Name _____

Reteaching
1-1

Exponents

base ⟶ 5^4 ⟵ exponent

The number 5 is the **base.** The base is the factor that is being multiplied.

The number 4 is the **exponent.** The exponent tells how many times the base is used as a factor.

$$5^4 = 5 \times 5 \times 5 \times 5 = 625$$

The base (5) is used as a factor the exponent (4) number of times.

To write a product in exponential form:
$4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4$

First write the base: 4

Count the number of times the base is used as a factor. This is the exponent. 4^7

To evaluate an exponential number: 6^3

Write the base as a factor the number of times shown by the exponent.

$6^3 = 6 \times 6 \times 6 = 216$

To write the expanded form of a number using exponents:

Write the number in expanded form.

$52{,}965 = (5 \times 10{,}000) + (2 \times 1{,}000) + (9 \times 100) + (6 \times 10) + (5 \times 1)$

Write the place values as powers of 10.

$52{,}965 = (5 \times 10^4) + (2 \times 10^3) + (9 \times 10^2) + (6 \times 10^1) + (5 \times 10^0)$

Tip: Any number raised to the first power equals that number. $8^1 = 8$

Write each power as a product and evaluate the expression.

1. 9^4 $9 \times 9 \times 9 \times 9 = 6{,}561$ 2. 4^5 $4 \times 4 \times 4 \times 4 \times 4 = 1{,}024$

Write each product in exponential form.

3. $3 \times 3 \times 3 \times 3 \times 3$ 3^5 4. $7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7$ 7^8

Write the number in expanded form using exponents.

5. $74{,}271 = (7 \times 10^4) + (4 \times 10^3) + (2 \times 10^2) + (7 \times 10^1) + (1 \times 10^0)$

6. **Number Sense** Explain the difference between 4^6 and 6^4.

4^6 means $4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4{,}096$ and 6^4 means $6 \times 6 \times 6 \times 6 = 1{,}296$.

Name _____

Practice
1-1

Exponents

Write each expression in exponential form.

1. $5 \times 5 \times 5 \times 5 \times 5 \times 5$ **5^6**

2. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ **2^7**

3. $3 \times 3 \times 3$ **3^3**

4. 9 **9^1**

Write each number in expanded form using exponents.

5. 53,806 **$(5 \times 10^4) + (3 \times 10^3) + (8 \times 10^2) + (6 \times 10^0)$**

6. 527,519 **$(5 \times 10^5) + (2 \times 10^4) + (7 \times 10^3) + (5 \times 10^2) + (1 \times 10^1) + (9 \times 10^0)$**

Evaluate.

7. 6^2 **36**

8. 5^3 **125**

9. 3^6 **729**

10. 2^8 **256**

11. **Reasoning** Zach invested $50 and was able to triple his money in two years. Kayla also began with $50 in investments, and was able to cube her money in two years. Who had more money after two years? Explain.

Kayla had more money, because she had $\$50^3$, or $50 \times 50 \times 50 = \$125{,}000$. Zach only had $\$50 \times 3 = \$150$ after two years.

12. **Writing to Explain** In 1968, the estimated population of the world was 3,559,028,982 people. When this number is written in expanded form using exponents, one power of 10 would not be represented. Which power of 10? Why?

10^5 would not be represented because there is a 0 in the hundred-thousands place.

13. **Number Sense** Which is **NOT** equal to 1?

A 10^0

B 4^1

C 1×10^0

D 1^4

Name _____

Enrichment
1-1

Power Patterns

Patterns

Powers of 2	Powers of 3	Powers of 5
$2^1 = 2$	$3^1 = 3$	$5^1 = 5$
$2^2 = 4$	$3^2 = 9$	$5^2 = 25$
$2^3 = 8$	$3^3 = 27$	$5^3 = 125$
$2^4 = 16$	$3^4 = 81$	$5^4 = 625$
$2^5 = 32$	$3^5 = 243$	$5^5 = 3{,}125$
$2^6 = 64$	$3^6 = 729$	$5^6 = 15{,}625$
$2^7 = 128$	$3^7 = 2{,}187$	$5^7 = 78{,}125$
$2^8 = 256$	$3^8 = 6{,}561$	$5^8 = 390{,}625$
$2^9 = 512$	$3^9 = 19{,}683$	$5^9 = 1{,}953{,}125$
$2^{10} = 1{,}024$	$3^{10} = 59{,}049$	$5^{10} = 9{,}765{,}625$

1. Complete the *Powers of 2* column in the chart. Then, describe the pattern you see.

   The exponents increase by 1 and each product doubles.

2. Complete the *Powers of 3* column in the chart. Then describe the pattern you see.

   The exponents increase by 1 and each product triples.

3. How are the patterns for powers of 2 and powers of 3 the same?

   The exponents increase by 1 and the product increases times the base number.

4. Describe the pattern you expect to find in the *Powers of 5* column in the chart. Then, complete the chart.

   The exponents will increase by 1 and the product will increase times 5.

Name _____

Reteaching
1-2

Properties of Operations

Commutative Properties You can add or multiply numbers in any order and the sum or product will be the same. **Examples:** $10 + 5 + 3 = 5 + 3 + 10 = 18$ $7 \times 5 = 5 \times 7 = 35$	**Associative Properties** You can group numbers differently. It will not affect the sum or product. **Examples:** $2 + (7 + 6) = (2 + 7) + 6 = 15$ $(4 \times 5) \times 8 = 4 \times (5 \times 8) = 160$
Identity Properties You can add zero to a number or multiply it by 1 and not change the value of the number. **Examples:** $17 + 0 = 17$ $45 \times 1 = 45$	**Multiplication Property of Zero** If you multiply a number by zero, the product will always be zero. **Example:** $12 \times 0 = 0$

Find each missing number. Tell what property or properties are shown.

1. $9 \times 5 = 5 \times$ 9
   Commutative Property of Multiplication

2. 1 $\times 89 = 89$
   Identity Property of Multiplication

3. $(3 + 4) + 19 = 3 + ($ 4 $+ 19)$
   Associative Property of Addition

4. $128 +$ 0 $= 128$
   Identity Property of Addition

5. 12 $+ 18 = 18 + 12$
   Commutative Property of Addition

6. **Reasoning** What is the product of any number, x, multiplied by 1? Explain how you know.
   Sample answer: The product of any number, x, multiplied by 1 is x because of the Identity Property of Multiplication.

Name _____

Practice
1-2

Properties of Operations

Find each missing number. Tell what property or properties are shown.

1. $(32 + \underline{14}) + 2 + 7 = 32 + (14 + 2) + 7$
   Associative Property of Addition

2. $8 + 6 + 12 = \underline{8} + 12 + 6$
   Commutative Property of Addition

3. $(8 \times \underline{9}) \times 7 = 8 \times (9 \times 7)$
   Associative Property of Multiplication

4. $\underline{34} + 0 = 34$
   Identity Property of Addition

5. $12 \times 3 = 3 \times \underline{12}$
   Commutative Property of Multiplication

6. $1 \times \underline{288} = 288$
   Identity Property of Multiplication

7. **Reasoning** Write a number sentence that shows why the associative property does not work with subtraction.
   Sample answer: $(4 - 3) - 1 \neq 4 - (3 - 1)$

8. Which property is shown in $(23 \times 5) \times 13 \times 7 = 23 \times (5 \times 13) \times 7$?

   A Commutative Property of Multiplication
   B Identity Property of Multiplication
   (C) Associative Property of Multiplication
   D Associative Property of Addition

9. **Writing to Explain** Explain why you do not have to do any computing to solve $15 \times 0 \times (13 + 7)$.
   Sample answer: The product of zero and any number is zero.

Name _____

Enrichment
1-2

Find the Patterns

Patterns

The number patterns below use combinations of addition, subtraction, multiplication, and division. Answer the questions, then follow the directions to write your own patterns.

1. 2, 1, 8, 7, 14, 13, 20

The number pattern uses addition and **subtraction**.

The pattern is **subtract** 1, add **7**.

Write the next five numbers in the pattern. **19**, **26**, **25**, **32**, **31**

Write your own number pattern that uses the same operations. (answers will vary)

Check that students' patterns use addition and subtraction.

2. 1, 1, 11, 6, 6, 16, 11, 11, 21, 16

The number pattern uses addition, **subtraction**, and **multiplication**.

The pattern is **multiply by 1**, **add 10**, and **subtract 5**.

Write the next five numbers in the pattern. **16**, **26**, **21**, **21**, **31**

Write your own number pattern that uses the same operations. (answers will vary)

Check that students' patterns use addition, subtraction, and multiplication.

3. 5, 10, 14, 6, 12, 16, 8, 16, 20, 12

The number pattern uses **addition**, **subtraction**, and **multiplication**.

