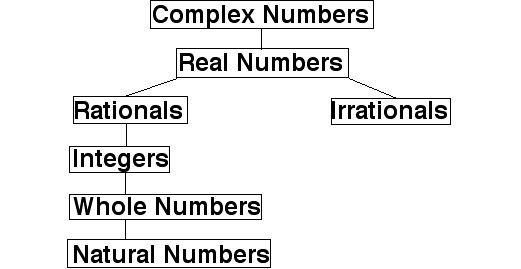
**Section 1-1 Notes: Real Numbers**

Intro: There are many different *types* of numbers and they’re often related to each other.   
  
**Natural (Counting) Numbers:** 1, 2, 3, ...  
  
**Whole Numbers:** 0, 1, 2, 3, ...  
  
**Integers:** ..., -3, -2, -1, 0, 1, 2, 3, ...  
  
**Rational Number:** (Fraction) *a/b* where *a* and *b* are integers and *b ­ 0*. (Rational numbers always *terminate* OR *repeat*)  
  
Examples: 3/4; -0.1765451; .23232323...  
  
**Irrational Numbers:** Not rational, meaning nonterminating and nonrepeating.  
  
Examples: ¹; *e*; http://www.paly.net/~sfriedla/algebratwo/Notes/Unit1/Algebratwo1_1and1_21.jpg  
  
**Real Numbers:** The set of all rational and irrational numbers  
  
So how are these dudes all related?  


**Properties of Real Numbers**

|  |  |  |
| --- | --- | --- |
| **Property** | **Addition** | **Multiplication** |
| *Closure* | *a + b* is a real # | *a • b* is a real # |
| *Commutative* | *a + b = b + a* | *ab = ba* |
| *Associative* | *a + (b + c) =  (a + b) + c* | *a(bc) = (ab)c* |
| *Identity* | *a + 0 = a* | *a • 1 = a* |
| *Inverse* | *a + (-a) = 0* | *a •1/a = 1; a ­ 0* |

**Distributive Property:** *a(b + c) = ab + ac*

**Closure:** Operation on two members of the set yields another member of the set

This means if you add any two real numbers   
*a* and *b*, then *a + b* will be a real number too!

Your turn: Identify the properties shown below  
  
a. *(3 + 9) + 8 = 3 + (9 + 8)* b. *14 • 1 = 14*  
  
Note:

* (-a) is also called the ***additive inverse*** of *a*
* 1/a is also called the ***reciprocal*** of *a*

Definitions:  
Subtraction: a - b = a + (-b)   
Division: a/b = a • 1/b  
  
Subtraction = difference addition = sum   
Division = quotient multiplication = product

**Unit (Dimensional) Analysis**

Units work just like variables do!  
  
Examples:  
a. *345 miles - 120 miles = 225 miles*  
b. *(2 hours)(60 miles/hour) = 120 miles*  
c. *$24/3 hours = $8/hour* d. *(40 feet/second)(60 seconds/min) =   
2400 feet/min*

Your turn: Simplify  
a. If you’re driving 45 miles per hour. How many feet per second are you driving?   
(Hint: 5280 feet = 1 mile)

**Section 1-2 Notes: Algebraic Expressions and Models**

**Numerical Expression:** Working with numbers  
 **Algebraic Expression:** Working with variables  
  
Example: *25 = 2 • 2 • 2 • 2 • 2 = 32*  
“2” is the **base** “5” is the **exponent  
  
Order of Operations:** **PEMDAS  
P = Parentheses** *(grouping symbols)* **E = Exponents  
MD = Multiplication/Division** *(from left to right)***AS = Addition/Subtraction** *(from left to right)*  
Example: Simplify *-4 + 2(-2 + 5)2*   
  
Solution: *-4 + 2(3)2* (Did parentheses)  
*= -4 + 2(9)* (Did exponent)  
*= - 4 + 18* (Did multiplication)  
*= 14* (Did addition)

**Substitution Property**

Example: Evaluate *-3x2 - 5x + 7* when *x = -2*Solution: -3(-2)2 - 5(-2) + 7 (Substitute x = -2)  
= -3(4) - 5(-2) + 7 (Did Exponent)  
= -12 + 10 + 7 (Did Multiplication)  
= 5 (Did Addition)   
  
Definitions: Example:   
**Constant:** a number *3*  
**Variable:** a letter *x*  
**Coefficient:** number in front of a letter *4* in *4x*

Example: You want to buy either a CD or a cassette for 10 people. CDs cost $13 each and cassettes cost $8 each. Write an expression for the total amount you must spend.  
  
Solution:  
(1) Define your variables  
Let x = # of CDs, y = # of cassettes, C = Cost  
(2) Write your expression  
***13x + 8y = C***Your turn: How much would it cost you if you gave 4 people cassettes and the rest CDs?