Warm up

Define a variable and write each phrase as an algebraic expression.

1. Tonya spent $9 on each shirt.

2. Eric had six dollars more than Darlene.

3. Kamaya's biology class requires 580 pages of reading over the course of the school year. Her history class requires *h* more pages than her biology class. Write an expression that models the number of pages in biology class.

4. A diner charges $1.35 for a cup of coffee and $0.59 for refills. Which expression could be used to find the cost of a cup of coffee with *r* number of refills?

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Answers

1. Let y = the number of shirts; $9y$

2. Let d = Darlene's money; $d + 6$

3. $580 + h$

4. $1.35 + 0.59r$

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Common Core State Standards

- 6.EE.3
  Apply the properties of operations to generate equivalent expressions.

Mathematical Practices

1 Make sense of problems and persevere in solving them.
2 Reason abstractly and quantitatively.
3 Construct viable arguments and critique the reasoning of others.
4 Model with mathematics.
5 Use appropriate tools strategically.

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Essential Question

HOW is it helpful to write numbers in different ways?

What will we learn today?

To use properties to:

- **Compare expressions**
- **Solve problems**

Vocabulary

- properties
- Commutative Properties
- Associative Properties
- Identity Properties
- equivalent expressions

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Properties of Operations

A property is a statement that is true for any number.

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Additive Identity

Add zero to keep the number's identity

In words

Examples

In symbols

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Multiplicative Identity

Multiply by one to keep the number's identity

In words

In symbols Examples

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Multiplicative Property of Zero

Zero times a number = zero product

In words

In symbols Examples

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Commutative Property

COmmutative = Change Order

In words

In symbols Examples

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Associative Property

Associate with different groups = Move Parentheses

In words

In symbols Examples

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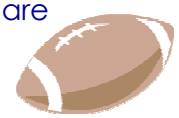
Which identity or property does the situation below represent?

A football team is on the 35-yard line. The quarterback is **sacked** at the **line of scrimmage**. The team gains 0 yards, so they are still at the 35-yard line.



What do the **bolded** words mean?

Sep 24-6:24 PM

A counterexample is an example to prove a conjecture is false. With your partner or group, decide if the following conjectures are true or false. If it is false, come up with a counterexample to support your answer.

1. Division of whole numbers is associative. FALSE
2. Subtraction of whole numbers is associative. FALSE
3. Division of fractions is associative. FALSE
4. Subtraction of fractions is commutative. FALSE
5. Addition of decimals is commutative. TRUE
6. Multiplication of decimals is associative. TRUE
7. Division of decimals is commutative. FALSE

Nov 14-2:08 PM

The 6th grade math department is planning a picnic. Each student will be charged $6 for a sandwich and chips. The teachers will purchase the following items for all 7th grade students at the picnic: juice for $76, napkins for $18 and cups for $29.

Mr. Godfrey said he would calculate the cost by using the expression: 6s + (76 + 18 + 29)

Mrs. Reinke said she would calculate the cost by using the expression: 76 + (6p + 29 + 18)

Mrs. Reynolds said she would calculate the cost by using the expression: 76 + 29 + 18 + 6x

1. Which teacher's expression is correct? Justify your reasoning using the knowledge of the properties you learned today. Support your reasoning using details (1 paragraph mininum!)

2. Using the correct expression, find out the cost of the picnic for 509 sixth graders.

Nov 14-3:38 PM

Guided Practice

Determine whether the two expressions are equivalent. If so, tell what property is applied. If not, explain why. (Examples 1–4)

1. (35 + 17) + 43 and 35 + (17 + 43) _____
2. (25 − 9) − 5 and 25 − (9 − 5) _____
3. 59 × 1 and 59 _____
4. At a gymnastics meet, a gymnast scored an 8.95 on the vault and a 9.2 on the uneven bars. Write two equivalent expressions that could be used to find her total score. (Example 5)
5. Nadia bought suntan lotion for $12, sunglasses for $15, and a towel for $18. Use the Associative Property to mentally find the total of her purchases. (Example 6)
6. **Building on the Essential Question** How can using properties help you to simplify expressions?

Rate Yourself!

How confident are you about using properties? Check the box that applies.

