

# MULTIPLYING AND DIVIDING

2

Name: Key Date: \_\_\_\_\_ Period: \_\_\_\_\_

## SECTION 2.5 LONG DIVISION

### VOCABULARY

| DEFINITION  | EXAMPLE  |
|---|--|
| <b>Scaffolding:</b> a division method where partial quotients are computed, stacked, and combined | $42 \div 2 = 21$ $\begin{array}{r} 20 \\ 2 \overline{) 42} \\ \underline{-40} \\ 2 \\ \underline{-2} \\ 0 \end{array}$ |

**Big Idea:** How do we model long division using scaffolding?

### EXPLORATION 1: THE DIVISION ALGORITHM

We have seen how closely related multiplication and division are. For example, we know  $8 \div 4 = 2$  because  $4 \times 2 = 8$ . Also recall that in the long division form, the multiplication fact is rewritten as

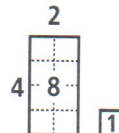
$$4 \overline{) 8} \quad \text{The area model looks like this:}$$



We have the **dividend** 8 "under" the **quotient** 2, and the **divisor** 4 is to the left of the dividend.

By changing the dividend to 9, our problem becomes  $9 \div 4$ . Because  $8 \div 4 = 2$ , we see that  $9 \div 4$  must be more than 2. In the long division form we have,

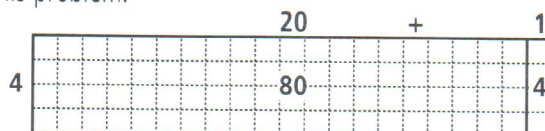
$$4 \overline{) 9} \quad \text{The area model looks like this:}$$



The quotient is 2, and the remainder is 1.

Now consider the problem,  $84 \div 4$ . We know that  $80 \div 4$  is 20 and  $4 \div 4$  is 1. Putting these together shows  $84 \div 4 = 21$ .

Here is the area model for this problem:



OR

$$\begin{array}{r} 1 \\ 20 \\ 4 \overline{) 84} \\ \underline{-80} \\ 4 \\ \underline{-4} \\ 0 \end{array}$$

This is called the **scaffolding** method because the different partial quotients are first computed and stacked, then combined, much like a scaffold is used in constructing a building.

### PROBLEMS:

- Use the scaffolding method to compute the following quotients. You may sketch a picture of the corresponding area model if it helps.

a.  $52 \div 4 = 13$

$$\begin{array}{r} 13 \\ 4 \overline{) 52} \\ \underline{-40} \\ 12 \\ \underline{-12} \\ 0 \end{array}$$

b.  $960 \div 6 = 160$

$$\begin{array}{r} 160 \\ 6 \overline{) 960} \\ \underline{-600} \\ 360 \\ \underline{-360} \\ 0 \end{array}$$

c.  $2,175 \div 25$

$= 87$

$$\begin{array}{r} 87 \\ 25 \overline{) 2175} \\ \underline{-2000} \\ 175 \\ \underline{-100} \\ 75 \\ \underline{-75} \\ 0 \end{array}$$

- In dividing, we know that it is more common to start with the largest place value to determine the quotient and then gradually include the smaller place values. Let's try a problem using that method. In the space below work  $2153 \div 14$ .

$$\begin{array}{r} 153 \\ 14 \overline{) 2153} \\ \underline{-1400} \\ 753 \\ \underline{-700} \\ 53 \\ \underline{-42} \\ 11 \end{array}$$

$2153 \div 14 = 153 \text{ R } 11$

Another way to think about this problem is to consider the related multiplication statement. Because the division problem is, "What does  $2,153 \div 14$  equal?" the related multiplication statement reads, "What times 14 equals 2,153?"

what?



3. The area of Robert's dorm room is 96 square feet. The room is 8 feet long. What is the width?

$$96 \div 8 = 12 \text{ ft} \quad \text{because} \quad 8 \cdot 12 = 96$$

4. Compute the following quotients and remainders. Check your answer with a visual method. Identify the dividend, quotient, divisor, and remainder.

a.  $265 \div 2$

$$2 \overline{) 264} \quad \boxed{1}$$

Dividend is 265.

Divisor is 2.

Quotient is 132.

Remainder is 1.

b.  $99 \div 15$

$$15 \overline{) 90} \quad \boxed{6} \quad \boxed{9}$$

Dividend is 99.

Divisor is 15.

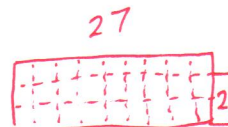
Quotient is 6.

Remainder is 9.

5. Kayla is going to rent some movies for a slumber party. Each movie rental costs \$3 per night. If Kayla has \$29 to spend, how many movies can she rent?

$$29 \div 3 = 9 \text{ r } 2$$

Kayla can rent 9 movies.  
(She will have \$2 left.)



SUMMARY (What I learned in this section)

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