The pattern is **multiply by 2**, **add 4**, and **subtract 8**.

Write the next three numbers in the pattern. **24**, **28**, **20**

Name _____

Reteaching
1-3

Order of Operations

Order of operations is a set of rules that mathematicians use when computing numbers. Here is how order of operations is used to solve the following problem: $7 + (5 \times 4) \times 3$.

Order of Operations

First, compute all numbers inside parentheses.	$7 + (5 \times 4) \times 3$ $7 + \quad 20 \quad \times 3$
Next, evaluate terms with exponents. If there are no exponents, go to the next step.	$7 + 20 \times 3$
Then, multiply and divide the numbers from left to right.	$7 + 60$
Finally, add and subtract the numbers from left to right.	67

How to use parentheses to make each sentence true:	$6 + 2 \times 9 = 72$
Using order of operations, $6 + 2 \times 9 = 24$, not 72.	
Place parentheses around $6 + 2$ so that this operation is done first:	$(6 + 2) \times 9 = 72$ $8 \times 9 = 72$

Evaluate each expression.

1. $8 + 7 \times 5 =$ **43**
2. $18 - 3 \times 2 =$ **12**
3. $3 \times 7 + 3 \times 5 =$ **36**
4. $40 \div (2 \times 4) =$ **5**
5. $6 \times 3 - 6 \times 2 =$ **6**
6. $9 + 2^3 =$ **17**
7. $7 + 12 \times 3 - 2 =$ **41**
8. $4 \times (5 + 5) \div 20 + 6 =$ **8**
9. $4^2 - (3 \times 5) =$ **1**
10. $(3 \times 2) + 3^2 =$ **15**

11. **Reasoning** Which operation should be performed *last* in this problem: $3^2 + 7 \times 4$? Why?

Addition; It is the last step in order of operations.

Use parentheses to make each sentence true.

12. $0 \times 6 + 9 = 9$ — **$(0 \times 6) + 9 = 9$**
13. $3^2 + 2 \times 2 = 13$ — **$3^2 + (2 \times 2) = 13$**

Name _____

Practice
1-3

Order of Operations

Evaluate each expression.

1. $3 + 4 \times 7$ **31**

2. $88 - 6 \times 6$ **52**

3. $8 \times 2 + 7 \times 3$ **37**

4. $(5 + 9) + 3 \times 8$ **38**

5. $(6 + 3^2) + 5$ **20**

6. $9^2 - (7 \times 5) + 3$ **49**

7. $48 \div 2 + 6$ **30**

8. $26 \div (5 + 8) + 1$ **3**

9. $18 + 3 \times (6 \div 2)$ **27**

10. **Reasoning** What operation would you perform *last* in this problem: $(2 \times 3) + (7 \times 2)$? **Addition**

Use parentheses to make each number sentence true. VARY

11. $10 + (5 \times (4^2) \div 2^3) = 20$

12. $124 - 6 \times (0 + 15) = 34$

13. $(10^2 - 10) + 3 = 93$

14. $(7 + (5) \times (3) \div 3) = 12$ OR (3 ways)

15. Mr. Miller's sixth-grade class went on a field trip to hear the symphony perform. Their seats were grouped in the following ways: 2 groups of 3 seats; 3 groups of 4 seats, 4 groups of 2 seats, and 1 seat (for Mr. Miller). Write a number sentence to calculate how many students went on the field trip.

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

26 students

16. Evaluate the expression $(4^2 - 4) + 6 \div 2$.

A 4 B 9 C 12 (D) 15

17. **Writing to Explain** Suppose you had to evaluate $9^2 + 5 \times 4$. Tell the order in which you would compute these numbers.

First you would compute 9^2, then 5×4, then add 81 to 20.

Name _____

Enrichment
1-3

Operational Order

Number Sense

For **1–4,** use the digits in the number 2,013 and the symbols +, −, ×, ÷, or ( ) to find each number.

Example: 0 = (2 + 1) − (3 + 0)

Sample answers given for 1–14.

1. 1 = **(3 × 1) − (2 + 0)**
2. 3 = **(2 − 1) × 3 + 0**
3. 5 = **(2 + 0) × 3 − 1**
4. 6 = **(1 + 0) × (2 × 3)**

For **5–8,** use the digits in the number 3,427 and the symbols +, −, ×, ÷, or ( ) to find each number.

5. 3 = **(7 − 4) × (3 − 2)**
6. 7 = **2 + 3 × 4 − 7**
7. 29 = **4 × 2 + 7 × 3**
8. 38 = **7 × (2 × 3) − 4**

For **9–14,** use the digits in the number 1,892 and the symbols +, −, ×, ÷, or ( ) to find each number.

9. 1 = **(9 − 8) × 2 − 1**
10. 2 = **8 − (9 − 2) + 1**
11. 10 = **(9 × 2) × 1 − 8**
12. 55 = **(9 − 2) × 8 − 1**
13. 66 = **(9 −1) × 8 + 2**
14. 75 = **(9 × 8) + 1 + 2**

Name _____

Reteaching
1-4

The Distributive Property

You can use the distributive property to multiply mentally.

Example A. Evaluate 7×53.

	7×53
Break 53 apart into $50 + 3$.	$7 \times (50 + 3)$
Then distribute the 7 to each part.	$(7 \times 50) + (7 \times 3)$
Multiply.	$350 + 21$
Add the products.	371

Example B. Evaluate $5(42) - 5(2)$. Remember $5(42)$ means 5×42.

Use the distributive property in reverse.	$5(42) - 5(2)$
Join 42 and 2 using the minus sign.	$5\ (42 - 2)$
Subtract.	5×40
Multiply the difference by 5.	200

Find each missing number.

1. $8 \times (30 + 2) = (8 \times$ **30** $) + (8 \times 2)$
2. $(6 \times$ **37** $) - (6 \times 7) = 6 \times (37 - 7)$
3. $8(28) = 8\ (20) + 8\ ($ **8** $)$
4. $3(22) + 3(4) = 3($ **20** $) + 3(6)$

Use the distributive property and mental math to evaluate.

5. $6(24)$ **144**
6. $4(13) - 4(3)$ **40**
7. $7(24 + 6)$ **210**
8. $2(72)$ **144**
9. $9(12) + 9(3)$ **135**
10. $5(24 - 3)$ **105**

11. **Number Sense** What are two other ways to write 9(46)?

9(40) + 9(6); 9(40 + 6)

Name _____

Practice
1-4

The Distributive Property

Find each missing number.

1. $8 \times (30 + 2) = (8 \times$ **30** $) + (8 \times 2)$
2. $8(94) = 8($ **90** $) + 8(4)$
3. $5(45 + 5) = 5($ **50** $)$
4. $9(42) - 9(4) = 9(30) + 9($ **8** $)$

Use the distributive property and mental math to evaluate.

5. $3(58 - 8)$ **150**
6. $7(31 + 19)$ **350**
7. $9(72)$ **648**
8. $4(26) - 4(16)$ **40**
9. $8(41) + 8(5)$ **368**
10. $5(22 - 5)$ **85**

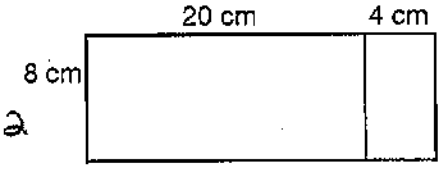
11. **Writing to Explain** Describe the mental math steps you would use to find 7(42).

Break 42 into 40 + 2. Multiply 40 × 7 = 280 and 2 × 7 = 14. Then add 280 + 14 = 294.

12. **Number Sense** Use mental math to evaluate the expression 6(31) + 6(4) − 6(15).

120 6(20)

13. **Geometry** Write an expression for the area of this rectangle. Evaluate your expression to find the area.



8 (20 + 4) = 160 + 32 = 192 cm^2

14. **Algebra** Which expression is equal to $12m + 12n$?

A $12mn$

B $12m + n$

C $12m - 12n$

(D) $12(m + n)$

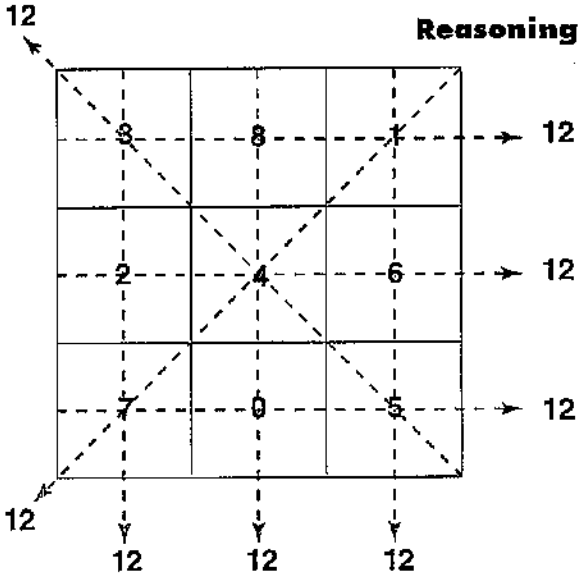
Name _____

Enrichment
1-4

Puzzling Squares

Reasoning

In an addition puzzle square, the sum of each row, column, and diagonal is the same. In the addition puzzle square shown at the right, each row, column, and diagonal adds to a sum of 12.



