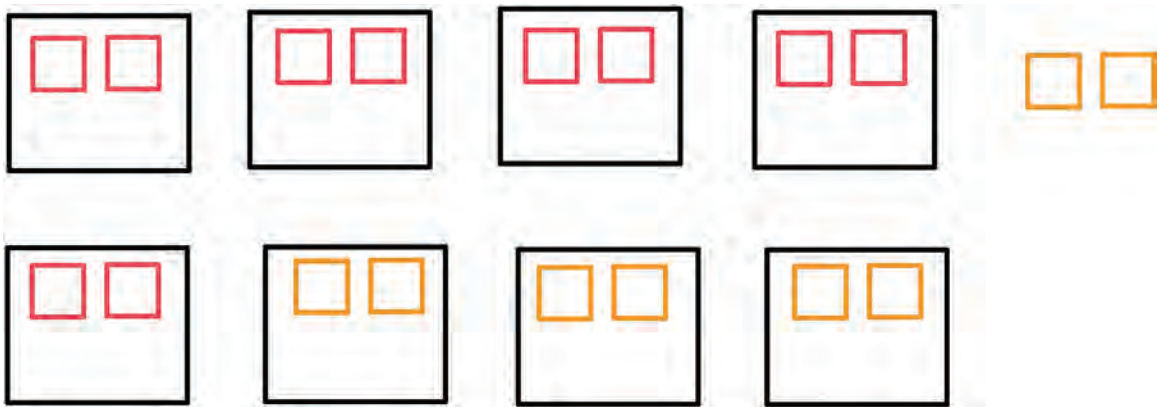
We can assign the following representations for each place value and rewrite 1,875 as follows, represented by 1 thousand, 8 hundreds, 7 tens, and 5 ones.

To divide 1,875 into 8 equal parts, we can create 8 equal groups out of the parts of 1,875.

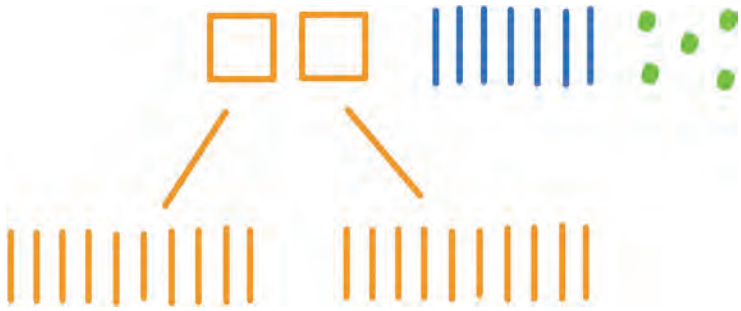
First, we look at the thousands and see if we have enough to fill 8 groups evenly. We do not, so we must unbundle the 1 thousand into 10 hundreds as shown by the ten red squares below.



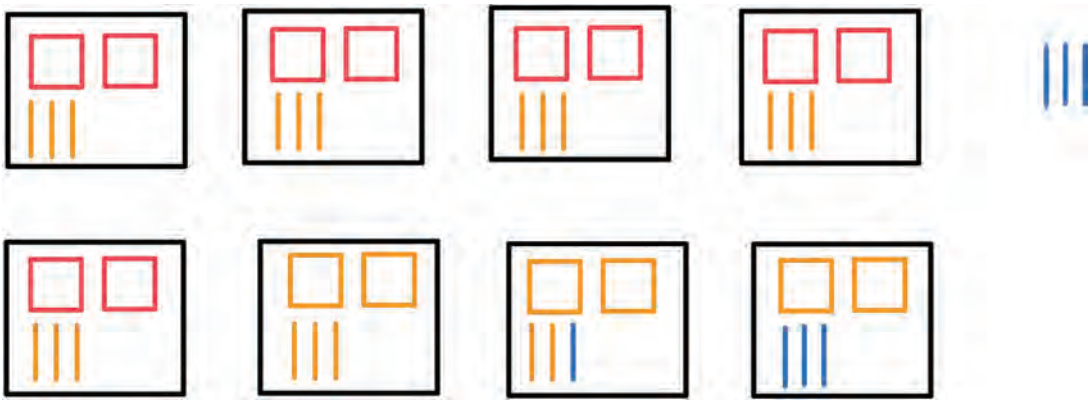
Then, we can begin filling the 8 groups with an even amount of hundreds, using the new hundreds (red) created by unbundling the 1 thousand and the existing 8 hundreds (orange). We see that we can fit 2 hundreds in each box, with 2 left over.



Since we cannot divide the remaining 2 hundreds evenly into 8 groups, we must unbundle them into 10 tens each as shown by the orange tens below.

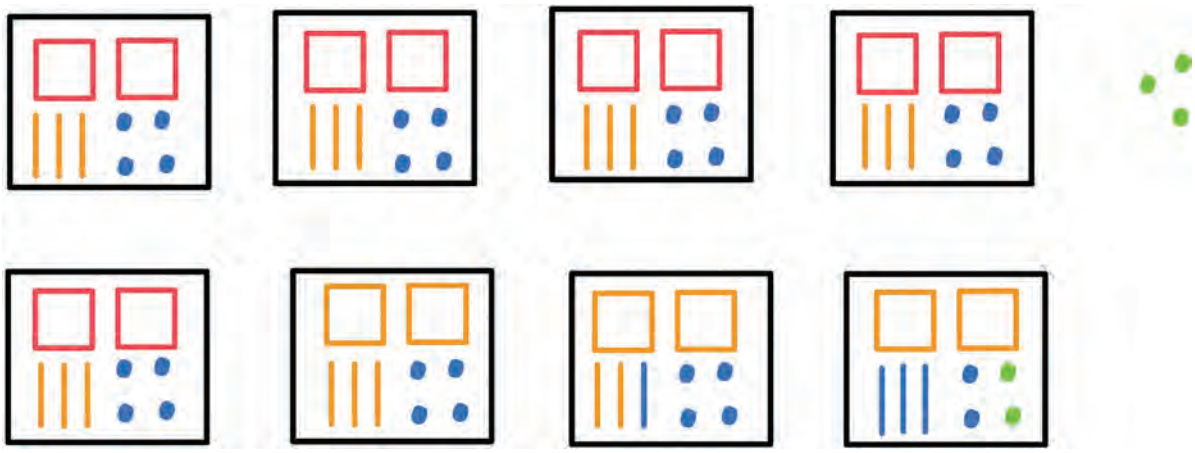


Now we combine our 20 unbundled tens with our existing 7 tens (this represents "bringing down the 7" in the division algorithm), giving us 27 tens that we can split evenly into our 8 groups. We see that we can fit 3 tens in each box, with 3 left.



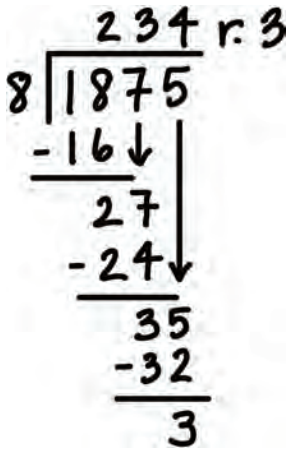
Since we cannot divide the remaining 3 tens evenly into 8 groups, we must unbundle them into 10 ones each as shown by the blue ones below.

Now we combine our 30 unbundled ones with our existing 5 ones (this represents "bringing down the 5" in the division algorithm), giving us 35 ones that we can split evenly into our 8 groups. We see that we can fit 4 ones in each box, with 3 left over.



We can see that each box gets 2 hundreds, 3 tens, and 4 ones, with 3 ones left over, which tells us that 1,875 ÷ 8 = 234 r.3.

We can check our work using the standard division algorithm.



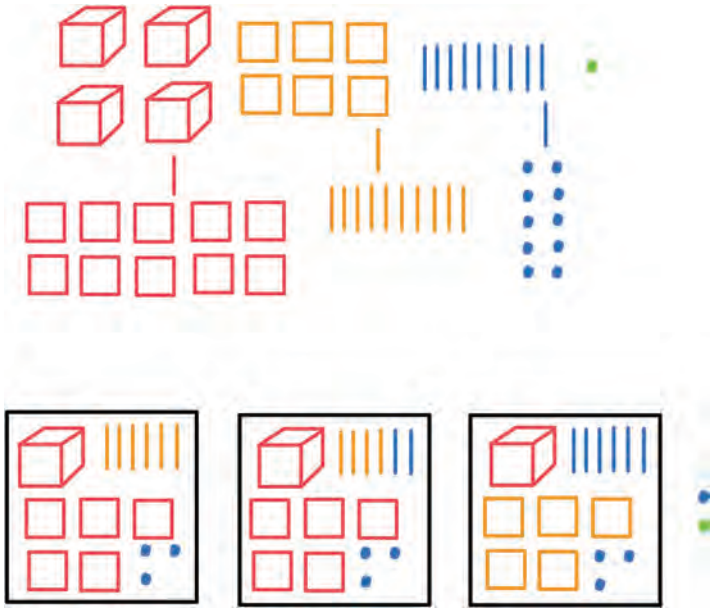
Now you try!

1. Draw a visual model to represent the following division problem. Show all your work.

   4,691 ÷ 3

   Answer: 1,563 r.2

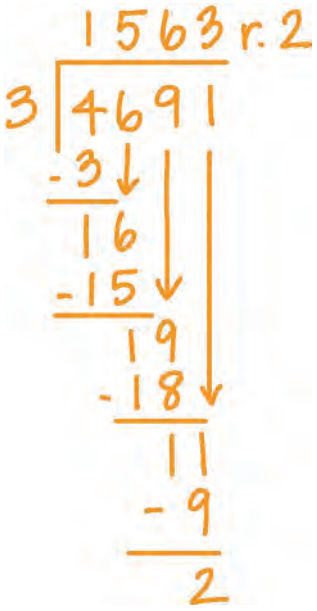
   Students should show all their work for the visual model and the standard algorithm. They can either complete the visual model step by step, as illustrated in the given example above, or in one image, as illustrated in the answer below.



