

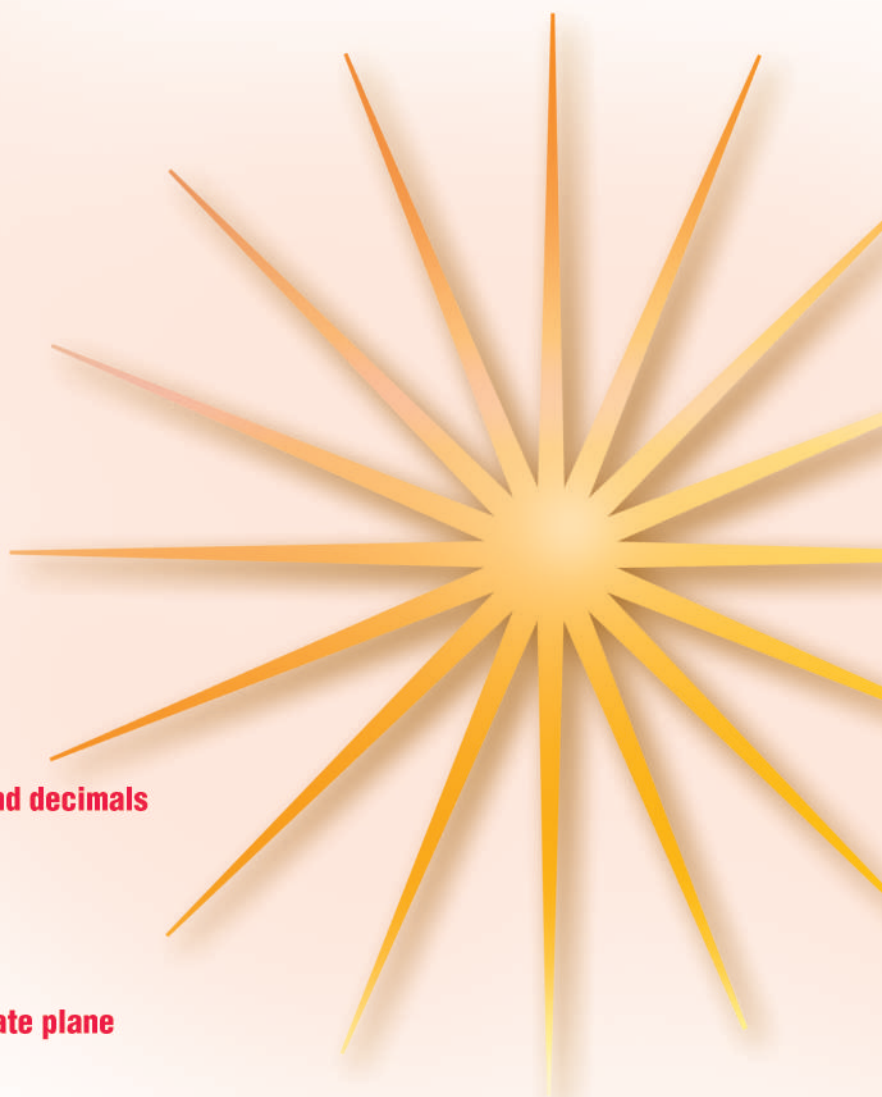
SPECTRUM[®] Math

GRADE
6



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- Answer key





Math

Grade 6

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**Check What You Know****Understanding the Number System and Operations**

Rewrite each expression using the Distributive Property.

a

1. $4 \times (6 + 2) =$ _____

2. $4 \times (2 + 6) =$ _____

3. $(3 \times 6) - (3 \times 3) =$ _____

b

$(2 \times 5) + (2 \times 4) =$ _____

$6 \times (5 - 1) =$ _____

$8 \times (3 - 1) =$ _____

Find the Greatest Common Factor of each set of numbers.

a

4. 15, 20 _____

5. 65, 39 _____

b

12, 36 _____

95, 76 _____

c

72, 60 _____

96, 112 _____

Find the Least Common Multiple of each set of numbers.

