

Properties of Real Numbers

Vocabulary

Review

1. Write two examples of *numerical expressions* and *algebraic expressions*.

Numerical Expressions

Algebraic Expressions

2. Reasoning Lan has three pens and some pencils. Why does she need an algebraic expression to represent the number of writing tools she has? Explain.

Vocabulary Builder

counterexample (noun) KOWN tur eg ZAM pul

You need only one counterexample to prove that a statement is false.

Definition: A **counterexample** is an example that shows that a statement is not always true.

Related Words: counteract (verb), counterargument (noun), counterclockwise (adjective)

Example: For all real numbers, $a + b = a \cdot b$ is a *false* statement. You can show the statement is false by using a **counterexample** like the one below.

5 + 3 = 8 is *not* equal to $5 \cdot 3 = 15$.

• Use Your Vocabulary

Draw a line from each statement to a *counterexample* that shows it to be false.

Statement	Counterexample
3. If you live in Miami, you live in Florida.	Mexico is in North America.
4. If you live near an ocean, you live near the Atlantic Ocean.	People in California live near the Pacific Ocean.
5. If you live in North America, you live in the United States.	Miami is a city in Ohio.

14

Properties Properties of Real Numbers

Draw a line from each property in Column A to the equation that illustrates it in Column B.

Column A	Column B
6. Associative Property of Addition	15y + 0 = 15y
7. Associative Property of Multiplication	$7b \cdot 2 = 2 \cdot 7b$
8. Commutative Property of Addition	$(c\cdot 3)\cdot 5=c\cdot (3\cdot 5)$
9. Commutative Property of Multiplication	6x + 5y = 5y + 6x
10. Identity Property of Addition	$a \cdot 1 = a$
11. Identity Property of Multiplication	(g + 11h) + 9h = g + (11h + 9h)
12. Multiplication Property of -1	$7k \cdot 0 = 0$
13. Zero Property of Multiplication	$15m \cdot (-1) = -15m$

Problem 1 Identifying Properties

ke note

Got it? What property is illustrated by $4x \cdot 1 = 4x$?

14. For each question, determine if the stated characteristic is or is not being illustrated by $4x \cdot 1 = 4x$.

Is the same number being added to both sides of the equation?

Are groupings being changed in the equation?

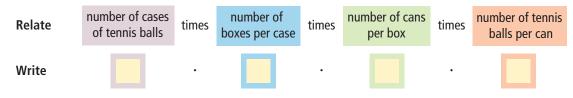
Is 0 or 1 part of the equation?

15. Think of the operation symbol that will make the equation $4x \blacksquare 1 = 4x$ true. What property is illustrated by $4x \cdot 1 = 4x$?

Problem 2 Using Properties for Mental Calculations

Got lt? A can holds 3 tennis balls. A box holds 4 cans. A case holds 6 boxes. How many tennis balls are in 10 cases? Use mental math.

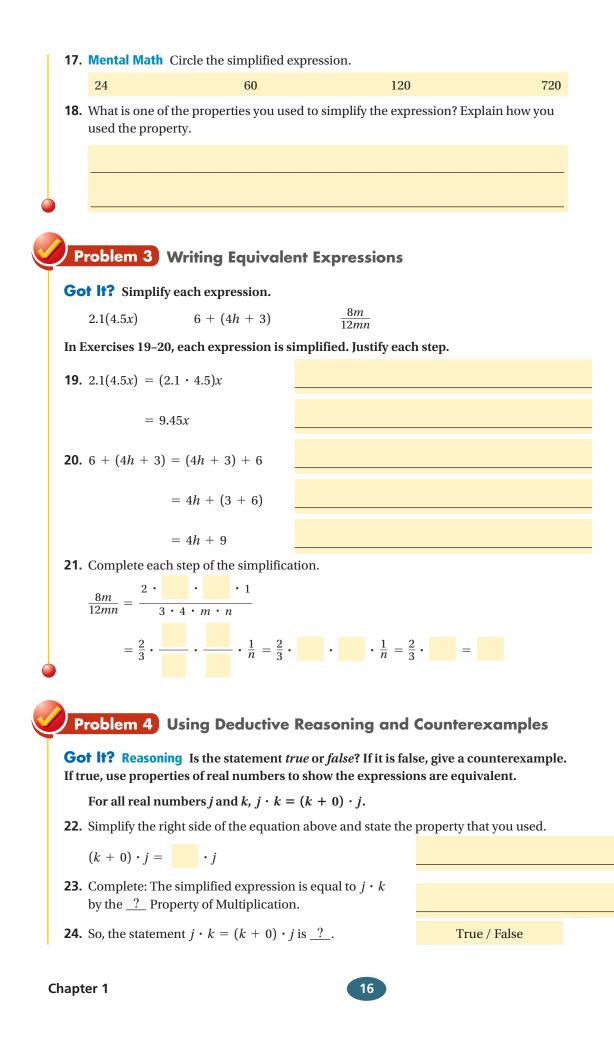
16. Complete the boxes below to write an expression for the number of tennis balls in 10 cases.

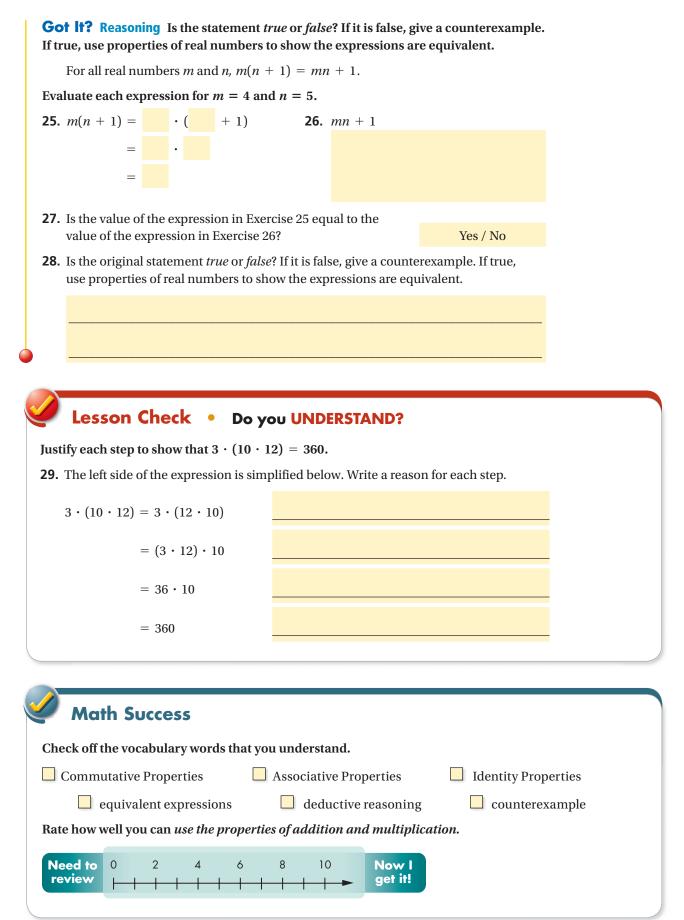


Yes / No

Yes / No

Yes / No





17