For more help, go online to access a Personal Tutor.

FOLDABLES Time to update your Foldable!

Nov 14-4:12 PM

Guided Practice

Determine whether the two expressions are equivalent. If so, tell what property is applied. If not, explain why. (Examples 1–4)

1. (35 + 17) + 43 and 35 + (17 + 43) yes; Associative Property
2. (25 − 9) − 5 and 25 − (9 − 5) No; the first expression is equal to 11 and the second is equal to 21.
3. 59 × 1 and 59 yes; Identity Property
4. At a gymnastics meet, a gymnast scored an 8.95 on the vault and a 9.2 on the uneven bars. Write two equivalent expressions that could be used to find her total score. (Example 5)
   8.95 + 9.2 and 9.2 + 8.95
5. Nadia bought suntan lotion for $12, sunglasses for $15, and a towel for $18. Use the Associative Property to mentally find the total of her purchases. (Example 6) $45;
   The expression 12 + 15 + 18 can be rewritten as (18 + 12) + 15.
6. **Building on the Essential Question** How can using properties help you to simplify expressions?
   Sample answer: The properties can help you to mentally solve problems.

Rate Yourself!

How confident are you about using properties? Check the box that applies.

For more help, go online to access a Personal Tutor.

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Jan 14-2:35 PM

Algebra: Properties

Determine whether the two expressions are equivalent. If so, tell what property is applied. If not, explain why.

1. 2 • (3 • 7) and (2 • 3) • 7
2. 6 + 3 and 3 + 6
3. 26 − (9 − 7) and (26 − 9) − 7
4. 18 • 1 and 18
5. 7 • 2 and 2 • 7
6. 6 − (4 − 1) and (6 − 4) − 1
7. 7 + 0 and 7
8. 0 + 12 and 0
9. 625 + 281 and 281 + 625
10. (12 • 18) • 5 and 12 • (18 • 5)
11. 2 + (8 + 2) and (2 + 8) + 2
12. 40 ÷ 10 and 10 ÷ 40

Use one or more properties to rewrite each expression as an expression that does not use parentheses.

13. $(p \cdot 1) \cdot 6$
14. $(a + 5) + 23$
15. $7 \cdot (y \cdot 3)$
16. $(b + 4) + 17$
17. $6 + (x + 50)$
18. $(y \cdot 200) \cdot 2$

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Algebra: Properties

1. **MUSIC** Mr. Escalante and Mrs. Turner plan to take their music classes to a musical revue. Tickets cost $6 each. They need a total of 48 tickets. Use the Commutative Property to write two equivalent expressions that could be used to find the total cost.
2. **SAVINGS** Mrs. Perez was looking at her bank account statement. She noticed that her beginning balance was $500, and she had added nothing to her account. What was the ending balance on her statement? What property did you apply?
3. **ADDITION** Mr. Brooks was working on addition using dominos with a group of 1st graders. When picking the domino with 3 dots on one end and 5 dots on the other, some students read, "3 plus 5 equals 8" while others read it as, "5 plus 3 equals 8." What property were these children using? Explain.
4. **AREA** Taylor noticed that for the rectangle below she could multiply 2 times 3 to get its area of 6 square inches. How else could she find the area?

   3 in.
   2 in.
5. **NUMBER CUBES** Students in Mr. Rivas' class were practicing their multiplication skills by rolling three 6-sided number cubes. Wapi rolled a 2, a 3, and a 5. He multiplied the three numbers as follows using the order of operations: $(2 \times 3) \times 5 = 30$. Write another way Wapi could have performed the multiplication without changing the order of the numbers. State the property you used.
6. **FACTS** Bik was working on memorizing her multiplication facts. She noticed that anytime she multiplied a number by 1, she got the same number she started with. What property allows this to be true?

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How did what you learned today help you answer the

Essential Question

HOW is it helpful to write numbers in different ways?

Sample answers:

- **Properties can be used to write equivalent expressions which help in solving problems**
- **Using properties to write equivalent numbers allows for formulas to be easier to use**

Jan 14-5:18 PM

TICKET
Out the Door

Use the Associative Property
to write an expression
equivalent to 23 + (7 + 18)
that makes it easier to
add the numbers mentally.

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