6. 12, 3 _____

7. 7, 10, 3 _____

15, 3, 2 _____

12, 6 _____

4, 7 _____

7, 3, 5 _____



Check What You Know

Understanding the Number System and Operations

Multiply or divide.

a

$$\begin{array}{r} 8. \quad 312 \\ \times 263 \\ \hline \end{array}$$

b

$$\begin{array}{r} 428 \\ \times 321 \\ \hline \end{array}$$

c

$$\begin{array}{r} 2185 \\ \times 216 \\ \hline \end{array}$$

d

$$\begin{array}{r} 3372 \\ \times 351 \\ \hline \end{array}$$

$$9. \quad 73 \overline{)6278}$$

$$54 \overline{)8239}$$

$$27 \overline{)54702}$$

$$83 \overline{)96542}$$

$$10. \quad \begin{array}{r} 2.86 \\ \times 0.3 \\ \hline \end{array}$$

$$\begin{array}{r} 0.82 \\ \times 0.43 \\ \hline \end{array}$$

$$\begin{array}{r} \$78.53 \\ \times 16 \\ \hline \end{array}$$

$$\begin{array}{r} 3.21 \\ \times 8.72 \\ \hline \end{array}$$

$$11. \quad 0.08 \overline{)64}$$

$$0.3 \overline{)726}$$

$$0.83 \overline{)2.1995}$$

$$14 \overline{)\$7.70}$$

SHOW YOUR WORK

Solve each problem.

- 12.** One bag of peanuts costs \$1.52. How many bags can you buy with \$34.96?

You can buy _____ bags.

- 13.** A box containing 78.4 pounds of coffee will be divided into containers that hold 0.56 pounds each. How many containers can be filled?

_____ containers can be filled.

12.**13.**

Lesson 1.1 Number Properties

There are certain rules or properties of math that are always true.

The **Commutative Properties** of addition and multiplication state that the order in which numbers are added or multiplied does not change the result.

$$a + b = b + a \quad \text{and} \quad a \times b = b \times a$$

$$2 + 3 = 5 \qquad 5 \times 2 = 10$$

$$3 + 2 = 5 \qquad 2 \times 5 = 10$$

The **Associative Properties** of addition and multiplication state that the way in which addends or factors are grouped does not change the result.

$$(a + b) + c = a + (b + c) \quad \text{and} \quad (a \times b) \times c = a \times (b \times c)$$

$$(2 + 3) + 4 = 2 + (3 + 4) \qquad (2 \times 4) \times 5 = 2 \times (4 \times 5)$$

$$5 + 4 = 2 + 7 \qquad 8 \times 5 = 2 \times 20$$

$$9 = 9 \qquad 40 = 40$$

The **Identity Property of Addition** states that the sum of an addend and 0 is the addend.
 $5 + 0 = 5$

The **Identity Property of Multiplication** states that the product of a factor and 1 is that factor.
 $4 \times 1 = 4$

The **Properties of Zero** state that the product of a factor and 0 is 0. $5 \times 0 = 0$

The properties of zero also state that the quotient of zero and any non-zero divisor is 0. $0 \div 5 = 0$

Name the property shown by each statement.

- | a | b |
|--|-----------------------------------|
| 1. $2 \times 8 = 8 \times 2$ _____ | $2 + (3 + 4) = (2 + 3) + 4$ _____ |
| 2. $35 \times 1 = 35$ _____ | $32 + 25 = 25 + 32$ _____ |
| 3. $4 \times (6 \times 2) = (4 \times 6) \times 2$ _____ | $0 \times 9 = 0$ _____ |
| 4. $45 + 0 = 45$ _____ | $18 \times 0 = 0 \times 18$ _____ |

Rewrite each expression using the property indicated.