Puzzle square sum: 12

1. Complete the addition puzzle square.

24	29	28
31	27	23
26	25	30

Puzzle square sum: 81

2. Use the numbers 1–9 to make an addition puzzle square.

8	3	4
1	5	9
6	7	2

Puzzle square sum: 15

3. There are also multiplication puzzle squares in which the product of each row, column, and diagonal is the same. Follow the directions to make a multiplication puzzle square.

First, make an addition puzzle square using the digits 1, 2, and 3. Use each digit three times

1	3	2
3	2	1
2	1	3

Second, subtract 1 from each digit in the square, and raise 2 to the power of that number.

2^0	2^2	2^1
2^2	2^1	2^0
2^1	2^0	2^2

Third, complete your multiplication and write the product of each power of 2 to create the final multiplication puzzle square.

1	4	2
4	2	1
2	1	4

Puzzle square sum: 6 Puzzle square product: 8

Name _____

Reteaching
1-5

Evaluating Numerical Expressions

Brackets and parentheses are both used to show groupings.
Brackets are used to avoid double parentheses: [(instead of ((.

Evaluate expressions according to the order of operations.

1. Evaluate inside parentheses, then evaluate inside brackets.	$2.3^2 + \mathbf{[(9 \times 0.4) + (3 \times 0.8)]} \times 1.2$ $2.3^2 + \mathbf{[3.6 + 2.4]} \times 1.2$ $2.3^2 + 6 \times 1.2$
2. Evaluate exponents.	$\mathbf{2.3^2} + 6 \times 1.2$ $5.29 + 6 \times 1.2$
3. Multiply and divide from left to right.	$5.29 + \mathbf{6 \times 1.2}$ $5.29 + 7.2$
4. Add and subtract from left to right.	$\mathbf{5.29 + 7.2}$ 12.49

Evaluate each expression.

1. $(7.8 \div 2) \times 12$

46.8

2. $5.6 + (3 \times 9.6 - 4.8)$

29.6

3. $[(4.2 \times 3.4) - 9.28]$

5

4. $[4 \times (9.6 \div 3)] + 8.4$

21.2

5. $5 \times [(6 \times 2.3) + 0.9]$

73.5

6. $2^4 \div [(3.2 \times 0.8) + 1.44]$

4

7. Reasoning Is it possible to have an expression that uses brackets without using any parentheses? Give your reasons. **Yes, it is possible because brackets mean the same as parentheses.**

8. Estimation How could you estimate to get an approximate answer for this expression: $12.3 \times [(2 \times 1.7) + 6] - 2^3$? **Round each decimal to a whole number to get an estimate of 112.**

Name _____

Practice
1-5

Evaluating Numerical Expressions

1. $6^2 - (3.1 \times 5 + 2.3)$

18.2

2. $[(8 - 3.7) \times 6] \div 1.5$

27.3

3. $9^2 - [(4.2 \times 3.4) - 9.28]$

76

4. $3.2^2 - [(12.6 - 2^2) \times 0.6]$

5.08

5. $[(0.3 \times 8) + (1.5 \times 3)] + 6^2$

42.9

6. $40 \div [9.6 - (8 \times 0.2)]$

5

7. $3^3 + 4.2 \times 8 \div 0.2$

195

8. $8.8 + [(0.4 \times 7) + (3.1 \times 2)]$

17.8

9. $7^2 - [(6^2 - 22.4) + (8 \div 0.5)] + 3.8$

23.2

10. $9 + [(4.2 - 3.3) + (6.4 \div 0.8)] \times 3$

35.7

11. $41 - 3^2 + (8 \times 2.3) - 15 + (2.1 \times 4)$

43.8

12. $13 + 26 - [(2.8 \times 5) \div 7]$

37

13. $16 + 23 - [(5 + 2) \times 1.9] - 13 + 6.8$

19.5

14. Jessica bought a new computer for $800. She put $120 down and got a student discount of $50. Her mother gave her $\frac{1}{2}$ of the balance for her birthday. Which of these expressions could be used to find the amount Jessica still owes on the computer?

A $800 - 120 + 50 \div 2$

B $[800 - (120 - 50) \div 2]$

C $800 - (120 - 50) \div 2$

(D) $[800 - (120 + 50)] \div 2$

15. **Number Sense** A printing error in a math book removed the brackets and parentheses from the original expression of $(7 \times 3.4) - [(2.8 \times 5) - (4.3 \times 2)] + 4^2$. Give the order of operations a student solving this problem would have used to evaluate the expression with the printing error, and find the value of the incorrect expression and the correct expression.

Exponent, multiplication, multiplication, multiplication, subtraction, subtraction, addition; incorrect: 17.2; correct: 34.4

Name _____

Enrichment
1-5

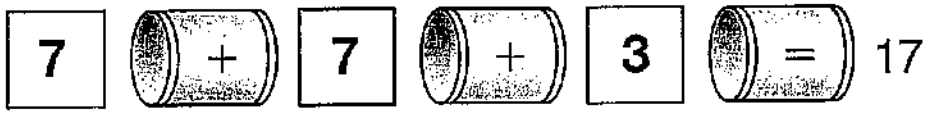
Prime Time

Every number greater than 5 can be written as the sum of three prime numbers. For example, 13 = 3 + 3 + 7 or 13 = 3 + 5 + 5.

Express the numbers below as the sum of three prime numbers. Write the primes in the squares.

Reasoning

Sample answers are given.

1. 

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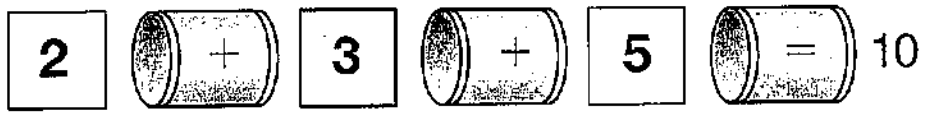
2. 

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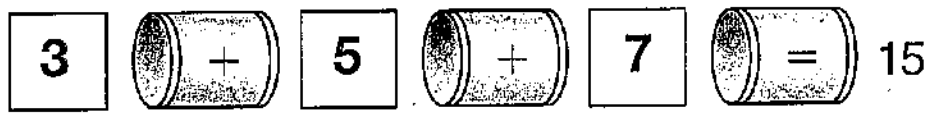
3. 

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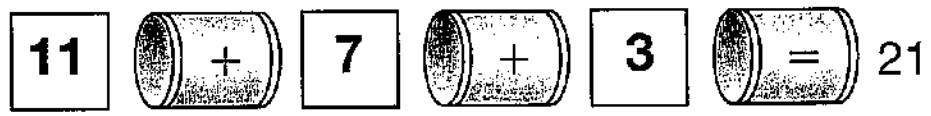
4. 

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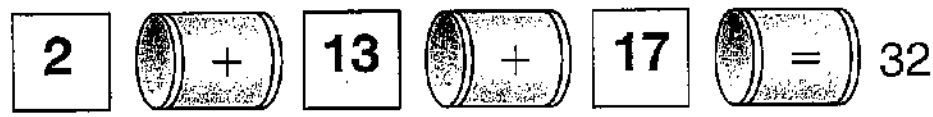
5. 

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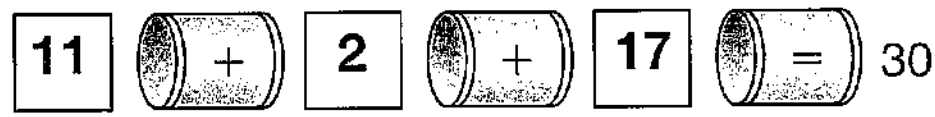
6. 

30

Name _____

Reteaching
1-6

Using Variables to Write Expressions

A variable represents a quantity that can change. To use a variable to write an algebraic expression for a situation, you need to decide which operation is appropriate for the situation. To help you, some words and phrases are listed below.

Word phrase	Variable	Operation	Algebraic Expression
ten **more than** a number b	b	Addition	$b + 10$
the **sum** of 8 and a number c	c		$8 + c$
five **less than** a number d	d	Subtraction	$d - 5$
15 **decreased by** a number e	e		$15 - e$
the **product** of 8 and a number f	f	Multiplication	$8f$
19 **times** a number g	g		$19g$
the quotient of a number h **divided by** 2	h	Division	$h \div 2$
a number i **divided into** 50	i		$50 \div i$

Write each algebraic expression.

