

How are basic operations applied to different forms of numbers?

Operations:	Fractions/Mixed Numbers	Decimals
+ or -	Common Denominator	Place Value
x	Improper Fraction	Decimal Digits
÷	① Improper Fraction ② Reciprocal / Multiplicative Inverse	Whole # Divisor

How are numeric and algebraic expressions evaluated and simplified?

Variable	vs	Constant
Variable Expressions can have different values. $x$ $2x-1$ $y^2$	⊙	⊙ Constant Expressions have a fixed value. $7$ $8-1$ $\pi$

# Evaluate

Simplify ☺ Perform all of the operations!

## Equation vs Expression

Equations can be solved\*.  
There must be an equal sign present to have an equation.

$$x + 1 = 5$$

$$2x - 3 = 9$$

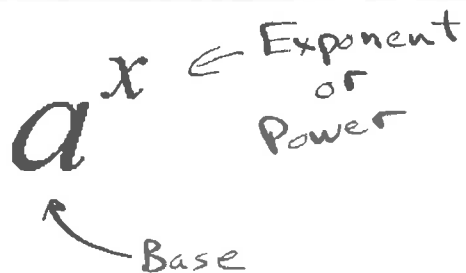
$$x^2 = -9x$$

☆ Expressions can be simplified\* or evaluated for a specific value of the variable(s).  
Do not use equal signs.

$$3$$

$$2 + x$$

$$3 + \sqrt{3}$$



How do we read it?

☉ a to the  $x^{\text{th}}$  power

How do we evaluate it?

☉ multiply "a" by itself "x" times

Ex 1:  $3^2$

$$3(3)$$

$$\boxed{9}$$

Ex 2:  $2^3 \cdot 5^2$

$$\underbrace{2(2)(2)} \cdot \underbrace{(5)(5)}$$

$$8 \cdot 25$$

$$\textcircled{200}$$

How are multiplication and division written in Algebraic expressions?

Multiplication	Division
$* 6(5) = 5(6)$ $6 \times 5$ $6 \cdot 5$ $* 6[5]$ $* 6^x$ $4!$ $4 \cdot 3 \cdot 2 \cdot 1$	$2 \overline{)6}$ $6 \div 2$ $\frac{6}{2} \times$
Commutative Property of mult.  Exponents Factorial (!)	

### Order of Operations

☆ **REMDAS**  
 ↳

- ☆ 1. Perform any operations within grouping symbols.
- 2. Evaluate exponents.
- 3. Multiply or divide from left to right.
- 4. Add or subtract from left to right.

Evaluate each expression. Show all steps and circle your final answer.

1.  $50 - 25 + 5(3)$

$$50 - 25 + 15$$

$$25 + 15$$

$$\boxed{40}$$

2.  $3(18 - 7(2))^2$

$$3(18 - 14)^2$$

$$3(4)^2$$

$$3(16)$$

$$\boxed{48}$$

Evaluate each expression. Show all steps and circle your final answer.

3.  $120 - 24 \div 4 \times 3 + 1$

$$120 - 6 \times 3 + 1$$

$$120 - 18 + 1$$

$$102 + 1$$

$$\boxed{103}$$

4.  $\frac{8(6) - 4(2.5)}{[(3)(2)]^2}$  ←

$$[(3)(2)]^2$$

$$48 - 10$$

$$\frac{\quad}{(6)^2}$$

$$\frac{38}{36}$$

$$36$$

$$\boxed{\frac{19}{18}}$$

Evaluate each expression for the given value of the variable.

5.  $2x - y^3$  when  $x = 15, y = 3$

$$2(15) - (3)^3$$

$$2(15) - 27$$

$$30 - 27$$

$$\boxed{3}$$

6.  $\frac{m(n^2 - mn)}{(m+n)^2}$  when  $m = 2, n = 3$

$$\frac{2(3^2 - (2)(3))}{(2+3)^2}$$

$$(2+3)^2$$

$$2(9 - 2(3))$$

$$(5)^2$$

$$2(9 - 6)$$

$$25$$

$$2(3)$$

$$25$$

$$\boxed{\frac{6}{25}}$$

What are the Grouping Symbols?

P Parenthesis

B Brackets

F/D Fraction/Division Bar

A Absolute Value

R Radical Symbol

! Factorial

$$\sqrt{9} = 3$$

$$\sqrt[3]{27} = 3$$

$$\sqrt[3]{8} = 2$$

What are the different types of numbers?

**Counting Numbers:**  $\{1, 2, 3, 4, 5, 6, \dots\}$   
also known as the natural numbers

**Whole Numbers:**  $\{0, 1, 2, 3, 4, 5, \dots\}$   
the counting numbers and zero

**Integers:**  $\{\dots -3, -2, -1, 0, 1, 2, 3 \dots\}$   
the whole numbers and their opposites

**Rational Numbers:** numbers that can be expressed as a fraction of integers - integers are included in this set

$$\sqrt{9} = 3$$

**Irrational Numbers:** numbers that cannot be expressed as a fraction of integers

$$\pi \quad \sqrt{8}$$

**Real Numbers:** all of the rational and irrational numbers

⊙ **Imaginary Numbers:**  $i = \sqrt{-1}$

Is a repeating decimal a rational or an irrational number?

