

# THE REAL NUMBER SYSTEM

RATIONAL NUMBERS  
any number that can be expressed as a fraction (ratio)  $\frac{1}{4}$   $\frac{2}{3}$

INTEGERS: whole numbers and their opposites  $4$   $-4$

WHOLE NUMBERS: natural numbers and zero

NATURAL #s  
counting #s  
 $1, 2, 3, \dots$

IRRATIONAL NUMBERS  
decimals that never terminate or repeat

$\sqrt{10}$   
 $\sqrt{1.6}$   
 $e$

In your own words, describe the difference between rational and irrational numbers.

Rational numbers can be expressed as a fraction. Irrational numbers have decimals that never end or repeat.

	Natural/Counting Numbers	Whole Numbers	Integers	Rational	Irrational
★ 0		✓	✓	✓	
-5			✓	✓	
7	✓	✓	✓	✓	
$\pi$					✓
$3\frac{1}{5}$				✓	
$\sqrt{3}$					✓
-1.2				✓	

Check all the number sets that would apply for each number.

# 6-2c Multiplying Radicals & The Real Number System

$$\sqrt{a} * \sqrt{b} = \sqrt{a * b}$$

\*Radicals can only be multiplied if they have the same index.

$$\sqrt{2} \cdot \sqrt{3} \text{ OK}$$

$$\sqrt[3]{2} \cdot \sqrt{3} \text{ NOT OK}$$

EXAMPLES:

1.  $\sqrt{2} * \sqrt{10}$

$$\sqrt{2 \cdot 10}$$

$$\sqrt{20}$$

$$\boxed{2\sqrt{5}}$$

2.  $\sqrt{2} * \sqrt{8}$

$$\sqrt{16}$$

$$\boxed{4}$$

3.  $\sqrt{3x} * \sqrt{2}$

$$\boxed{\sqrt{6x}}$$

4.  $\sqrt{3x} * \sqrt{3x}$

$$\sqrt{9x^2}$$

$$\boxed{3x}$$

5.  $3\sqrt{2x} * 2\sqrt{5x}$

$$3 \cdot 2 \sqrt{2x \cdot 5x}$$

$$6\sqrt{10x^2}$$

$$2 \cdot 3 \cdot \cancel{x \cdot x}$$

$$\boxed{6x\sqrt{10}}$$

6.  $2\sqrt{9y} * \sqrt{9y^3}$

$$2 \sqrt{9y \cdot 9y^3}$$

$$2\sqrt{81y^4}$$

$$2 \cdot 9 \cdot y^2$$

$$\boxed{18y^2}$$