1. a number j **divided by** 5

   Identify the operation. **Division** Write the expression. **$j \div 5$**

2. the **sum** of 2 and a number k **$2 + k$**

3. 6 **times** a number m **$6m$**

4. a number n **divided into** 9 **$9 \div n$**

5. 4 **less than** a number p **$p - 4$**

6. q fewer limes than 10 **$10 - q$**

7. r tickets at \$7 each **$7r$**

8. A field goal scores 3 points. Write an algebraic expression to represent the number of points the Raiders will score from field goals.

   Identify the operation **Multiplication** Write the expression. **$3s$**

9. **Writing to Explain** Write an algebraic expression to represent the situation below. Explain how the expression relates to the situation.

   Some children share 5 apples equally among themselves.

$5 \div t$; The words 'share' and 'equally' show that the operation is division. The 5 refers to the apples. The variable, t, refers to the number of children equally sharing the apples.

Name _____

Practice
1-6

Using Variables to Write Expressions

Write each algebraic expression.

1. 6 more than a number c **$c + 6$**
2. twice a number b **$2b$**
3. 25 less than a number d **$d - 25$**
4. the product of 7 and a number e **$7e$**
5. 50 divided by a number f **$50 \div f$**
6. the sum of a number g and 2 **$g + 2$**
7. 8 more stripes than a number h **$h + 8$**
8. 12 fewer hats than four times a number i **$4i - 12$**

9. Alexander has $10. He buys a snack. Which expression shows how much money Alexander has left?

   A $s + 10$

   (B) $10 - s$

   C $10s$

   D $s \div 10$

10. A diner has booths and counter seating. Each booth can seat 4 people. Another 15 people can sit at the counter. Which expression shows how many customers can be seated in the diner?

    A $15b - 4$

    B $15b + 4$

    C $4b - 15$

    (D) $4b + 15$

11. **Reasonableness** Linnia bought some flats of flowers. Each flat holds 9 flowers. Linnia has planted 10 flowers. Is $9x + 10$ a reasonable way to represent the number of flowers that Linnia has left to plant? Explain your answer.

No, Linnia purchased $9x$ flowers. She has planted 10 of them, so she has fewer than $9x$ flowers left to plant. The expression should be $9x - 10$.

Name _____

Enrichment
1-6

Say It in Shapes

Visual Thinking

An expression and a shape are given for each exercise below. Use the shape to represent the given expression. Then use the properties of operations to give an equivalent expression.

Example: 4 + 3 + 1, circle

Answer:

○○○○ + ○○○ + ○ = ○○○ + ○ + ○○○○

1. 5 + 2 + 7, triangle

△△△△△ + △△ + △△△△△△△ =

△△△△△△△ + △△△△△△△

2. 2(3 + 8), square

(□□□ + □□□□□□□□) + (□□□ + □□□□□□□□) =

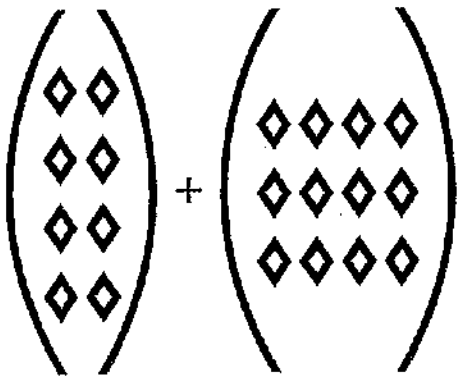
□□□ + □□□□□□□□
□□□ □□□□□□□□

3. 8 + (7 + 4), circle

○○○○○○○○ + (○○○○○○○ + ○○○○) =

(○○○○○○○○ + ○○○○○○○) + ○○○○

4. (4 × 2) + (3 × 4), diamond



= (◇◇◇◇◇◇◇◇) +
(◇◇◇◇◇◇◇◇◇◇◇◇)

Name _____

Reteaching
1-7

Parts of an Expression

There are special words you can use to describe expressions and the parts of expressions.

Terms are the parts of an expression separated by a plus or a minus sign.

$3k - 9w + 14$ has three terms: $3k$, $9w$, 14.

$h + 9$ is a **sum**.

$h - 9$ is a **difference**.

A **coefficient** is a number that is multiplied by a variable.

In the term $3k$, 3 is the coefficient of k.

$9h$ is a **product**. The **factors** are 9 and h.

$\frac{h}{9}$ is a **quotient**.

Tell how many terms are in each expression.

1. $4s + 4t$ 2

2. $ab + cd - ef$ 3

Identify the coefficient of the variable. Then identify the factors.

3. $28p$ 28; 28 and p

4. $4q$ 4; 4 and q

Describe each expression using **two** of these words: sum, difference, product, or quotient.

5. $vw - 12$ product and difference

6. $\frac{34}{a} + 5$ quotient and sum

7. $6(15 + 3)$ product and sum

8. $\frac{13y}{10}$ product and quotient

9. **Writing to Explain** Oscar says the expression $t \div u$ has two terms. Vincent says it has one term. Who is right? Explain.

Vincent is right. Terms are separated by a plus or a minus sign. This expression has no plus or minus signs.

Name _____

Practice
1-7

Parts of an Expression

Describe each expression.

1. $n - 4$ **Sample answer: This expression is the difference *n* minus 4.**

2. $25(b + 4)$ **Sample answer: This expression has two terms. One factor is 25 and the other is the sum *b* plus 4.**

Tell how many terms are in each expression.

3. $\frac{22x}{3y}$ **1**

4. $\frac{a}{b} + \frac{c}{d}$ **2**

Identify the coefficient of the variable. Then identify the factors.

5. $37n$ **37; 37 and *n***

6. $8.5w$ **8.5; 8.5 and *w***

Use the table for 7 and 8. Inez is buying office supplies for her company. She buys *b* boxes of black ink cartridges and *c* boxes of colored ink cartridges.

Item	Number in box	Cost per box
Black ink cartridges	8	$130
Colored ink cartridges	6	$115

7. Write an expression for the total number of ink cartridges Inez buys.
$8b + 6c$

8. Write an expression for the total cost of the cartridges Inez buys.
$130b + 115c$

9. **Writing to Explain** Compare the expressions you wrote in 7 and 8. How are they alike? How are they different? Use terminology from this lesson in your explanation.
Sample answer: Alike: Both expressions have 2 terms, both contain the variables *b* and *c*, and both are sums. Different: The terms with the same variable have different coefficients.

10. Which expression shows the sum of two products?

A $2jk$ B $(4 + d)(7 + e)$ C $5a + bc$ D $2 + \frac{u}{4}$

Name _____

Enrichment
1-7

Product Patterns

These products have fascinating patterns. Look for the pattern and then write the next two instances of it.

1. $101 \times 11 = 1{,}111$
$101 \times 22 = 2{,}222$
$101 \times 33 = 3{,}333$
$101 \times 44 = 4{,}444$

101 × **55** = **5,555**

101 × **66** = **6,666**

2. $1 \times 1 = 1$
$11 \times 11 = 121$
$111 \times 111 = 12{,}321$
$1{,}111 \times 1{,}111 = 1{,}234{,}321$

11,111 × **11,111** = **123,454,321**

111,111 × **111,111** = **12,345,654,321**

3. $143 \times 7 = 1{,}001$
$143 \times 14 = 2{,}002$
$143 \times 21 = 3{,}003$
$143 \times 28 = 4{,}004$

143 × **35** = **5,005**

143 × **42** = **6,006**

4. $37 \times 3 = 111$
$37 \times 6 = 222$
$37 \times 9 = 333$
$37 \times 12 = 444$

37 × **15** = **555**

37 × **18** = **666**

Some products and sums also have interesting patterns.
Look for the pattern and then write the next two instances of it.

5. $9 \times 9 + 7 = 88$
$9 \times 98 + 6 = 888$
$9 \times 987 + 5 = 8{,}888$
$9 \times 9{,}876 + 4 = 88{,}888$

9 × **98,765** + **3** =

888,888

9 × **987,654** + **2** =

8,888,888

6. $1 \times 8 + 1 = 9$
$12 \times 8 + 2 = 98$
$123 \times 8 + 3 = 987$
$1{,}234 \times 8 + 4 = 9{,}876$

12,345 × **8** + **5** =

98,765

123,456 × **8** + **6** =

987,564

Name _____

Reteaching
1-8

Evaluating Algebraic Expressions

To evaluate an expression, follow these steps:

1. Substitute or replace the variable with the value given in the problem.
2. Perform the operation or operations.
3. If there is more than one operation, use the order of operations.

