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Lesson 1 Reteach

Algebraic Expressions

To evaluate an algebraic expression you replace each variable with its numerical value, then use the order of operations to simplify.

Example 1

Evaluate $6x - 7$ if $x = 8$.

$6x - 7 = 6(8) - 7$ Replace x with 8.
$= 48 - 7$ Use the order of operations.
$= 41$ Subtract 7 from 48.

Example 2

Evaluate $5m - 3n$ if $m = 6$ and $n = 5$.

$5m - 3n = 5(6) - 3(5)$ Replace m with 6 and n with 5.
$= 30 - 15$ Use the order of operations.
$= 15$ Subtract 15 from 30.

Example 3

Evaluate $\frac{ab}{3}$ if $a = 7$ and $b = 6$.

$\frac{ab}{3} = \frac{(7)(6)}{3}$ Replace a with 7 and b with 6.
$= \frac{42}{3}$ The fraction bar is like a grouping symbol.
$= 14$ Divide.

Example 4

Evaluate $x^3 + 4$ if $x = 3$.

$x^3 + 4 = 3^3 + 4$ Replace x with 3.
$= 27 + 4$ Use the order of operations.
$= 31$ Add 27 and 4.

Exercises

Evaluate each expression if $a = 4$, $b = 2$, and $c = 7$.

1. $3ac$ **2.** $5b^3$ **3.** abc

4. $5 + 6c$ **5.** $\frac{ab}{8}$ **6.** $2a - 3b$

7. $\frac{b^4}{4}$ **8.** $c - a$ **9.** $20 - bc$

10. $2bc$ **11.** $ac - 3b$ **12.** $6a^2$

13. $7c$ **14.** $6a - b$ **15.** $ab - c$

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Lesson 1 Skills Practice

Algebraic Expressions

Evaluate each expression if $w = 2$, $x = 3$, $y = 5$, and $z = 6$.

1. $2w$

2. $y + 5$

3. $9 - z$

4. $x + w$

5. $3 + 4z$

6. $6y - 5$

7. y^2

8. $y - x$

9. $\frac{z}{2}$

Evaluate each expression if $m = 3$, $n = 7$, and $p = 9$.

10. $m + n$

11. $12 - 3m$

12. $5p$

13. $3.3p$

14. $3.3p + 2$

15. $2p + 3.3$

16. $20 + 2n$

17. $20 - 2n$

18. $\frac{n}{7}$

19. n^2

20. $6m^2$

21. $\frac{p^2}{3}$

22. $1.1 + n$

23. $p - 8.1$

24. $3.6m$

25. $3n - 2m$

26. $3m - n$

27. $2.1n + p$

28. $\frac{m^2}{p}$

29. $\frac{2.5m + 2.5}{5}$

30. $\frac{(n + 2)^2}{3}$

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Lesson 2 Reteach

Sequences

An **arithmetic sequence** is a list in which each term is found by adding the same number to the previous term. 1, 3, 5, 7, 9, …
(+2 +2 +2 +2)

Example 1

Describe the relationship between terms in the arithmetic sequence 17, 23, 29, 35, … Then write the next three terms in the sequence.

17, 23, 29, 35, …. Each term is found by adding 6 to the previous term.
(+6 +6 +6) $35 + 6 = 41$ $41 + 6 = 47$ $47 + 6 = 53$
The next three terms are 41, 47, and 53.

Example 2

MONEY Brian's parents have decided to start giving him a monthly allowance for one year. Each month they will increase his allowance by $10. Suppose this pattern continues. What algebraic expression can be used to find Brian's allowance after any given number of months? How much money will Brian receive for allowance for the 10th month?

Make a table to display the sequence.

Position	Operation	Value of Term
1	$1 \cdot 10$	10
2	$2 \cdot 10$	20
3	$3 \cdot 10$	30
n	$n \cdot 10$	$10n$

Each term is 20 times its position number. So, the expression is $10n$.
How much money will Brian receive after 10 months?
$10n$ Write the expression.
$10(10) = 100$ Replace n with 10

So, Brian will receive $100 after 10 months.

Exercises

Describe the relationship between terms in the arithmetic sequences. Write the next three terms in the sequence.

