

Data Displays

GUIDED SKILL SUPPORT

See Chapter 1 Guided Skill Support for a review of this topic.

Area and Perimeter

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See Chapter 1 Guided Skill Support for a review of this topic.

For additional information, see the Methods & Meanings boxes in Lessons 2.2.2 and 2.2.3 of the *Core Connections Course 1* text.

Multiplying With Area Models

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Overview

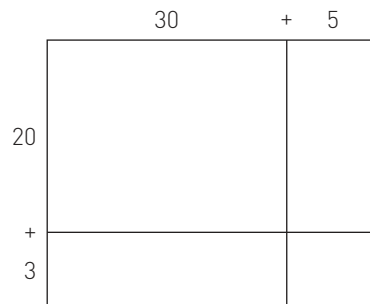
If a large rectangle is cut into a number of smaller rectangles, then the area of the large rectangle is equal to the sum of the areas of all the smaller rectangles. Multiplication can be represented as the area of a rectangle, so this idea can be applied to products. Breaking a product up into parts is the basis for multiplication using area models. An area model can be used to visualize multiplication and as a way to multiply numbers by using a diagram. Multiplication using rectangle models reinforces the multiplication algorithm and will continue to be used and extended through high school algebra courses.

For additional information, see the Methods & Meanings box in Lesson 2.3.2 of the *Core Connections Course 1* text.

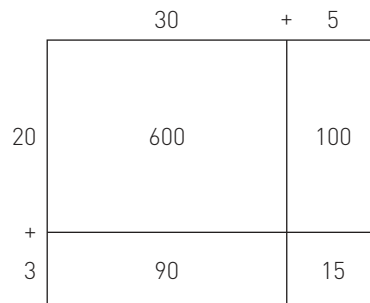
Examples

1. Multiply $23 \cdot 35$ using an area model.

A two-digit number is multiplied by a two-digit number. The numbers to be multiplied are separated (decomposed) based on place value. In this case, 23 has 2 tens (20) and 3 ones and 35 has 3 tens (30) and 5 ones.



The area of the large rectangle is equal to the sum of the areas of each of the smaller rectangles. The area of each of the smaller rectangles is calculated by multiplying its dimensions.



Calculate the area of each of the smaller rectangles and then add them together.

$$23 \cdot 35 = (20 + 3)(30 + 5) = 600 + 100 + 90 + 15 = 805$$

2. Multiply $243 \cdot 25$ using an area model.

Since a three-digit number is multiplied by a two-digit number there are six sections in the rectangle.

	20	+	5
200	4,000		1,000
+			
40	800		200
+			
3	60		15

Calculate the area of each smaller rectangle and add them together.

$$243 \cdot 25 = (200 + 40 + 3)(20 + 5) = 4,000 + 1,000 + 800 + 200 + 60 + 15 = 6,075$$

Practice

Use an area model to determine each product.

1. $47 \cdot 52$

2. $38 \cdot 84$

3. $126 \cdot 35$

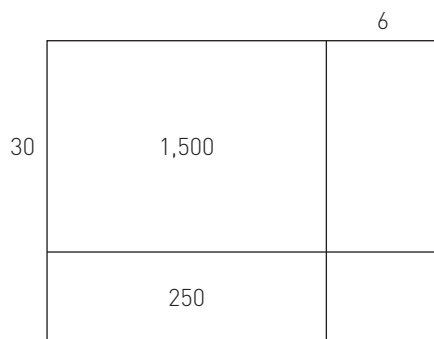
4. $72 \cdot 39$

5. $67 \cdot 89$

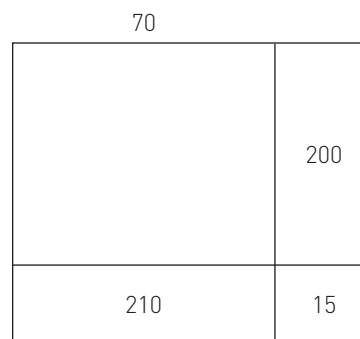
6. $347 \cdot 85$

What multiplication problem does each area model represent and what is the product?

