# Math-2 PROPERTIES 2-1 (Number Systems)

Property of Equality: if the *same operation* is applied to both sides of an equal sign, then the resulting equation is an equivalent equation (has the same solution).

$\boxed{x = \sqrt{4}}$ $\quad (x)^2 = \left(\sqrt{4}\right)^2$ $\quad x^2 = 4$

Closure Property:

Complex Number system: closed for addition, subtraction, and multiplication.
It is ***not*** closed for division since:

a) $\frac{2+3i}{0} = ???$ (2 and 3i are rational numbers, but 2/0 is not a number. Neither is 3i/0)

Real Number system: closed for addition, multiplication, and subtraction.
It is ***not*** closed for division since division by zero does NOT result in any number at all. $\frac{2}{0} = ???$

Imaginary Number system: closed for addition.
It is ***not*** closed for multiplication, division, or subtraction since:

a) $i * i = -1$ (negative 1 is a real number)

b) $i \div i = 1$ (positive 1 is a real number)

c) $i - i = 0$ (zero is a real number)

Rational Number system: closed for addition, subtraction, and multiplication.
It is ***not*** closed for division since:

a) $\frac{2}{0} = ???$ (2 and 0 are rational numbers, but 2 divided by zero is not a number at all)

# Math-2 (More) PROPERTIES 2-1 (Number Systems)

## Closure Property

Irrational Number system: closed for addition.
It is ***not*** closed for multiplication, division, or subtraction since:

a) $\sqrt{2} * \sqrt{2} = 2$ (SQRT(2) is an irrational number but 2 is a rational number )

b) $\sqrt{2} \div \sqrt{2} = 1$ (SQRT (2) is an irrational number but 1 is a rational number)

c) $\sqrt{2} - \sqrt{2} = 0$ (SQRT (2) is an irrational number but zero is a rational number)

Integer Number system: closed for addition, subtraction, and multiplication
It is ***not*** closed for division since:

a) $(-3) \div 2 = -\frac{3}{2}$ (-3 and 2 are integers but -3/2 is not an integer)

Whole Number system: closed for addition and multiplication
It is ***not*** closed for division or subtraction since:

a) $2 - 3 = -1$ (2 and 3 are whole numbers but -1 is not a whole number)

b) $3 \div 2 = \frac{3}{2}$ (2 and 3 are whole numbers but 3/2 is not a whole number)

Natural number system: closed for addition and multiplication.
It is ***not*** closed for division or subtraction (same reason as whole number system: