Family Guide to CPM CHAPTER 6

In this chapter, students will learn how to:

- Represent division of fractions using diagrams.
- Divide whole and mixed numbers by fractions.
- Use the Order of Operations to find the correct value of a numerical expression.
- Combine like terms and simplify algebraic expressions.

Chapter 6 Main Ideas

Section 6.1

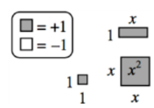
Students extend their knowledge about operations with portions to include division with fractions. Students focus on making sense of the operation of division, relying on diagrams and reasoning, before moving to an algorithm. They begin by distributing some number of whole units among some smaller number of people, generating expressions that include division of fractions. Students then focus on the connection between the operation of division and fractions.

Section 6.2

Students are provided distinctly different rules for finding the area of a trapezoid and are challenged to visualize how the trapezoid might have been decomposed and recomposed based on the rule. Students apply the Order of Operations when they are challenged to use the different rules to calculate the area of a trapezoid. They use the knowledge that a trapezoid with defined dimensions has a specific area in order to verify that they have correctly evaluated different expressions for the area. Then students use a concrete manipulative (called "algebra tiles") to build shapes that have an unknown dimension. Students learn that specific but unknown dimension will be represented with a variable. Students write expressions to represent the perimeter and area of these shapes. Because students will "see" the shapes and build their expressions differently, they will generate multiple expressions, creating the need to decide whether expressions are equivalent. This process motivates students to use and practice combining like terms in an expression. Students will also learn to substitute a given value for a variable and to evaluate an expression.

Key Words

algebra tiles- An algebra tile is a manipulative whose area represents a constant or variable quantity. The algebra tiles used in this course consist of large squares with dimensions x-by-x and y-by-y; rectangles with dimensions x-by-1, y-by-1, and x-by-y; and small squares with dimensions 1-by-1. These tiles are named by their areas: x^2, x, and 1, respectively. The smallest squares are called "unit tiles." In this text, shaded tiles will represent positive quantities while unshaded tiles will represent negative quantities.



coefficient- A number multiplying a variable or product of variables. For example, –7 is the coefficient of $-7xy^2$

constant term- A number that is not multiplied by a variable. In the expression $2x + 3(5 - 2x) + 8$, the number 8 is a constant term. The number 3 is not a constant term, because it is multiplied by a variable inside the parentheses.

rule- A rule is an equation or inequality that represents the relationship between two numerical quantities. We often use a rule to represent the relationship between quantities in a table, a pattern, a real-world situation, or a graph.

quotient- The result of a division problem

term- A term is a single number, variable, or the product of numbers and variables, such as –45, $1.2x$, and $3xy^2$.

Where These Topics Are Revisited

Operations with fractions will return in Chapter 7.

Students' understanding of dividing portions will prove useful as they work on percent applications in Chapter 9.

Student work with algebraic expressions and algebra tiles will continue in Chapter 7.

What's Coming Up in the Next Chapter

Students will look at Rates and Operations in Chapter 7.

How You Can Help at Home

Encourage your student by asking them to think about these questions:

"Is there another way to see it?"

"How can I represent it?"

"How can I rewrite it?"

"Are these representations equivalent?"

The CPM website: **http://homework.cpm.org** provides access to e-tools like algebra tiles.

<u>On the Chapter 6 assessment, students will be expected to show their understanding of the following:</u>
6.NS.2 Fluently divide multi-digit numbers using the standard algorithm
6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.
6.EE.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity
6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
6.EE.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

Sample Problems from the Chapter

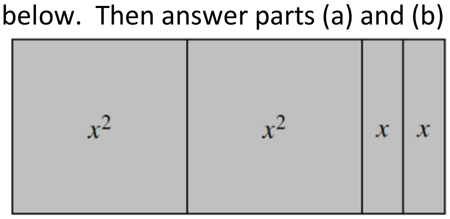
Troy knows that division and multiplication are inverse operations. In other words, multiplication undoes division and division undoes multiplication. You can use multiplication to check an answer to a division problem. Troy challenged Phillip to the matching game, "Divide & Conquer." He said to Phillip, *"I'll ask you a division problem. You solve it and turn it around with a multiplication sentence to prove your answer."*
When Troy said, "*3 pies divided in eighths results in 24 pieces."* Phillip responded, *"If I eat $\frac{1}{8}$ of a pie, 24 times, I've eaten 3 whole pies. $\frac{1}{8} \cdot 24 = 3$."*

State each problem below as a division problem. Then solve the problem and confirm your solution by writing and stating the appropriate multiplication sentence.

If each box holds 5 books, how many boxes or partial boxes would be filled by 14 books?

How much does each person get if $\frac{1}{2}$ pound of chocolate is shared equally between 3 people?

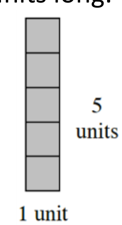
On your paper, sketch the shape made with algebra tiles below. Then answer parts (a) and (b) below.

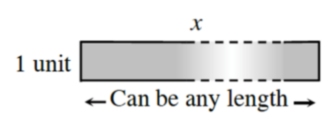


a. Find the area of the shape.
b. If the algebra tiles were rearranged into a different shape, how would the area change?

<u>Naming Algebra Tiles</u>

Algebra tiles help us represent unknown quantities in a concrete way. For example, in contrast to a 1 x 5 tile that has a length of 5 units, like the one shown at right, an *x*-tile has an unknown length. You can represent its length with a symbol or letter (like *x*) that represents a number, called a variable. Because its length is not fixed, the *x*-tile could be 6 units, 5 units, 0.37 units, or any other number of units long.





Algebra tiles can be used to build algebraic expressions. The three main algebra tiles are shown at right. The large square has a side of length x units. Its area is x^2 square units, so it is referred to as an x^2-tile.

The rectangle has length of x units and width of 1 unit. Its area is x square units, so it is called an *x*-tile.
The small square has a side of length 1 unit. Its area is 1 square unit, so it is called a one or unit tile.