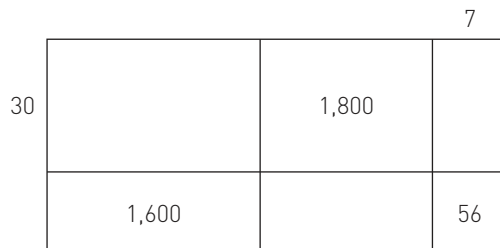
7.



8.



9.



Answers

1. 2,444

3. 4,410

5. 5,963

7. $35 \cdot 56 = 1,960$

	50	+	6	
30	1,500		180	
+				
5	250		30	

2. 3,192

4. 2,808

6. 29,495

8. $43 \cdot 75 = 3,225$

	70	+	5	
40	2,800		200	
+				
3	210		15	

9. $38 \cdot 267 = 10,146$

	200	+	60	+	7	
30	6,000		1,800		210	
+						
8	1,600		480		56	

Factors, Multiples, and the Distributive Property

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Overview

The **greatest common factor** (GCF) of two or more integers is the greatest positive integer which is a factor of both (or all) of the integers. To determine the GCF of two numbers, make a list of all the factors for each number, then identify the greatest number both lists have in common.

The **least common multiple** (LCM) of two or more integers is the smallest positive integer divisible by both (or all) of the integers. To determine the LCM of two numbers, make a list of the first several multiples for each number, then identify the smallest number both lists have in common.

The **Distributive Property** shows how to write an expression in two equivalent ways: as a product, $a(b + c)$, and as a sum, $ab + ac$. To rewrite the product as a sum, “distribute” the multiplier by multiplying it by each term in the parentheses. To rewrite the sum as a product, divide each term by a common factor and write the factor outside the parentheses.

For additional information, see the Methods & Meanings box in Lessons 2.3.4 of the *Core Connections Course 1* text. For additional examples and practice, see the *Core Connections Course 1* Checkpoint 8A materials.

Examples

1. Consider the numbers 18 and 24.

- a. What is the LCM?

List several multiples of each number.

Multiples of 18: 18, 36, 54, 72, 90, ...

Multiples of 24: 24, 48, 72, 96, 120, ...

The smallest multiple that both lists have in common is 72. Therefore, $\text{LCM}(18, 24) = 72$.

- b. What is the GCF?

List the factors of each number.

Factors of 18: 1, 2, 3, 6, 9, 18

Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

The greatest factor that both lists have in common is 6. Therefore, $\text{GCF}(18, 24) = 6$.

2. Use the Distributive Property to evaluate each expression.

a. $2(47)$

$$\begin{aligned}
 &2(47) \\
 &= 2(40 + 7) && \text{First, expand 47 as } 40 + 7 \text{ and rewrite the expression.} \\
 &= 2(40) + 2(7) && \text{Then distribute the 2.} \\
 &= 80 + 14 \\
 &= 94
 \end{aligned}$$

b. $72 + 90$

72 and 90 have several common factors. Possible expressions are shown.

Common Factor: 18

$$\begin{aligned}
 &72 + 90 \\
 &= 18(4) + 18(5) \\
 &= 18(4 + 5) \\
 &= 18(9) \\
 &= 162
 \end{aligned}$$

Common Factor: 2

$$\begin{aligned}
 &72 + 90 \\
 &= 2(36) + 2(45) \\
 &= 2(36 + 45) \\
 &= 2(81) \\
 &= 162
 \end{aligned}$$

Common Factor: 6

$$\begin{aligned}
 &72 + 90 \\
 &= 6(12) + 6(15) \\
 &= 6(12 + 15) \\
 &= 6(27) \\
 &= 162
 \end{aligned}$$

Practice

What are the LCM and GCF for each pair of numbers?

1. 2 and 10 2. 9 and 6 3. 30 and 33 4. 10 and 35

Use the Distributive Property to evaluate each expression.