Let  $x = 0.\overline{3}$  ☆

$$\begin{array}{r} \times 10 \quad \times 10 \\ 10x = 3.\overline{3} \\ -x = -0.\overline{3} \\ \hline \end{array}$$

$$\frac{9x}{9} = \frac{3}{9}$$

$$x = \frac{1}{3}$$

So  $0.\overline{3} = \frac{1}{3}$ .

It is rational.

☆ Let  $x = 0.\overline{27}$

$$\begin{array}{r} \times 100 \quad \times 100 \\ 100x = 27.\overline{27} \\ -x = -0.\overline{27} \\ \hline \end{array}$$

$$\frac{99x}{99} = \frac{27}{99}$$

$$x = \frac{3}{11}$$

So  $0.\overline{27} = \frac{3}{11}$ .

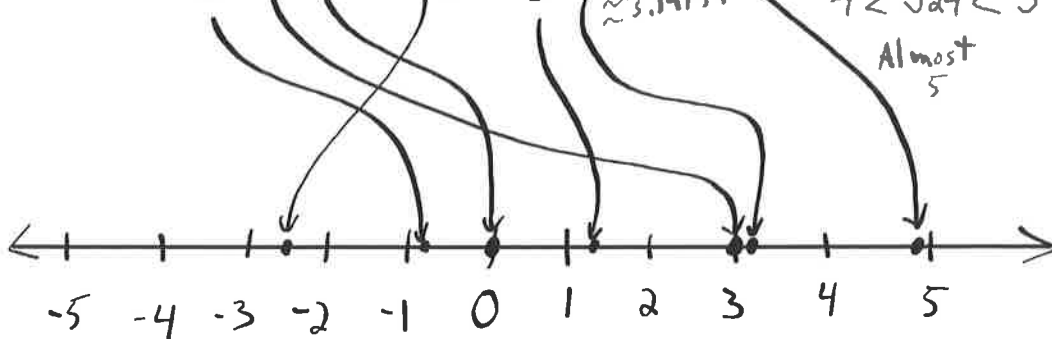
It is Rational.

☺ Repeating decimals are RATIONAL numbers!

### Real Number Line

Graph the following numbers:

$-\frac{7}{8}, 3, 0, -2\frac{1}{2}, 1\frac{1}{3}, \pi, \sqrt{24}$       $\sqrt{16} < \sqrt{24} < \sqrt{25}$   
 $4 < \sqrt{24} < 5$   
 Almost 5



Absolute Value of a number:

the distance between the number and zero  
(the number of units away from zero)

Ex 1:  $|5|$

$5$

Ex 2:  $|-5|$

$5$

Ex 3:  $|15 - 12|$

$13$

$3$

Absolute value is a grouping symbol!

This forces you to evaluate inside the bars first.

Evaluate each expression.

Ex 4:  $|36| + |-45|$

$36 + 45$

$81$

Ex 5:  $4|-2.25|$

$4(2.25)$

$9$

Ex 6:  $-|3^2 + 5|$

$-|9 + 5|$

$-|14|$

$-(14)$

$-14$

Ex 7:  $6| -(-2) + 6 |$

$6|2 + 6|$

$6|8|$

$6(8)$

$48$



Evaluate each expression if  $x = -8$ .

Ex 8:  $-x$   
 $-(-8)$   
 $8$

Ex 9:  $|x|$   
 $|-8|$   
 $8$

Ex 10:  $-|x|$   
 $-|-8|$   
 $-(8)$   
 $-8$

Ex 11:  $2|x|$   
 $2|-8|$   
 $2(8)$   
 $16$

Ex 12:  $-x + |x|$   
 $-(-8) + |-8|$   
 $8 + 8$   
 $16$

Ex 13:  $|x| - |-x|$   
 $|-8| - | -(-8) |$   
 $8 - |8|$   
 $8 - 8$   
 $0$

Ex 14:  $5|-x-8|$   
 $5|-(-8)-8|$   
 $5|8-8|$   
 $5|0|$   
 $5(0)$   
 $0$

Assignment #4: p. 10-11 #3-31 odd

p. 68 #17 and 22 (graph), 43-49 odd

Instructions for all assignments:

1. Put your name, date, and period in the upper right hand corner of your paper.
2. Put the assignment number as well as the page number and problem numbers on the first line on the left.
3. Copy all original problems!
4. Show steps vertically!
5. Circle final answers!

○	A #4	p. 10-11 #3-31 odd p. 68 #17, 22, 43-49 odd	Name Date Period
○			