

PROPERTIES OF OUR NUMBER SYSTEM

PRAXIS FLASHCARD #21

PROPERTIES OF NUMBER SYSTEM OPERATIONS

PROPERTY	ADDITION	MULTIPLICATION
Closure	$a + b$ is a real number	ab is a real number
Commutative	$a + b = b + a$	$ab = ba$
Associative	$a + (b + c) = (a + b) + c$	$a(bc) = (ab)c$
Inverse	$a + (-a) = 0$	$a \cdot 1/a = 1$
Identity	$a + 0 = a$	$a \cdot 1 = a$
Distributive	$a(b + c) = ab + ac$	

PRAXIS FLASHCARD #205

ASSOCIATIVE PROPERTY

The **associative property** says that three numbers may be added/multiplied using the first two numbers first and then the third -or- they may be added/multiplied using the last two numbers first and then the first number. The sum/product will be the same regardless:

$$(a + b) + c = a + (b + c)$$
$$(a \times b) \times c = a \times (b \times c)$$

PRAXIS FLASHCARD #206

COMMUTATIVE PROPERTY

The **commutative property** says that two numbers can be added/multiplied in any order and the sum/product will be the same regardless:

$$a + b = b + a$$
$$a \times b = b \times a$$

PRAXIS FLASHCARD #207

DISTRIBUTIVE PROPERTY

The **distributive property** involves both addition and multiplication. If two numbers are added inside parenthesis but multiplied by a third number outside the parenthesis, that third number may be distributed to each of the numbers inside parenthesis and then added. The distributive property is one case where multiplication comes before parenthesis in the order of operations:

$$a(b + c) = ab + ac$$

PRAXIS FLASHCARD #185

CLOSURE PROPERTY

Closure is a property of operations. Number sets are closed under addition and multiplication, but not under subtraction or division. This means that you can add any two whole numbers and the result will be a whole number. But you can't subtract any two whole numbers and be guaranteed that the result will be a whole number (it might be a negative number, which is not a whole number).

PRAXIS FLASHCARD #209

IDENTITY PROPERTY

The **identity property** defines what happens when you add or multiply by the identity numbers.

The additive identity is zero. When you add zero and a number, the result is that number.

The multiplicative identity is one. When you multiply one and a number, the result is that number.

$$n + 0 = n$$
$$n \times 1 = n$$

PRAXIS FLASHCARD #228

ADDITIVE IDENTITY

The **additive identity** is zero.

Any number added to zero results in a sum of that number. The additive identity does not change the number when it is added to it.

PRAXIS FLASHCARD #297**MULTIPLICATIVE IDENTITY**

The **multiplicative identity** is the number one (1). We can multiply any number by one and the result is the original number. Multiplying by the multiplicative identity does not change the value of the number.

We use the multiplicative identity when we simplify fractions. If the numerator has a factor of 2, and the denominator has a factor of 2, that is the fraction $\frac{2}{2}$, which is the whole number 1. Since multiplying by 1 does not change the value of the original fraction, we can "cancel" that 1 to simplify the fraction:

$$\frac{4}{6} = \frac{2 \times 2}{2 \times 3} = \frac{2}{2} \times \frac{2}{3} = 1 \times \frac{2}{3} = \frac{2}{3}$$

PRAXIS FLASHCARD #208**INVERSE PROPERTY**

The **inverse property** defines what happens when you add or multiply inverse numbers.

The additive inverse is the negative or opposite of a number. When you add a number and its opposite, the result is zero.

The multiplicative inverse is the reciprocal of a number. When you multiply a number and its opposite, the result is one.

$$a + (-a) = 0$$
$$a \times \frac{1}{a} = 1$$

PRAXIS FLASHCARD #235**ADDITIVE INVERSE**

The **additive inverse** is a number such that when a number and its additive inverse are added, the resulting sum is zero (the additive identity). The additive inverse is the negative of a number and the opposite of the value of a variable:

$$(n) + (-n) = 0$$
$$(6) + (-6) = 0$$

PRAXIS FLASHCARD #298**MULTIPLICATIVE INVERSE**

The **multiplicative inverse** of a number is the reciprocal of that number. We can multiply any number by its multiplicative inverse and the result is the number one.

$$\frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1$$

PRAXIS FLASHCARD #210**PROPERTIES OF ZERO**

The number zero has some interesting properties:

- Division by zero is undefined
- Zero is neither positive nor negative
- Zero is the additive identity
- Any number multiplied by zero equals zero
- Zero is used as the universal place holder
- Zero is neither prime nor composite
- Zero has no multiplicative inverse
- A number with an exponent of zero equals 1
- Zero factorial equals 1

PRAXIS FLASHCARD #211**PROPERTIES OF ONE**

The number one has some interesting properties:

- One is the multiplicative identity
- Any number multiplied by one equals the number
- One is neither prime nor composite
- A number with an exponent of 1 equals the number
- The number one raised to any power equals one
- Any nonzero number divided by itself equals one