- | | |
|--|--|
| 5. Associative; $(3 + 5) + 2 =$ _____ | Commutative; $5 \times 7 =$ _____ |
| 6. Identity; $0 + 4 =$ _____ | Associative; $3 \times (2 \times 5) =$ _____ |
| 7. Commutative; $7 + 9 =$ _____ | Associative; $(2 + 5) + 4 =$ _____ |
| 8. Identity; $7 \times 1 =$ _____ | Identity; $37 + 0 =$ _____ |
| 9. Properties of Zero; $0 \times 12 =$ _____ | Properties of Zero; $0 \div 6 =$ _____ |

Lesson 1.2 The Distributive Property

The **Distributive Property** combines the operations of addition and multiplication.

$$\begin{array}{rcl}
 a \times (b + c) & = & (a \times b) + (a \times c) \\
 3 \times (2 + 5) & = & (3 \times 2) + (3 \times 5) \\
 3 \times 7 & & 6 + 15 \\
 21 & & 21
 \end{array}$$

Indicate which operation should be done first.

- | a | b |
|--|-------------------------------------|
| 1. $(2 \times 5) + (2 \times 3)$ _____ | $7 \times (3 + 5)$ _____ |
| 2. $(6 + 9) \times 4$ _____ | $(3 \times 5) + (3 \times 7)$ _____ |

Rewrite each expression using the Distributive Property.

- | | |
|--|---------------------------------------|
| 3. $4 \times (6 + 2) =$ _____ | $(2 \times 5) + (2 \times 4) =$ _____ |
| 4. $(5 \times 1) + (5 \times 6) =$ _____ | $4 \times (2 + 6) =$ _____ |
| 5. $8 \times (4 + 3) =$ _____ | $(5 \times 0) + (5 \times 1) =$ _____ |

Write each missing number.

- | | |
|---|--|
| 6. $(5 \times 3) + (n \times 4) = 5 \times (3 + 4)$ _____ | $7 \times (n + 3) = (7 \times 2) + (7 \times 3)$ _____ |
| 7. $n \times (5 + 3) = (6 \times 5) + (6 \times 3)$ _____ | $(5 \times 7) + (n \times 4) = 5 \times (7 + 4)$ _____ |
| 8. $(4 \times 5) + (4 \times 2) = 4 \times (5 + n)$ _____ | $3 \times (n + 5) = (3 \times 4) + (3 \times 5)$ _____ |

Replace a with 2, b with 5, and c with 3. Then, find the value of each expression

- | | |
|---|---------------------------------------|
| 9. $a \times (b + c) =$ _____ | $(a \times b) + (a \times c) =$ _____ |
| 10. $(c \times a) + (c \times b) =$ _____ | $b \times (a + c) =$ _____ |

Lesson 1.2 The Distributive Property

The **Distributive Property** states: $a \times (b + c) = (a \times b) + (a \times c)$

The same property also means that: $a \times (b - c) = (a \times b) - (a \times c)$

This can help solve complex multiplication problems:

$$26 = 20 + 6 \quad 17 \times 26 = (17 \times 20) + (17 \times 6) = 340 + 102 = 442$$

$$18 = 20 - 2 \quad 47 \times 18 = (47 \times 20) - (47 \times 2) = 940 - 94 = 846$$

Using the Distributive Property, rewrite each expression in a way that will help solve it. Then, solve.

a**b**

1. $22 \times 102 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$39 \times 25 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

2. $146 \times 33 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$28 \times 16 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

3. $36 \times 35 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$51 \times 106 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

4. $19 \times 256 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$45 \times 17 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

5. $57 \times 38 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$48 \times 45 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

6. $82 \times 80 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$51 \times 82 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

7. $43 \times 142 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$264 \times 67 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

8. $12 \times 39 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

$58 \times 35 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

Lesson 1.3 Multi-Digit Multiplication

Multiply 3,263 by 3.

$$\begin{array}{r} 3263 \\ \times 43 \\ \hline \end{array}$$

$$\begin{array}{r} 3263 \\ \times 3 \\ \hline 9789 \end{array}$$

Multiply 3,263 by 40.

$$\begin{array}{r} 3263 \\ \times 40 \\ \hline 130520 \end{array}$$

Add.

$$\begin{array}{r} 3263 \\ \times 43 \\ \hline 9789 \\ + 130520 \\ \hline 140,309 \end{array}$$

Multiply.