1. 2, 4, 6, 8, …

2. 4, 7, 10, 13, …

3. 0.3, 0.6, 0.9, 1.2, …

4. 200, 212, 224, 236, …

5. 1.5, 2.0, 2.5, 3.0, …

6. 12, 19, 26, 33, …

7. SALES Mama's bakery just opened and is currently selling only two types of pastry. Each month, Mama's bakery will add two more types of pastry to their menu. Suppose this pattern continues. What algebraic expression can be used to find the number of pastries offered after any given number of months? How many pastries will be offered in one year?

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Lesson 2 Skills Practice

Sequences

Describe the relationship between the terms in each arithmetic sequence.

1. 3, 6, 9, 12…

2. 1, 3, 5, 7, …

3. 1, 2, 3, 4, …

4. 0, 7, 14, 21, …

5. 2, 5, 8, 11, …

6. 5, 10, 15, 20, …

7. 0.3, 0.6, 0.9, 1.2, …

8. 1, 10, 19, 28, …

9. 6, 18, 24, 30, …

10. 0.5, 2.5, 4.5, 6.5, …

11. 3, 7, 11, 15, …

12. 0, 4.5, 9, 13.5, …

13. 11, 22, 33, 44, …

14. 16, 21, 26, 31, …

Give the next three terms in each sequence.

15. 3, 6, 9, 12, …

16. 18, 21, 24, 27, …

17. 7, 10, 13, 16, …

18. 4, 8, 12, 16, …

19. 0, 7, 14, 21, …

20. 7, 12, 17, 22, …

21. 5, 7, 9, 11, …

22. 5, 15, 25, 35, …

23. 21, 42, 63, 84, …

24. 1.1, 2.2, 3.3, 4.4, …

25. 0.5, 1.0, 1.5, 2.0, …

26. 1.7, 1.9, 2.1, 2.3, …

27. 0.5, 1.5, 2.5, 3.5, …

28. 0.1, 0.2, 0.3, 0.4, …

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Lesson 3 Reteach

Properties of Operations

Example 1

Name the property shown by the statement $u + v = v + u$.

The order in which the variables are being added changed. This is the Commutative Property of Addition.

Example 2

State whether the following conjecture is *true* or *false*. If *false*, provide a counterexample.

Subtraction of integers is commutative.

Write two subtraction expressions using the Commutative Property.

$17 - 9 \stackrel{?}{=} 9 - 17$ State the conjecture.

$8 \neq -8$ Subtract.

We found a counterexample. That is, $17 - 9 \neq 9 - 17$. So, subtraction is *not* commutative. The conjecture is false.

Example 3

Simplify the expression. Justify each step.

$9 + (3x + 4)$

$9 + (3x + 4) = 9 + (4 + 3x)$ Commutative Property of Addition

$= (9 + 4) + 3x$ Associative Property of Addition

$= 13 + 3x$ Simplify.

Exercises

Name the property shown by each statement.

1. $7 \cdot 1 = 7$

2. $4 + (3y + 2) = (4 + 3y) + 2$

State whether the following conjectures are *true* or *false*. If *false*, provide a counterexample.

3. The product of two even numbers is odd.

4. The difference of two odd numbers is even.

5. Simplify $4 + (5x + 2)$. Justify each step.

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Lesson 3 Skills Practice

Properties of Operations

Name the property shown by each statement.

1. $9 \cdot 6 = 6 \cdot 9$

2. $m + 0 = m$

3. $14 \cdot 1 = 14$

4. $2 + (8 + 3) = (2 + 8) + 3$

5. $x + y = y + x$

6. $m + 2) + n = n + (m + 2)$

State whether the following conjectures are *true* or *false*. If *false*, provide a counterexample.

7. The sum of an even whole number and an odd whole number is always odd.

8. Division of whole numbers is always commutative.

Simplify each expression. Justify each step.

9. $5 + (b + 2)$

10. $8(2q)$

11. **RAIN** Piper recorded the amount of rain that fell for four nights in the table below. Use mental math to find the total amount of rain. Explain your reasoning.

Day	Monday	Tuesday	Wednesday	Thursday
Rain (in.)	2.6	1.5	1.4	2.5

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Lesson 4 Reteach

The Distributive Property

Distributive Property		
Words	To multiply a sum or difference by a number, multiply each term inside the parentheses by the number outside the parentheses.	
Symbols	$a(b + c) = ab + ac$	$a(b - c) = ab - ac$
Examples	$3(2 + 5) = 3 \cdot 2 + 3 \cdot 5$	$6(8 - 3) = 6 \cdot 8 - 6 \cdot 3$

Examples

Use the Distributive Property to evaluate each expression.