Evaluate $4 + 2n$ for 3.

Replace n with 3.	$4 + 2(3)$
Multiply first.	$4 + 6$
Then add.	10

The value of the expression is 10.

Evaluate $g^2 - 3(3) + g \div 2$; $g = 4$.

Replace g with 4.	$4^2 - 3(3) + 4 \div 2$
Evaluate terms with exponents.	$16 - 3(3) + 4 \div 2$
Then multiply and divide.	$16 - 9 + 2$
Then subtract and add.	9

The value of the expression is 9.

Apply the substitutions and evaluate.

1. $12n$; $n = 3$ **$12(3) = 36$**

2. $2t - 4$; $t = 6$ **$2(6) - 4 = 8$**

3. $r + 48 \div r$; $r = 8$ **$8 + 48 \div 8 = 14$**

For **4–7**, evaluate each expression for 3, 6, and 8.

4. $7x$ **21, 42, 56**

5. $6x + 4$ **22, 40, 52**

6. $14 + x \div 2$ **15.5, 17, 18**

7. $x + 2x$ **9, 18, 24**

8. Katie rented a bicycle at the beach for $3 an hour plus a $5 fee. Write an expression that shows how much it will cost Katie to rent the bicycle. Then solve the expression for 4 hours.

Sample answer: $3x + 5$; $17

9. **Writing to Explain** Timothy is solving the problem $50 + 108x \div 4$. What order of operations should he follow?

Multiply and divide left to right, and then add.

Name _____

Practice
1-8

Evaluating Algebraic Expressions

Apply the substitutions and evaluate.

1. $7x - 4; x = 9$ **$7(9) - 4 = 59$**

2. $3d + (5 - d); d = 4$ **$(3 \times 4) + (5 - 4) = 13$**

3. $8 + 2g - g \div 2; g = 6$ **$8 + (2 \times 6) - 6 \div 2 = 17$**

For **7–10,** evaluate each expression for 2, 6, and 8.

4. $5x$ **10, 30, 40**

5. $x + 12$ **14, 18, 20**

6. $96 \div x$ **48, 16, 12**

7. $x^2 - x$ **2, 30, 56**

8. Evaluate the expression for the values of h.

h	6	18	24	42	54
$(h - 6) + h \div 6$	**1**	**15**	**22**	**43**	**57**

9. The table shows how much Tia charges for pet sitting. Write an expression to show how much Tia will earn for sitting two dogs for a day and two cats per hour. Then solve for sitting two dogs for the day and one cat for 6 hours.

Number of Pets	Per Day	Per Hour
One dog	$20	$7
Two dogs	$25	$9
One or two cats	$15	$6

$25 + 6x$; $61

10. **Writing to Explain** Tia wrote $20 + 7x$ to find how much she earned for one pet sitting job and $15x$ for another job. Explain the difference between the expressions.

Sample answer: The expression $20 + 7x$ represents sitting one dog for a day and another dog for x hours. The expression $15x$ represents sitting one or two cats for x days.

11. Evaluate the expression $6 + 8f$ for $f = 4$.

A 8

B 18

C 38

D 56

Name _____

Enrichment
1-8

Patterns in Expressions

Patterns

Evaluate each expression in a series for the specified value of the variable x. Then describe the pattern created. Finally, use the pattern to write and evaluate an expression to show the specified term in the pattern.

1. Evaluate each expression for $x = 2$: $x + 1, x + 2, x + 3, x + 4, x + 5, \ldots$

   3, 4, 5, 6, 7, . . .

   Describe the pattern. **Sample answer: Add 2 to the number of each term, when the value of x is 2.**

   Write and evaluate an expression to show the twentieth term in the pattern. **20 + 2 = 22**

2. Evaluate each expression for $x = 3$: $\left(\frac{x}{3}\right), 2\left(\frac{x}{3}\right), 3\left(\frac{x}{3}\right), 4\left(\frac{x}{3}\right), 5\left(\frac{x}{3}\right), \ldots$

   1, 2, 3, 4, 5, . . . **Sample answer:**

   Describe the pattern. **Multiply the number of each term term by 1, when the value of x is 3.**

   Write and evaluate an expression to show the fifteenth term in the pattern. **15 × 1 = 15**

3. Evaluate each expression for $x = 4$: $2(1x - 2), 2(2x - 2), 2(3x - 2), 2(4x - 2), 2(5x - 2), \ldots$

   4, 12, 20, 28, 36, . . . **Sample answer:**

   Describe the pattern. **Multiply the number of each term by 8 and subtract 4, when the value of x is 4.**

   Write and evaluate an expression to show the tenth term in the pattern. **(10 × 8) − 4 = 76**

4. If you used other values for x to evaluate the expressions in Exercises 1, 2, and 3, would the patterns change? Explain your answer.

   Sample answer: Yes, the patterns would change because they depend on the value of x.

Name _____

Reteaching
1-9

Using Expressions to Describe Patterns

You can write an expression to describe the pattern in an input/output table.

Look at the first input and output values in the table.

Ask Yourself: What do I need to do to the input 11 to get the output 5?

You might need to add, subtract, multiply, divide, or perform more than one operation.

INPUT	OUTPUT
11	5
12	6
13	7
15	★
20	★

In this table, you can subtract 6 from 11 to get 5.

Check the input and output values for 12 and 13.

$12 - 6 = 6$

$13 - 6 = 7$

The pattern is true for all of the values in the table. So, the pattern is subtract 6.

You can write the expression $x - 6$ to describe the pattern.

Substitute input values for the variable x to get the output values.

Find the output values for 15 and 20. **9, 14**

The input/output table shows how much Jake pays for toys. Use the input/output table for **1–4.**

INPUT	OUTPUT
6	18
7	21
8	24
9	27

1. If Jake buys 12 toys, what is the cost? **$36**
2. If Jake pays $45, how many toys did he buy? **15 toys**
3. Write an expression to describe the output pattern if the input is the variable t. **3t**
4. What inputs and outputs should be added to the table for 20 toys? **INPUT: 20, OUTPUT: 60**
5. **Writing to Explain** Jessie says that the expression 2x describes the input/output table. Explain why Jessie's expression is correct or incorrect.

INPUT	2	3	4	5
OUTPUT	4	5	6	7

Sample answer: You can multiply by 2 for the first output value in the table, but not for the other outputs, so the expression is incorrect; the correct expression is x + 2.

Name _____

Practice
1-9

Using Expressions to Describe Patterns

Use this table for 1–4.

Total Cups in Boxes	18	36	54	66	72	84
Total Number of Boxes	3	6	9	□	□	□

1. How many boxes are needed for 66, 72, and 84 cups?

11, 12, 14

2. How many cups will be in 20 boxes?

120 cups

3. Write an algebraic expression that explains the relationship between the input (total cups in boxes) and output values (total number of boxes) if the variable c is the input.

$c \div 6$

4. **Writing to Explain** Jason thinks he needs 25 boxes to pack 144 cups. Is Jason correct? Explain.

Sample answer: No. The pattern is 6 cups to a box, so he needs 24 boxes.

5. **Make a Table** Lily is using seashells to make necklaces. Each necklace has 7 shells. Make an input/output table that shows the number of shells used for 10, 15, 20, and 25 necklaces. Write an algebraic expression that explains the relationship between the input and output values.

INPUT	OUTPUT
10	70
15	105
20	140
25	175

;7x

Use this table for 6 and 7.

Large White Butterfly Wing Beats					
Number of seconds	1	2	3	4	5
Number of beats	12	24	36	48	60

6. **Critical Thinking** What algebraic expression shows the number of wing beats for a chosen number of seconds?

A $60 + x$ **B** $x \div 12$ **C** $12 \div x$ **(D)** $12x$

7. How many times will a large white butterfly beat its wings in 12 seconds?

(A) 144 **B** 120 **C** 84 **D** 72

Name _____

Enrichment
1-9

Check Please

Reasoning

1. Marla and Tabitha each solved the equation $(\frac{n}{16}) + 22 = 44$. Marla's solution was $n = 352$. Tabitha's solution was $n = 368$. Substitute each solution into the equation to find who is correct. Show your work.

Marla's answer is correct; $n = 352$ because $(\frac{352}{16}) + 22 = 44$

2. Antonio and Mario each solved the equation $t(32) - 17 = 271$. Antonio's solution was $t = 8$. Mario's solution was $t = 9$. Substitute each solution into the equation to find who is correct. Show your work.

Mario's answer is correct; $t = 9$ because $9(32) - 17 = 271$

3. Jeanne and Mark each solved the equation $(37 - c) \times 3 = 75$. Jeanne's solution was $c = 13$. Mark's solution was $c = 12$. Substitute each solution into the equation to find who is correct. Show your work.