a

$$\begin{array}{r} 1. \quad 324 \\ \times 27 \\ \hline \end{array}$$

b

$$\begin{array}{r} 816 \\ \times 16 \\ \hline \end{array}$$

c

$$\begin{array}{r} 255 \\ \times 44 \\ \hline \end{array}$$

d

$$\begin{array}{r} 2165 \\ \times 23 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 5150 \\ \times 22 \\ \hline \end{array}$$

$$\begin{array}{r} 7182 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} 6324 \\ \times 36 \\ \hline \end{array}$$

$$\begin{array}{r} 4522 \\ \times 63 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 886 \\ \times 374 \\ \hline \end{array}$$

$$\begin{array}{r} 763 \\ \times 618 \\ \hline \end{array}$$

$$\begin{array}{r} 654 \\ \times 523 \\ \hline \end{array}$$

$$\begin{array}{r} 985 \\ \times 447 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 2186 \\ \times 342 \\ \hline \end{array}$$

$$\begin{array}{r} 1898 \\ \times 475 \\ \hline \end{array}$$

$$\begin{array}{r} 3688 \\ \times 259 \\ \hline \end{array}$$

$$\begin{array}{r} 2864 \\ \times 723 \\ \hline \end{array}$$

Lesson 1.4 Multi-Digit Division

983 is between 840 (28×30) and 1120 (28×40), so the tens digit is 3.

$$\begin{array}{r} 3 \\ 28 \overline{)983} \\ - 840 \quad \text{subtract} \\ \hline 143 \end{array}$$

143 is between 140 (28×5) and 168 (28×6), so the ones digit is 5.

$$\begin{array}{r} 35 \text{ r}3 \\ 28 \overline{)983} \\ - 840 \quad \text{subtract} \\ \hline 143 \\ - 140 \quad \text{subtract} \\ \hline 3 \quad \text{remainder} \end{array}$$

Divide.

	a	b	c	d	e
1.	$18 \overline{)94}$	$27 \overline{)68}$	$22 \overline{)88}$	$19 \overline{)78}$	$25 \overline{)64}$

2.	$43 \overline{)88}$	$12 \overline{)84}$	$32 \overline{)865}$	$24 \overline{)768}$	$31 \overline{)913}$
----	---------------------	---------------------	----------------------	----------------------	----------------------

3.	$27 \overline{)815}$	$54 \overline{)725}$	$45 \overline{)880}$	$23 \overline{)615}$	$18 \overline{)324}$
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Lesson 1.4 Multi-Digit Division

37,262 is between
32,800 (82×400) and
41,000 (82×500), so
the hundreds digit is 4.

$$\begin{array}{r} 4 \\ 82 \overline{)37262} \\ - 32800 \quad \text{subtract} \\ \hline 4462 \end{array}$$

4,462 is between
4,100 (82×50) and
4,920 (82×60), so the
tens digit is 5.

$$\begin{array}{r} 45 \\ 82 \overline{)37262} \\ - 32800 \\ \hline 4462 \\ - 4100 \quad \text{subtract} \\ \hline 362 \end{array}$$

362 is between
328 (82×4) and
410 (82×5), so the
ones digit is 4.

$$\begin{array}{r} 454 \text{ r}34 \\ 82 \overline{)37262} \\ - 32800 \\ \hline 4462 \\ - 4100 \\ \hline 362 \\ - 328 \quad \text{subtract} \\ \hline 34 \quad \text{remainder} \end{array}$$

Divide.

a

$$1. \quad 56 \overline{)6185}$$

b

$$32 \overline{)9984}$$

c

$$27 \overline{)9984}$$

d

$$13 \overline{)2329}$$

e

$$22 \overline{)2420}$$

$$2. \quad 45 \overline{)6950}$$

$$88 \overline{)9944}$$

$$21 \overline{)5672}$$

$$78 \overline{)40794}$$

$$65 \overline{)14625}$$

$$3. \quad 36 \overline{)52813}$$

$$63 \overline{)45675}$$

$$42 \overline{)34816}$$

$$23 \overline{)20378}$$

$$18 \overline{)10242}$$

Lesson 1.5 Reciprocal Operations

Multiplication and division are reciprocal, or opposite, operations. You can use reciprocal operations to check your answers when you work math problems.