1 $\mathbf{5(x + 3)}$

$5(x + 3) = 5 \cdot x + 5 \cdot 3$ Expand using the Distributive Property

$= 5x + 15$ Simplify.

2 $\mathbf{(4x - y)9}$

$(4x - y)9 = [4x + (-y)]9$ Rewrite $4x - y$ as $4x + (-y)$.

$= (4x)9 + (-y)9$ Expand using the Distributive Property.

$= 36x + (-9y)$ Simplify.

$= 36x - 9y$ Definition of subtraction.

Example 3

MOVIES Alwyn is taking three of his friends to the movies. Tickets cost $8.90 per person. Find Alwyn's total cost.

You can use the Distributive Property to find the total cost mentally.

$4(\$9 - \$0.10) = 4(\$9) - 4(\$0.10)$ Distributive Property

$= \$36 - \$0.40$ Multiply.

$= \$35.60$ Subtract.

Alwyn will pay $35.60 for himself and three friends to go to the movies.

Exercises

Use the Distributive Property to evaluate or rewrite each expression.

1. $5(w + 4)$

2. $(x - 5)(-2)$

3. $7(6x - 2y)$

4. $-6(4 + 2m)$

5. $8(2n + 7)$

6. $(3v + 6w)2$

7. BOOKS Mariah bought 7 books costing $11.20 each. Find the total cost of the 7 books. Justify your answer by using the Distributive Property.

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Lesson 4 Skills Practice

The Distributive Property

Use the Distributive Property to evaluate each expression.

1. $3(2 + 8)$

2. $(-3 + 4)2$

3. $-5(4 - 2)$

4. $(12 + 13)(-2)$

5. $8(10 - 4)$

6. $(-4 + -7)(-3)$

7. $(-7 + 3)4$

8. $-1(18 - 11)$

Use the Distributive Property to rewrite each expression.

9. $6(t + 2)$

10. $-5(4 + x)$

11. $(5 + v)(-3)$

12. $(w - 2)4$

13. $-7(8n - m)$

14. $(6 + d)(-6)$

15. $(4c + 2d)(-2)$

16. $-2(3f - 5g)$

17. **TRAIN RIDE** Mr. and Mrs. Caputo are taking their family into the city on the train. The cost per person is \$5.80. If there are 4 members in their family, how much does the train trip cost? Justify your answer by using the Distributive Property.

18. **CAMPING** Chantee went camping over the weekend. The cost for the site was \$16.95 a night for three nights. How much did it cost her to camp? Justify your answer by using the Distributive Property.

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Reteach

Problem-Solving Investigation: Make a Table

Example

Kylee is training for the marathon she will run in a few months. She will begin by running 3 miles the first day, 5 miles the next day, and 7 miles the next day.

Make a table to find the number of miles Kylee will run on her tenth day of training.

Understand Kylee will run 3 miles the first day, 5 miles the next day, and 7 miles the next day. You need to find the number of miles she will run on day 10 of training.

Plan Make a table and find a pattern. Then extend the pattern to find the solution.

Solve The first three days, Kylee will run 3 miles, 5 miles, and 7 miles. Extend the pattern.

Day	1	2	3	4	5	6	7	8	9	10
Miles	3	5	7	9	11	13	15	17	19	21
		+2	+2	+2	+2	+2	+2	+2	+2	+2

Kylee will run 21 miles on day 10 of her training.

Check Use counters or cubes to model the daily pattern of miles ran. Count the number of objects used to represent the number of miles ran on day 10.

Exercises

1. **RUNNING** Suppose Kylee's friend Derrick is also training for the marathon. On his first four days of training, he runs 1 mile, 1 mile, 2 miles, and 2 miles. How many miles will Derrick run on day 10 of his training?

2. **RUNNING** If Kylee and Derrick continue training in this pattern, how many days will they train before each one is running at least 26 miles?

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Skills Practice

Problem-Solving Investigation: Make a Table

Use the *make a table* strategy to solve Exercises 1–4.

1. **VOLUNTEERING** Isabel volunteers during the summer at the hospital. The first four weeks she worked 6 hours, 8 hours, 10 hours, and 12 hours each week. If she continues working in this pattern, how many weeks will she need to work in order to accumulate 100 total volunteer hours?

2. **DOGS** The table shows the number of minutes Jamal walks his dog each day. If the pattern continues, how long will he walk his dog on day 7?