Three boxes should include 1 thousand, 5 hundreds, 6 tens, and 3 ones, with a remainder of 2 ones.

2. Check your work by completing the problem using the standard division algorithm. Show all your work.

   Solution:



Activity C: Error Analysis—Order of Operations

Three students solved three different problems, and each student made a mistake. Examine their work in the chart below. In the second column, describe the error that they made in one or two complete sentences. In the third column, solve each problem correctly, showing all your work.

Solutions:

Student Work	Error	Correct Work
$\frac{6-2+12\div 3}{1^8}$ $\frac{6-2+12\div 3}{8}$ $\frac{6-2+4}{8}$ $\frac{4+4}{8}$ $\frac{8}{8}$ 1	The student incorrectly interpreted 1 to the 8th power to mean $1 \times 8 = 8$ instead of $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 = 1$.	$\frac{6-2+12\div 3}{1^8}$ $\frac{6-2+12\div 3}{1}$ $\frac{6-2+4}{1}$ $\frac{4+4}{1}$ $\frac{8}{1}$ 8
$(100\div 5\cdot 4\cdot 1\div 5)+3^2$ $(100\div 20\cdot 1\div 5)+3^2$ $(100\div 20\div 5)+3^2$ $(5\div 5)+3^2$ $1+3^2$ $1+9$ 10	In this problem, the student incorrectly followed the order of operations by doing all the multiplication before the division, instead of doing multiplication and division in order from left to right. They completed $5 \times 4 \times 1$ first instead of dividing 100 by 5.	$(100\div 5\cdot 4\cdot 1\div 5)+3^2$ $(20\cdot 4\cdot 1\div 5)+3^2$ $(80\cdot 1\div 5)+3^2$ $(80\div 5)+3^2$ $16+3^2$ $16+9$ 25

Student Work	Error	Correct Work
$80-\{5+3[2(10-8)]\}$ $80-\{5+3[2(2)]\}$ $80-\{5+3[4]\}$ $80-\{8[4]\}$ $80-32$ 48	**In this problem, the student incorrectly followed the order of operations by completing the addition before all the multiplication was finished inside the grouping symbols. They added the 5 and 3 together instead of multiplying the 3 and 4, which should have occurred first.**	$80-\{5+3[2(10-8)]\}$ $80-\{5+3[2(2)]\}$ $80-\{5+3[4]\}$ $80-\{5+12\}$ $80-17$ 63

SHARE YOUR WORK

When you have completed this portion of the lesson, please share the following work with your teacher.

- Exercise Sets 1.6 and 1.7 (showing handwritten computations and corrections)
- Choice of activity (labeled with the title of the activity):
  - Activity A: Mid-Chapter Review—Operations on Whole Numbers
  - Activity B: Visual Models—The Division Algorithm
  - Activity C: Error Analysis—Order of Operations

Make sure everything is labeled and you've included all your handwritten computations. If you have any questions about the work or how to share it, contact your teacher.

Lesson

4

Section 1.8 and Chapter Test

ASSIGNMENT CHECKLIST

- ☐ Read section 1.8 and complete the selected problems.
- ☐ Complete the chapter 1 test.
- ☐ Complete the assessment test (if provided).

Learning Objectives

Use the table below to track how your skills are developing over time and to identify skills that need more work as you progress through this lesson.

Skills	Notes
Evaluate algebraic expressions using given values	
Identify solutions to equations	
Translate phrases into algebraic expressions	

Lesson Introduction

In lesson 4, you will conclude your work with whole numbers in chapter 1. Your final skills will be evaluating algebraic expressions and identifying solutions to equations. These are both important foundational skills to have as we begin to develop algebraic concepts. You will wrap up the chapter with some culminating work that ties together all the skills you have mastered in lessons 1 through 4.

Exercise Sets

1. Read section 1.8, "Introduction to Variables, Algebraic Expressions, and Equations" (75), and then complete the following problems in Exercise Set 1.8.
    - 1 and 3
    - 7–19 odd
    - 25, 33, 37, 39, and 43
    - 45–51 odd
    - 63–77 odd
    - 81–87 odd
2. Optional: Complete the chapter review on page 89 for additional practice.

Chapter Test and Assessment Test

1. Complete the following problems in the chapter 1 test on page 96:
    - 1–34 all
2. For enrolled students: Complete the chapter 1 assessment test (if one has been provided).

SHARE YOUR WORK

When you have completed this portion of the lesson, please share the following work with your teacher.

- Exercise Set 1.8 (showing handwritten computations and corrections)
- Chapter 1 Test
- Chapter 1 Assessment Test (if one has been provided)

Make sure everything is labeled and you've included all your handwritten computations. If you have any questions about the work or how to share it, contact your teacher.