$$15 \times 4 = 60 \qquad 60 \div 15 = 4$$

$$8 \times 7 = 56 \qquad 56 \div 8 = 7$$

Multiply or divide. Use the reciprocal operation to check your answers.

a

1.

$$\begin{array}{r} 392 \\ \times 22 \\ \hline \end{array}$$

b

$$\begin{array}{r} 239 \\ \times 60 \\ \hline \end{array}$$

c

$$\begin{array}{r} 931 \\ \times 77 \\ \hline \end{array}$$

d

$$\begin{array}{r} 496 \\ \times 28 \\ \hline \end{array}$$

2.

$$\begin{array}{r} 193 \\ \times 55 \\ \hline \end{array}$$

$$\begin{array}{r} 529 \\ \times 31 \\ \hline \end{array}$$

$$\begin{array}{r} 695 \\ \times 75 \\ \hline \end{array}$$

$$\begin{array}{r} 972 \\ \times 93 \\ \hline \end{array}$$

3.

$$21 \overline{)2898}$$

$$22 \overline{)7898}$$

$$71 \overline{)5893}$$

$$32 \overline{)4832}$$

4.

$$11 \overline{)3498}$$

$$33 \overline{)5214}$$

$$42 \overline{)4914}$$

$$12 \overline{)8328}$$

Lesson 1.6 Problem Solving**SHOW YOUR WORK**

Estimate the answers to the following problems. Check your answer by using the opposite operation.

1. There are 527 sixth-grade students who will take a field trip. There are 9 buses. About how many students will be riding in each bus?

Round 527 to _____.

About _____ students will ride each bus.

2. At West Side Middle School, there are 42 classrooms with 28 desks in each. About how many desks are there?

Round 42 to _____ and round 28 to _____.

There are about _____ desks.

3. There are 563 books to be shelved in the library. Each shelf holds 7 books. About how many shelves will be used?

Round 563 to _____.

About _____ shelves will be used.

4. Mrs. Juergen's class is building a model city from craft sticks. Each house requires 267 sticks. The class will build 93 houses. About how many sticks will be needed?

Round 267 to _____ and round 93 to _____.

About _____ sticks will be needed.

5. Thirty-eight students are going on a field trip. Parents will drive. Each car can hold 4 students along with the driver. How many cars will be needed?

Round 38 to _____.

About _____ cars will be needed.

6. Jorge's family is taking a car trip to see his grandmother. The family plans to spend 3 days on the road. The distance is 687 miles. About how far must they drive each day?

Round 687 to _____.

They must drive about _____ miles each day.

1.

2.

3.

4.

5.

6.

Lesson 1.7 Greatest Common Factor

A **factor** is a divisor of a number. (For example, 3 and 4 are both factors of 12.) A **common factor** is a divisor that is shared by two or more numbers (1, 2, 4, and 8). The **greatest common factor** is the largest common factor shared by the numbers (8).

To find the greatest common factor of 32 and 40, list all of the factors of each.

$$32 \begin{cases} 1 \times 32 \\ 2 \times 16 \\ 4 \times 8 \end{cases} 1, 2, 4, 8, 16, \text{ and } 32$$

$$40 \begin{cases} 1 \times 40 \\ 2 \times 20 \\ 4 \times 10 \\ 5 \times 8 \end{cases} 1, 2, 4, 5, 8, 10, 20, \text{ and } 40$$

The greatest common factor is 8.

List the factors of each number below. Then, list the common factors and the greatest common factor.

	Factors	Common Factors	Greatest Common Factor
1.	8 _____ 12 _____	_____	_____
2.	6 _____ 18 _____	_____	_____
3.	24 _____ 15 _____	_____	_____
4.	4 _____ 6 _____	_____	_____
5.	5 _____ 12 _____	_____	_____
6.	16 _____ 12 _____	_____	_____