Day	Walk (min)
1	15
2	25
3	35
4	45

3. **MONEY** Charlotte is saving money for a new computer. Her first deposits were \$10, \$20, and \$40. If she continues saving in this pattern, how many deposits will she make before she has the \$625 she needs to buy the computer?

4. **GEOMETRY** Draw the next two figures in the pattern shown below.

Use any strategy to solve Exercises 5-8.

5. **ROSES** Mr. Wong planted a new rose bush and recorded the number of blooms each day. The table shows his data. If the rose bush continues blooming in this pattern, how many blooms can Mr. Wong expect on Sunday?

Day	Mon.	Tues.	Wed.	Thurs.	Fri.
Blooms	5	9	13	17	21

6. **FRIENDS** Lauren, Mark, Juan, and Sasha are sitting on a bench. The two girls are sitting in the middle. Juan is next to Lauren, and Mark is not the last one on the right. In what order are the friends sitting?

7. **LUNCH** Will bought three items for lunch from the menu shown. What did he have for lunch if it cost him \$4.50?

Lunch Menu	
Item	**Price (\$)**
Sandwich	3.25
Fries	1.50
Salad	2.25
Soup	1.00
Fruit	1.25

8. **NUMBERS** Caleb is thinking of two numbers between 1 and 20 whose sum is 17 and whose difference is 7. Find the numbers.

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Lesson 5 Reteach

Simplify Algebraic Expressions

When a plus or minus sign separates an algebraic expression into parts, each part is called a **term**. The numerical factor of a term that contains a variable is called the coefficient of the variable. A term without a variable is called a **constant**. **Like terms** contain the same variables to the same powers, such as $3x^2$ and $2x^2$.

Example

1 Identify the terms, like terms, coefficients, and constants in the expression $7x - 5 + x - 3x$.

$7x - 5 + x - 3x = 7x + (-5) + x + (-3x)$ Definition of subtraction
$= 7x + (-5) + 1x + (-3x)$ Identity Property; $x = 1x$

The terms are $7x$, -5, x, and $-3x$. The like terms are $7x$, x, and $-3x$. The coefficients are 7, 1, and -3. The constant is -5.

An algebraic expression is in **simplest form** if it has no like terms and no parentheses.

Examples

Write each expression in simplest form.

2 $5x + 3x$

$5x + 3x = (5 + 3)x$ or $8x$ Distributive Property; simplify.

3 $-2m + 5 + 6m - 3$

$-2m$ and $6m$ are like terms. 5 and -3 are also like terms.

$-2m + 5 + 6m - 3 = -2m + 5 + 6m + (-3)$ Definition of subtraction
$= -2m + 6m + 5 + (-3)$ Commutative Property
$= (-2 + 6)m + 5 + (-3)$ Distributive Property
$= 4m + 2$ Simplify.

Exercises

Identify the terms, like terms, coefficients, and constants in each expression.

1. $-4y - 3 + 2y$ **2.** $-5g + 3 + 2g - g$ **3.** $5 + 3a - 4 - a$

Write each expression in simplest form.

4. $3d + 6d$ **5.** $2 + 5s - 4$ **6.** $2z + 3 - 9z - 8$

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Lesson 5 Skills Practice

Simplify Algebraic Expressions

Identify the terms, like terms, coefficients, and constants in each expression.

1. $4e + 7e + 5$

2. $5a + 2 - 7$

3. $-3h - 2h + 6h + 9$

4. $4 - 4y + y - 3$

5. $7 - 5y + 2 + 1$

6. $2m + 3m - m$

7. $9k + 7 - k + 4$

8. $-8p + 6p - 2$

Write each expression in simplest form.

9. $3t + 6t$

10. $4r + r$

11. $7f - 2f$

12. $9a - 8a$

13. $5c + 8c$

14. $2g - 5g$

15. $8k + 3 + 4k$

16. $7m - 5m - 6$

17. $9 - 6x + 5$

18. $7p - 1 - 9p + 5$

19. $-b - 3b + 8b + 4$

20. $5h - 6 - 8 + 7h$

21. $8b + 6 - 8b + 1$

22. $t - 5 - 2t + 5$

23. $4w + 5w + w$

24. $6m - 7 + 2m + 7$

25. $5f - 7f + f$

26. $12y - 8 + 4y + y$

Write an expression in simplest form that represents the total amount in each situation.

27. **RUNNING** You run m miles on Friday, the same amount on Saturday, and 4 miles on Sunday.

28. **READING** Hendrick read b books in January, twice that amount in February, and 1 book in March.

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Lesson 6 Reteach

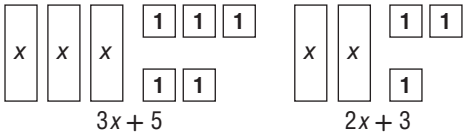
Add Linear Expressions

You can use models to add linear expressions.

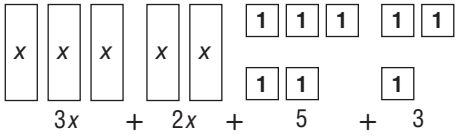
Example 1

Add $(3x + 5) + (2x + 3)$.

Step 1 Model each expression.



Step 2 Combine like tiles and write an expression for the combined tiles.

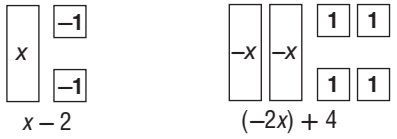


So, $(3x + 5) + (2x + 3) = 5x + 8$.

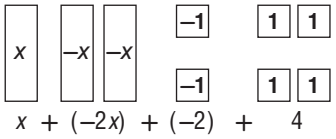
Example 2

Add $(x - 2) + (-2x + 4)$.

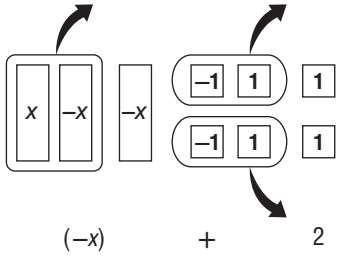
Step 1 Model each expression.



Step 2 Combine like tiles and write an expression for the combined tiles.



Step 3 Remove all zero pairs and write an expression for the remaining tiles.



So, $(x - 2) + (-2x + 4) = -x + 2$.

Exercises

Add. Use models if needed.

1. $(5x + 2) + (3x + 1)$

2. $(-8x + 1) + (-2x + 6)$

3. $(-7x + 4) + (x - 5)$

4. $(-6x + 1) + (4x - 1)$

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Lesson 6 Skills Practice

Add Linear Expressions

Add. Use models if needed.

1. $(5x + 7) + (x + 2)$

2. $(-6x + 3) + (x - 7)$

3. $(-x + 12) + (-4x + 2)$

4. $(-5x + 3) + (-7x - 1)$

5. $(-x + 3) + (4x - 10)$

6. $(5x + 4) + (-8x - 2)$

7. $(-7x + 1) + (4x - 5)$

8. $(6x - 2) + (-x + 5)$

9. $(-9x + 1) + (-7x + 8)$

10. $(-3x - 9) + (4x + 8)$

11. $(-9x - 12) + (x - 8)$

12. $(14x + 7) + (-3x + 2)$

13. $(2x - 1) + (-3x + 7)$

14. $(-5x + 4) + (-9x - 2)$

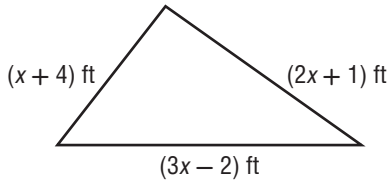
15. $(11x + 2) + (-8x - 2)$

16. $(-9x - 10) + (-5x - 4)$

17. Find the sum of $(10x + 3)$ and $(-4x - 2)$.

18. Find the sum of $(x + 3)$ and $(-x - 4)$.

19. **GEOMETRY** Write and simplify an expression to represent the perimeter of the triangle shown. Then find the value of x if the perimeter is 45 feet.



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Lesson 7 Reteach

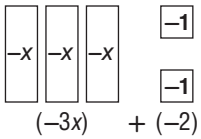
Subtract Linear Expressions

When subtracting expressions, subtract like terms. You can use models or the additive inverse.

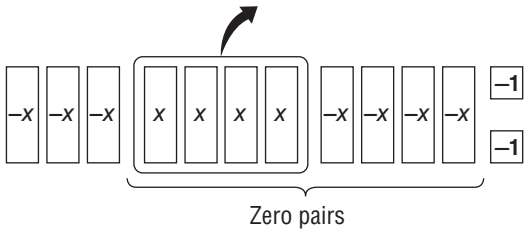
Example 1

Find $(-3x - 2) - (4x)$.

Step 1 Model the expression $-3x - 2$.