Mark's answer is correct; $c = 12$ because $(37 - 12) \times 3 = 75$

4. In the following equation $d = 147$. Which of the following is the correct solution for b? Check your answer. Show your work.

$(\frac{d}{21}) \times (2 + b) = 49$

A $b = 9$

B $b = 11$

Ⓒ $b = 5$

Sample answer: $(\frac{147}{21}) \times (2 + 5) = 49$

Name _____

Reteaching
1-10

Simplifying Algebraic Expressions

Algebraic expressions are simplified by combining **like terms.**
Like terms are terms that look alike such as 4y and 2y, or 5 and 3.

The algebraic expression $2x + 5x + 4$ can be simplified by combining like terms.

The like terms for this expression are $2x$ and $5x$.

$2x + 5x = 7x$ The coefficients are added and an x is placed with the sum. Notice that the variable x does not change when combining the like terms $2x$ and $5x$.

Solution: $2x + 5x + 4 = 7x + 4$

For **1–6**, simplify each algebraic expression.

1. $4x - x$
3x

2. $2y + 6y$
8y

3. $3x + 2 + x$
4x + 2

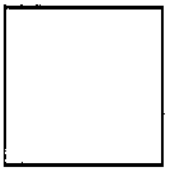
4. $7y + 3 - 6y$
y + 3

5. $6x + 5 - 3x$
3x + 5

6. $4y - 3 + 3y$
7y − 3

For **7** and **8**, use the picture shown to the right.

7. Find a simplified expression for the perimeter of the square.
12x − 8



8. Find the perimeter if $x = 3$.
28 units

9. Bill says that the algebraic expression $6y + 3 - y$ has been simplified. Is Bill correct? Explain.

Bill is not correct; the expression 6y + 3 − y is not simplified. The terms 6y and y are like terms and can be combined to get the simplified expression 5y + 3.

Name _____

Practice
1-10

Simplifying Algebraic Expressions

For **1–3**, identify the like terms.

1. $3x + 2 - x$
   $3x$ and x

2. $y + 3y - 2$
   y and $3y$

3. $6x + 2 - 3x + 4x$
   $6x$, $3x$, and $4x$

For **4–9**, simplify each algebraic expression.

4. $6x - 3x$
   $3x$

5. $4y + 3y$
   $7y$

6. $5x + 1 + 3x$
   $8x + 1$

7. $3y - 1 - y$
   $2y - 1$

8. $4 + 8x - 2 - 5x$
   $3x + 2$

9. $7y - 6 + 4 - 2y$
   $5y - 2$

For **10–15**, determine if the expressions are simplified. If they are not simplified, then simplify them.

10. $6x - x$
    No; $5x$

11. $3y + 4 - 2$
    No; $3y + 2$

12. $8y - 1$
    Yes

13. $2x + 3 + 5x$
    No; $7x + 3$

14. $9x + 2$
    Yes

15. $4 - 3y$
    Yes

16. Which of the following algebraic expressions is simplified?

    A $9y + 2 - 1$

    B $5y + 3 - 7y$

    C $4y + 6y$

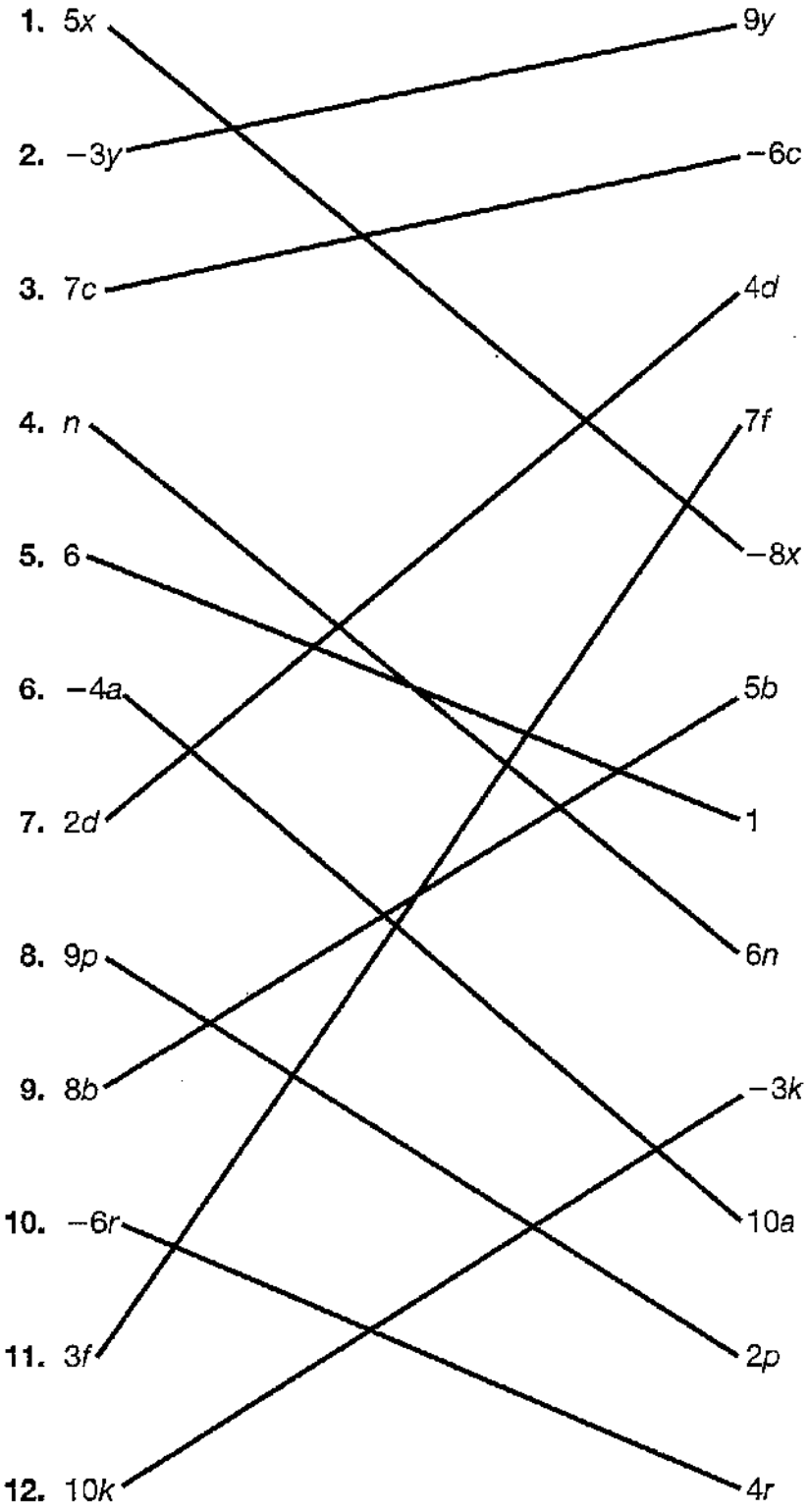
    D $8y + 3$

Name _____

Enrichment
1-10

Like Term Matching

Match a term from the left column with a term from the right column so that the terms are alike.



Name _____

Reteaching
1-11

Writing Equivalent Expressions

You can use the properties of operations to write equivalent expressions. Two algebraic expressions are equivalent if they have the same value when any number is substituted for the variable.

How can you use the properties of operations to write an equivalent expression for the expression below?

$2(5x + 7)$

Use the Distributive Property to expand the expression. Then use Associative Property of Multiplication to regroup the first term and multiply 2×5.

$$\begin{aligned} 2(5x + 7) &= 2(5x) + 2(7) \\ &= (2 \times 5)x + 14 \\ &= 10x + 14 \end{aligned}$$

How can you use the Distributive Property in reverse order to write an equivalent expression for the expression below?

$9x + 3$

Look for a common factor of both terms that is greater than 1. In this expression, the common factor is 3.

$$\begin{aligned} 9x + 3 &= 3(3x) + 3(1) \\ &= 3(3x + 1) \end{aligned}$$

Use the Distributive Property to write an equivalent expression by filling in the missing numbers.

1. $4(x - 2) = \underline{4}x - \underline{8}$
2. $15x - 5 = 5(\underline{3}x - \underline{1})$
3. $3(6x + 1) = \underline{18}x + \underline{3}$
4. $21x + 6 = 3(\underline{7}x + \underline{2})$

Find the missing number(s) so that the expressions are equivalent.

5. $2(4x + 6)$ and $\underline{8}x + 12$
6. $16x - 14$ and $\underline{2}(8x - \underline{7})$
7. $3(8x - 5)$ and $\underline{24}x - 15$
8. $10x + 25$ and $5(\underline{2}x + \underline{5})$

Use the Distributive Property to write an equivalent expression.