5. $6(9 + 4)$ 6. $4(9 + 8)$ 7. $7(8 + 6)$ 8. $5(7 + 4)$
9. $3(27) = 3(20 + 7)$ 10. $6(46) = 6(40 + 6)$ 11. $8(43)$ 12. $6(78)$

Answers

1. LCM = 10, GCF = 2 2. LCM = 18, GCF = 3 3. LCM = 330, GCF = 3
4. LCM = 70, GCF = 5 5. $54 + 24 = 78$ 6. $36 + 32 = 68$
7. $56 + 42 = 98$ 8. $35 + 20 = 55$ 9. $60 + 21 = 81$
10. $240 + 36 = 276$ 11. $8(40 + 3) = 320 + 24 = 344$ 12. $6(70 + 8) = 420 + 48 = 468$

Adding and Subtracting Multi-Digit Decimals

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Overview

When adding or subtracting multi-digit decimals, it is important to pay attention to place value. One process is similar to adding or subtracting whole numbers:

1. Write the problem in a vertical column and line up the place values by lining up the decimal points.
2. Write in zeros to the right of the decimal, as necessary, so that all decimal parts of the numbers have the same number of digits.
3. Add or subtract as with whole numbers, by starting with the smallest place value.
4. Place the decimal point in the answer.

For additional examples and practice, see the *Core Connections Course 1* Checkpoint 2 materials.

Examples

1. Add 47.37, 28.9, 14.56, and 7.8.

$$\begin{array}{r}
 \overset{1}{47.37} \\
 28.90 \\
 14.56 \\
 + 7.80 \\
 \hline
 3
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{2}{47.37} \\
 28.90 \\
 14.56 \\
 + 7.80 \\
 \hline
 .63
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{22}{47.37} \\
 28.90 \\
 14.56 \\
 + 7.80 \\
 \hline
 8.63
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{22}{47.37} \\
 28.90 \\
 14.56 \\
 + 7.80 \\
 \hline
 98.63
 \end{array}$$

2. Subtract 198.76 from 473.2.

$$\begin{array}{r}
 \overset{110}{473.20} \\
 - 198.76 \\
 \hline
 4
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{11}{473.20} \\
 - 198.76 \\
 \hline
 .44
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{12}{473.20} \\
 - 198.76 \\
 \hline
 4.44
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{16}{473.20} \\
 - 198.76 \\
 \hline
 74.44
 \end{array}
 \rightarrow
 \begin{array}{r}
 \overset{16}{473.20} \\
 - 198.76 \\
 \hline
 274.44
 \end{array}$$

Practice

Add.

- | | | |
|------------------------|-----------------------------|-------------------------------|
| 1. $4.7 + 7.9$ | 2. $3.93 + 2.82$ | 3. $38.72 + 6.7$ |
| 4. $4.73 + 692$ | 5. $42.1083 + 14.73$ | 6. $9.999 + 0.001$ |
| 7. $0.0001 + 99.9999$ | 8. $2.037 + 0.09387$ | 9. $47.9 + 68.073$ |
| 10. $476.384 + 27.847$ | 11. $48.32 + 284.3 + 4.638$ | 12. $278.63 + 47.0432 + 21.6$ |

Subtract.

- | | | |
|--------------------|----------------------|-------------------------------|
| 13. $8.73 - 4.6$ | 14. $9.38 - 7.5$ | 15. $7.045 - 3.76$ |
| 16. $6.304 - 3.68$ | 17. $14 - 7.431$ | 18. $23 - 15.37$ |
| 19. $0.647 - 0.39$ | 20. $1.34 - 0.0538$ | 21. $2.07 - 0.523$ |
| 22. $3.8 - 2.406$ | 23. $47.13 - 42.703$ | 24. $15.368 + 14.4 - 18.5376$ |

Answers

- | | | | |
|------------|-------------|-------------|--------------|
| 1. 12.6 | 2. 6.75 | 3. 45.42 | 4. 696.73 |
| 5. 56.8383 | 6. 10.000 | 7. 100.0000 | 8. 2.13087 |
| 9. 115.973 | 10. 504.231 | 11. 337.258 | 12. 347.2732 |
| 13. 4.13 | 14. 1.88 | 15. 3.285 | 16. 2.624 |
| 17. 6.569 | 18. 7.63 | 19. 0.257 | 20. 1.2862 |
| 21. 1.547 | 22. 1.394 | 23. 4.427 | 24. 11.2304 |