Step 2 Since there are no positive x-tiles to remove, add four zero pairs of x-tiles. Remove four positive x-tiles.



So, $(-3x - 2) - (4x) = -7x - 2$.

Example 2

Subtract $(4x + 6) - (-7x + 1)$.

The additive inverse of $-7x + 1$ is $7x - 1$.

$$\begin{array}{rl} 4x + 6 & \text{Arrange like terms in columns.} \\ \underline{+\ 7x - 1} & \text{Add.} \\ 11x + 5 & \end{array}$$

So, $(4x + 6) - (-7x + 1) = 11x + 5$.

Exercises

Subtract. Use models if needed.

1. $(9x + 10) - (2x + 4)$

2. $(3x + 4) - (2x - 5)$

3. $(6x + 3) - (-x - 2)$

4. $(4x - 1) - (x + 3)$

5. $(3x - 1) - (2x - 6)$

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Lesson 7 Skills Practice

Subtract Linear Expressions

Subtract. Use models if needed.

1. $(5x + 7) - (x + 2)$

2. $(2x - 6) - (x - 7)$

3. $(-x + 12) - (-4x + 2)$

4. $(-5x + 3) - (-7x - 1)$

5. $(-x + 3) - (4x - 10)$

6. $(5x + 4) - (-8x - 2)$

7. $(-7x + 1) - (4x - 5)$

8. $(6x - 2) - (-x + 5)$

9. $(-9x + 1) - (-7x + 8)$

10. $(-3x - 9) - (4x + 8)$

11. $(-9x - 12) - (x - 8)$

12. $(14x + 7) - (-3x + 2)$

13. $(5x - 1) - (-3x + 7)$

14. $(-5x + 4) - (-9x - 2)$

15. $(11x + 2) - (-8x - 2)$

16. $(-9x - 10) - (-5x - 4)$

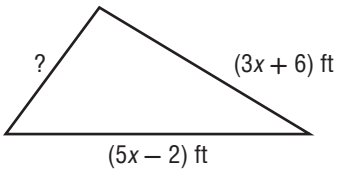
17. $(x - 2) - (x - 6)$

18. $(-6x + 1) - (-3x + 1)$

19. $(2x + 4) - (5x - 2)$

20. $(-12x - 6) - (-4x + 3)$

21. **GEOMETRY** The perimeter of the triangle shown is $(10x + 1)$ feet. Find the length of the missing side.



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Lesson 8 Reteach

Factor Linear Expressions

A **linear expression** is in factored form when it is expressed as the product of its factors.

Example 1

Factor $5x + 10$.

Use the GCF to factor the linear expression.

$5x = (5) \cdot x$ Write the prime factorization of $5x$ and 10.

$10 = (5) \cdot 2$ Circle the common factors.

The GCF of $5x$ and 10 is 5. Write each term as a product of the GCF and its remaining factors.

$5\boldsymbol{x} + 10 = 5(x) + 5(2)$

$= 5(x + 2)$ Distributive Property

So, $5x + 10 = 5(x + 2)$.

Example 2

Factor $3x + 8$.

$3\boldsymbol{x} = 3 \cdot \boldsymbol{x}$

$8 = 2 \cdot 2 \cdot 2$

There are no common factors, so $3x + 8$ *cannot be factored.*

Exercises

Factor each expression. If the expression cannot be factored, write *cannot be factored.*

1. $15x + 10$

2. $7x - 3$

3. $6x + 9$

4. $30x - 25$

5. $13x + 14$

6. $50x - 75$

7. $24x - 18$

8. $18x + 13$

9. $16x - 12$

10. $36x + 45$

NAME _____ DATE _____ PERIOD _____

Lesson 8 Skills Practice

Factor Linear Expressions

Factor each expression. If the expression cannot be factored, write *cannot be factored.*

1. $17x + 34$

2. $10x + 25$

3. $30x + 18$

4. $45x - 18$

5. $38x - 12$

6. $28x + 15$

7. $3x - 27$

8. $6x + 24$

9. $26x - 5$

10. $48x + 56$

11. $15x - 14$

12. $20x - 100$

13. $7x + 35$

14. $7x + 17$

15. $9x - 63$

16. $39x + 13$

17. $8x + 15$

18. $18x - 12$

19. $24x + 48$

20. $45x - 81$

21. The area of a rectangular sandbox is $(5x + 40)$ feet. Factor $5x + 40$ to find possible dimensions of the sandbox.