9. $3(2x - 1)$ **$6x - 3$**
10. $10x - 5$ **$5(2x - 1)$**
11. $7(3x + 4)$ **$21x + 28$**
12. $22x - 8$ **$2(11x - 4)$**

13. **Reasoning** Jun writes the expression $5(x + 2)$. Then he uses the Distributive Property to write the equivalent expression $5x + 10$. How can he substitute a value for the variable to check to see if expressions are equivalent?

Sample answer: Substitute 2 for x. $5(x + 2) = 5(4) = 20$. $5x + 10 = 10 + 10 = 20$. Both expressions have the same value, so they are equivalent.

Name _____

Practice
1-11

Writing Equivalent Expressions

Use the Distributive Property to write an equivalent expression by filling in the missing numbers.

1. $10(x + 3) = \underline{10}x + \underline{30}$
2. $7(8x + 2) = \underline{56}x + \underline{14}$
3. $6(7x - 8) = \underline{42}x - \underline{48}$
4. $24x - 3 = 3(\underline{8}x - \underline{1})$
5. $20x + 4 = 4(\underline{5}x + \underline{1})$
6. $9x + 27 = 9(\underline{1}x + \underline{3})$

Find the missing number(s) so that the expressions are equivalent.

7. $8(2x - 3)$ and $\underline{16}x - 24$
8. $5(3x - 9)$ and $\underline{15}x - \underline{45}$
9. $6(2x + 9)$ and $\underline{12}x + \underline{54}$
10. $22x - 11$ and $\underline{11}(2x - \underline{1})$
11. $18x + \underline{6}$ and $\underline{6}(3x + 1)$
12. $36x + \underline{21}$ and $\underline{3}(12x + 7)$

Use the Distributive Property to write an equivalent expression.

13. $3(6x - 7)$ **$18x - 21$**
14. $4(9x - 2)$ **$36x - 8$**
15. $6(8x + 1)$ **$48x + 6$**
16. $35x + 30$ **$5(7x + 6)$**
17. $70x - 10$ **$10(7x - 1)$**
18. $18x - 36$ **$9(2x - 4)$**

19. **Geometry** The formula for the perimeter of a rectangle is $2l + 2w$, where l is the length and w is the width. How can you use the Distributive Property to write an equivalent expression for $2l + 2w$? Explain.

$2(l + w)$; Sample explanation: The common factor of both terms in $2l + 2w$ is 2. You can use the Distributive Property in reverse to write $2(l + w)$.

20. **Writing to Explain** Eliot uses the Distributive Property to write an equivalent expression for $7(3x + 4)$. He writes $21x + 4$. Emma notices that Eliot made a mistake. How could Emma explain to Eliot where he went wrong? What is the correct equivalent expression?

Sample answer: When you use the Distributive Property, you need to multiply the number outside the parentheses by both addends inside the parentheses. Eliot multiplied the 7 by the 3, but he did not multiply the 7 by the 4. The correct equivalent expression is $21x + 28$.

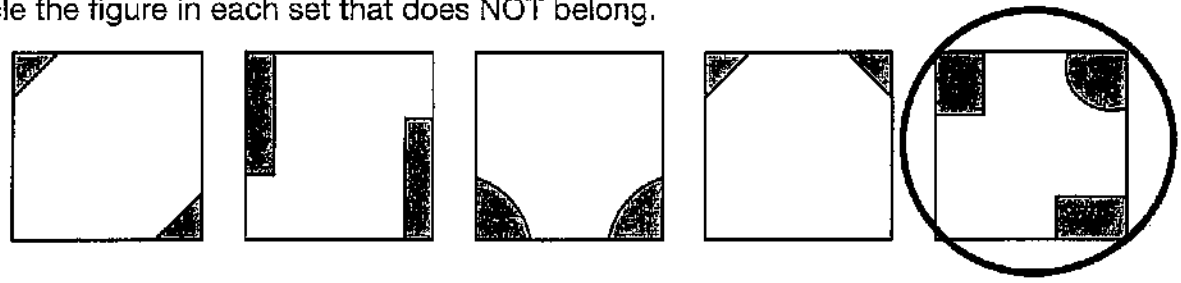
Name _____

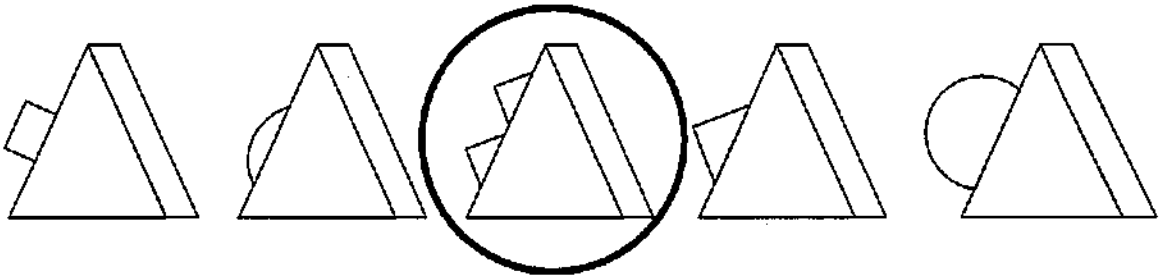
Enrichment
1-11

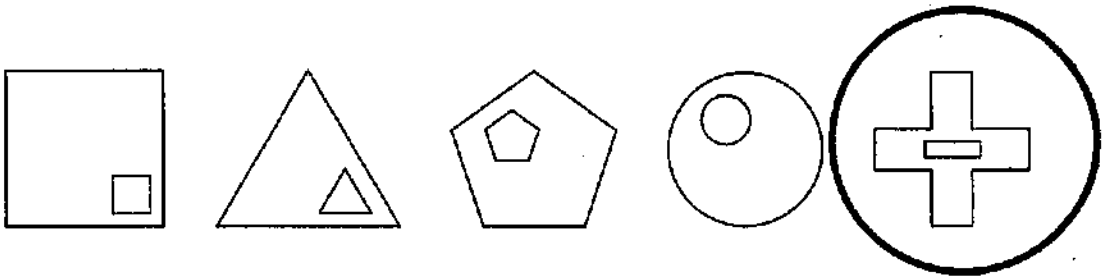
Go Figure

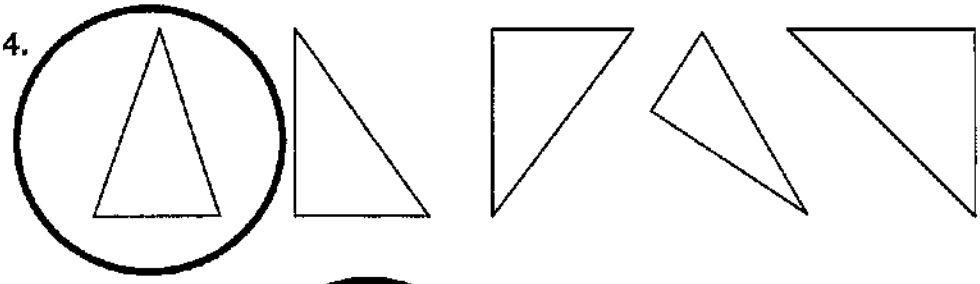
Visual Thinking

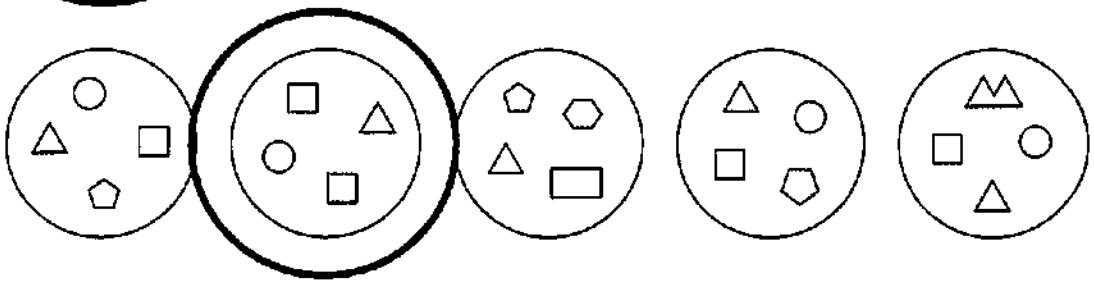
Circle the figure in each set that does NOT belong.

1. 

2. 

3. 

4. 

5. 

Name _____

Reteaching
1-12

Equivalent Expressions

Two expressions are equivalent if they have the same value when the variable is replaced with any number. For example, the following expressions are equivalent:

$2 + 1 + 2x$ $\quad$ $3 + 2x$ $\quad$ $3 + x + x$

Are the expressions $4(x + 2)$ and $2x + 5 + 2x + 3$ equivalent to $4x + 8$?

