Properties of Numbers

What You'll Learn

To understand and use the properties of numbers

🔊 **New Vocabulary** commutative properties, associative properties, identity properties

Why Learn This?

The properties of numbers can help you do mental math.

Yesterday, we learned three properties that help us do mental math faster with addition.

KEY CONCEPTS Properties of Numbers

Commutative Property of Addition Changing the order of addends does not change the sum.

$9 + 5 = 5 + 9$

Associative Property of Addition Changing the grouping of addends does not change the sum.

$(9 + 5) + 4 = 9 + (5 + 4)$

Identity Property of Addition The sum of 0 and any number is that number.

$0 + 9 = 9$

Today, we will add to our knowledge, with three properties that help us do multiplication faster, easier, and more accurately.

KEY CONCEPTS Properties of Numbers

Commutative Property of Multiplication Changing the order of factors does not change the product.

$4 \times 6 = 6 \times 4$

Associative Property of Multiplication Changing the grouping of factors does not change the product.

$(4 \times 6) \times 2 = 4 \times (6 \times 2)$

Identity Property of Multiplication The product of 1 and any number is that number.

$4 \times 1 = 4$

4 x 25 = 100

EXAMPLE Using the Properties of Multiplication

② **Mental Math** Find $4 \times 8 \times 25$.

What you think

First I will multiply 4 and 25. $4 \times 25 = 100$, and $8 \times 100 = 800$.

Why it works

$$
\begin{aligned}
4 \times 8 \times 25 &= 4 \times 25 \times 8 &&\leftarrow \text{Commutative Property of Multiplication} \\
&= (4 \times 25) \times 8 &&\leftarrow \text{Associative Property of Multiplication} \\
&= 100 \times 8 &&\leftarrow \text{Multiply inside the parentheses.} \\
&= 800 &&\leftarrow \text{Simplify.}
\end{aligned}
$$

② **EXAMPLE** Use mental math to find $2 \times 17 \times 50$.

$$
\begin{aligned}
2 \times 17 \times 50 &= 2 \times 50 \times 17 &&\leftarrow \text{Commutative Property of Multiplication} \\
&= (2 \times 50) \times 17 &&\leftarrow \text{Associative Property of Multiplication} \\
&= 100 \times 17 &&\leftarrow \text{Multiply inside parentheses.} \\
&= 1,700 &&\leftarrow \text{Simplify.}
\end{aligned}
$$

Let's talk this through together.

1. Use Mental Math to find $20 \times (6 \times 5)$.

   A. 600
   B. 6000
   C. 60
   D. 170

Talk with your table partners, and see if you can agree on the answer to this question.

1. Name the property used in this statement:
$25 + 27 + 15 = 25 + 15 + 27$

   A. Associative Property of Addition
   B. Zero Property of Addition
   C. None of these
   D. Commutative Property of Addition

Again, talk with your table partners and see if you agree on the answer to this question.

2. Name the property used in this statement:
$(9 \times 4) \times 5 = 9 \times (4 \times 5)$

   A. Multiplication property of 1
   B. Associative Property of Multiplication
   C. Commutative Property of Multiplication
   D. Multiplication property of 0

Last table talk question - and you do not get to use paper/pencil. See if you can agree on the answer to this one.

3. Use mental math to find $(25 \times 9) \times 8$.

   A. 2,500
   B. 1,800
   C. None of these
   D. 2,000

Time to get a clicker and show what you know.

Name the property being used:
4 x 12 x 25 = 4 x 25 x 12

(A) associative property of multiplication

(B) commutative property of multiplication

(C) identify property of multiplication

Name the property being used:
(13 x 2) x 5 = 13 x (2 x 5)

(A) associative property of multiplication

(B) commutative property of multiplication

(C) identify property of multiplication

6 + 7 + 0 + 49 = 6 + 7 + 49

(A) This is the identity property of addition because it multiplies times 1 which does not change its value.

(B) This is the identity property of addition because it adds a zero but it does not change its value.

(C) This is the association property of addition because the addends are grouped with parentheses.

(D) This is the commutative property of addition because the order of the addends is changed.

Solve using mental math, and text in your answer: 16 + 23 + 4 = _____

Use the number keypad and text in your answer. Remember, this is mental math, so no paper/pencil can be used.

Solve using mental math:
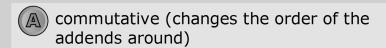**50 x 17 x 2 = _____**

(A) 170

(B) 1700

(C) 17,000

What property will help you solve this? 17 + 19 + 3

(A) commutative (changes the order of the addends around)

(B) associative (changes the parenthesis and regroup numbers)

(C) identify (add a zero, or multiply by 1)

Power down your clickers and put them away.

No assignment.