



Exploring Multiplication and Division Through Problem Solving

Key Content from This Unit:

In this unit students will use multiplication and division to solve problems. This is supported by measurement and conversion of measurement from a larger unit to a smaller unit. Students find all the factors pairs and multiples of numbers in the range of 1–100 and determine whether it is prime or composite. Students distinguish the difference between multiplicative and additive comparisons (i.e., the difference between “two times more” and “two more”).

Factor Pairs for 35	
1	35
5	7

Students will learn how to determine if a number is prime or composite by looking for factor pairs in the number.

What came before this:

Students should come to fourth grade knowing from memory all one digit multiplication facts. They use multiplication and division within 100 to solve word problems. They solved problems using all four operations including measurement problems. They studied multiplication in terms of equal groups, arrays, and area.

What comes after this:

In future fourth-grade units, students will multiply multidigit numbers up to four digits by a one-digit whole and two two-digit whole numbers.

Vocabulary to Know

Associative Property:

$$3 \times (4 \times 8) = (3 \times 4) \times 8$$

Distributive Property:

$$6 \times (3 + 5) = (6 \times 3) + (6 \times 5)$$

Partial Product:

$$24 \times 6 = (20 \times 6) + (4 \times 6)$$

Factor: numbers that are multiplied to obtain a product

Multiple: Example- multiples of 6 are 12, 18, 24, 30, etc.

Product: the answer when multiplying factors

Quotient: the answer when one number is divided by another

Prime Number: positive integer only having factors of one and itself

Composite Number: positive integer having three or more factors

Common Core Focus:

- Find factor pairs and multiples in the range 1–100.
- Determine prime or composite numbers in the range 1–100.
- Interpret multiplication as a comparison.
- Solve word problems involving multiplicative comparison.
- Express measurements in a larger unit in terms of a smaller unit.
- Solve problems involving intervals of time and distance.
- Represent measurement quantities using diagrams and number lines.

4.OA.1, 4.OA.2, 4.OA.4, 4.MD.1, 4.MD.2

Spotlight on the Math Practices

Look for and Express Regularity in Repeated Reasoning

Mathematically proficient students can look for, develop, and generalize relationships and patterns and apply reasonable thoughts about patterns and properties to new situations.

In this unit, students *look for and express regularity in repeated reasoning* when they:

- Notice if calculations are repeated.
- Look for shortcuts, explaining their value and efficiency.
- Continually evaluate the reasonableness of intermediate results.

How Can You Help at Home?

- Continue to review multiplication and division facts with your student
- Help your student notice related math facts, e.g. $6 \times 8 = (6 \times 4) + (6 \times 4) = 48$ or when solving $35 \div 7 = ?$, think $7 \times ? = 35$
- Become familiar with the area model, a different method of multiplying than you may have learned
- Discuss mathematical patterns, such as 5×9 , 5×90 , 50×90 , 50×900 , etc.

KEY MATHEMATICAL MODELS of the COMMON CORE


Tape Diagram


The TAPE DIAGRAM is a powerful model that students can use to solve a variety of problems. In earlier grades, tape diagrams are models of addition and subtraction however in the upper grades tape diagrams are used to solve increasing more complex problems. Tape diagrams are also called “bar models” and consist of a simple bar drawing that students make to represent a word problem. They then use the drawing to discuss and solve the problem.

As students move through the grades, tape diagrams provide an essential bridge to algebra.

Below you will find several examples of tape diagrams that represent multiplicative comparison problems which if a focus of this unit.

A tape diagram used to solve a Compare problem
A big penguin will eat 3 times as much fish as a small penguin.
The big penguin will eat 420 grams of fish. All together, how much will the two penguins eat?

Big penguin: 

Small penguin: 

B = number of grams the big penguin eats
 S = number of grams the small penguin eats

$$3 \cdot S = B$$
$$3 \cdot S = 420$$
$$S = 140$$
$$S + B = 140 + 420$$
$$= 560$$

Some Resources to Help at Home

- www.multiplication.com has engaging games for students to practice their computation
- Play Multiply and Conquer from NCTM at <http://illuminations.nctm.org/Lesson.aspx?id=3210>
- Read about ‘Cluster Problems’ to help make more difficult multiplication equations easier to solve. <https://suite.io/mark-giffen/3r4p2em>
- Thinking Blocks at Math Playground provides great practice modeling and solving word problems using tape diagrams <http://www.mathplayground.com/thinkingblocks.html>
- Have your child make “Strategy Cards” for the facts they are struggling with by writing the fact on the front (like 8×6) and then write a meaningful strategy for solving it on the back (like think $8 \times 5 + 8 \times 1 = 40 + 8 = 48$). They not just see the correct answer but if they weren’t sure how to solve it, they are reminded of a strategy to use.