You can apply the Distributive Property: $4(x + 2) = 4x + 8$

The expressions $4(x + 2)$ and $4x + 8$ are equivalent.

You can apply the Commutative Property of Addition and combine like terms.

$$2x + 5 + 2x + 3 = 2x + 2x + 5 + 3 = 4x + 8$$

The expressions $2x + 5 + 2x + 3$ and $4x + 8$ are equivalent.

Identify the expressions that are equivalent to expression given.

1. $2(x - 5)$

A $2x - 8 - 2$
B $2x - 8 + 2$
C $2x - 5$
D $2x - 10$

A, D

2. $3(x - 3)$

A $3x - 6$
B $3x - 8 - 1$
C $x + 2x - 3$
D $x - 3 + x - 3 + x - 3$

B, D

3. $8x + 10$

A $2(4x + 10)$
B $4x + 4x + 10$
C $2(4x + 5)$
D $10x + 8 + 2 - 2x$

B, C, D

4. $7x + 6$

A $6x + x + 6$
B $6(x + 1) + x$
C $4x + 2 + 3x + 4$
D $7x + 8 - 2$

A, B, C, D

Determine if the expressions are equivalent. Substitute 3 for y to check.

5. $5(y + 4)$ and $2 + 5y + 18$

Yes; 35 = 35

6. $2y - 6$ and $6y - 6 - 3y$

No; 0 ≠ 3

7. Number Sense Show that $4x - 7$ is equivalent to $4(x - 1) - 3$ when $x = 3$.

$4 \times 3 - 7 = 12 - 7 = 5$

$4(3 - 1) - 3 = 4 \times 2 - 3 = 8 - 3 = 5$

Name _____

Practice
1-12

Equivalent Expressions

Identify the expressions that are equivalent to expression given.

1. $4(x - 4)$

A $4x - 18 - 2$

B $2x - 16 + 2x$

C $16 + 4x$

D $8x - 16 - 4x$

A, B, D

2. $12x - 3$

A $9x - 6 + 3x + 3$

B $12(x - 1)$

C $14x - 6 - 2x - 3$

D $4(3x - 1)$

A

3. $5x + 7$

A $4x - 7 + 14 + x$

B $5(x + 1) + 2$

C $x - 3 + 4x + 10 + x$

D $5(x + 2) - 3$

A, B, D

4. $10(x + 2)$

A $20 + 2x + 8x - 10$

B $10x + 2$

C $x + 10 + 9x + 2$

D $15 + 20x + 5 - 10x$

D

5. $2(4x - 7)$

A $2 + 8x - 16$

B $5x - 14 + 3x$

C $2x + 2x - 4 + 4x - 10$

D $8(x - 1) - 6$

A, B, C, D

6. $12x + 10 - 5x$

A $10x + 2 - 3x + 8$

B $17x + 12 - 2$

C $3 + 7x + 7$

D $2 + 7x + 5$

A, C

Determine if the expressions are equivalent. Substitute 4 for y to check.

7. $4y + 10 - y$ and $2(y + 5)$

No; $22 \neq 18$

8. $3y - 12$ and $7y - 6 - 4y - 6$

Yes; $0 = 0$

9. $2(5y + 3)$ and $2 + 10y + 4$

Yes; $46 = 46$

10. $4y - 1 - y$ and $5 + 5y - 6$

No; $11 \neq 19$

11. Writing to Explain Are the algebraic expressions $4(2x + 3)$ and $8x + 12$ equivalent? Explain.

Yes; Sample answer: If $x = 2$, then $4(2x + 3) = 28$ and $8x + 12 = 28$, so $4(2x + 3) = 8x + 12$.

Name _____

Enrichment
1-12

Can You Produce the Number?

Number Sense

Use the numbers and symbols below to write equations that will produce the answers from 1 to 10. Use at least three of the numbers and any number of operations or grouping symbols.

Numbers
1 2 3 4 5
Operations and Grouping Symbols
[ ] ( ) + − × ÷

1. $(5 - 3) \div 2 = 1$
2. $(5 - 1) \div 2 = 2$
3. $(4 \times 2) - 5 = 3$
4. $(5 + 3) \div 2 = 4$
5. $(2 \times 3) - 1 = 5$
6. $(5 + 3) - 2 = 6$
7. $(3 \times 5) - (4 \times 2) = 7$
8. $5 + 4 - 1 = 8$
9. $4 + 3 + 2 = 9$
10. $(5 \times 4) \div 2 = 10$

For 1–10, sample answers have been given.

Name _____

Reteaching
1-13

Problem Solving: Make an Organized List

You can make an organized list in a table using the information given in a problem. A table organizes the information and helps you solve the problem.

Angie has $30 to spend at a carnival. Tickets for rides cost $1.25 each. Write an expression to show how much Angie has left after buying x tickets at the carnival. Make a table to show how much Angie has left after buying $x = 3$ tickets, $x = 8$ tickets, and $x = 15$ tickets.

Write an Expression

x = number of tickets

Spending Money		Price of Tickets		Number of Tickets
↓		↓		↓
30	−	1.25	×	x

The expression $30 - 1.25x$ represents the situation.

Make a Table

Use x as a label for one column.
Use $30 - 1.25x$ for the other column.

Enter the values for x: 3, 8, and 15.

Solve the expression for each x-value and enter it into the table.

x	$30 - 1.25x$
3	26.25
8	20
15	11.25

So, Angie has $26.25 left after she buys 3 tickets, $20 left after she buys 8 tickets, and $11.25 left after she buys $15 tickets.

1. Arturo works at a horse ranch. He makes $50 each week for cleaning out stalls and $12 for each horse that he grooms. Write an expression that describes Arturo's weekly earnings after grooming x horses.

   $50 + 12x$

2. Using your answer for Exercise 1, complete the table to find how much Arturo earns in a week if he grooms 5 horses, 9 horses, and 12 horses.

x	$50 + 12x$
5	**110**
9	**158**
12	**194**

3. Gina sells bracelets at a fair for $6 each. Complete the table to show how much she earns for $x = 12$ bracelets, $x = 35$ bracelets, and $x = 56$ bracelets.

x	$6x$
12	**72**
35	**210**
56	**336**

Name _____

Practice
1-13

Problem Solving: Make an Organized List

1. Selena earns $8.75 per hour working at her job. It costs $3.50 to ride the bus to and from work. Write an expression that describes how much Selena has each day after x hours of work and paying her bus fare.

$8.75x - 3.5$

2. Complete the table to find how much Selena earns each day if she works 3 hours, 5 hours, or 8 hours.

x	$8.75x - 3.5$
3	22.75
5	40.25
8	66.50

3. A health food store sells protein powder online. A 10-lb carton of protein powder costs $27.25. It costs $4.95 to ship the powder whether you buy 1 or more cartons. Write an expression to show the cost including shipping of x cartons of protein powder.

$27.25x + 4.95$

4. Complete the table to find how much it costs to have 2, 5, and 9 cartons of protein powder shipped.

x	$27.25x + 4.95$
2	59.45
5	141.20
9	250.20

5. **Critical Thinking** Lee earns 3 points for every dollar he spends at the pet store. Which value completes this table?

x	$3x$
27	?

A 9 B 24 C 30 (D) 81

6. **Writing to Explain** A wildlife park charges $18 for each admission ticket x. Explain the labels you would use to make a table to find the cost of 4 tickets, 9 tickets, and 12 tickets.

Sample answer:
One column would have the label x with the values 4, 9, and 12 in the column. The other column would have the label $18x$ to represent the cost of the tickets.

Name _____

Enrichment
1-13

Make a Choice

Decision Making

For each exercise below, tell whether you would choose option A or option B. Then write a mathematical explanation that supports your choice.

1. **A.** One dollar each day for 1 week

   B. One nickel the first day, two nickels the second day, three nickels the third day, and so on for 2 weeks

Sample answer: Option A because the total amount is greater. Option A: $1 × 7 = $7; Option B: $0.05 + $0.10 + $0.15 + . . . = $5.25

2. **A.** Ten dollars each hour for 10 days

   B. Two pennies the first hour, four pennies the second hour, eight pennies the third hour, and so on for 20 hr

Sample answer: Option B because the total amount is greater. Option A: 10 × 24 × $10 = $2,400; Option B: $0.02 + $0.04 + $0.08 + . . . = $20,971.50

3. **A.** Ten dollars doubled every 2 days for 30 days

   B. One dollar tripled every 2 days for 30 days

Sample answer: Option B because the total amount is greater. Option A: $10 × 2^{15} = $327,680; Option B: $1 × 3^{15} = $14,348,907.