**Concepts to Know for TEST #2 – Math 311 Sp 2011**

**Word Problems**

Addition
sum, total, altogether, perimeter, more than

Subtraction
difference, subtract, less, subtracted from, less than, missing addend

Multiplication
repeated addition, per, each, of, multiplied, product

Division
ratio, divided, broken into equal parts, quotient, missing factor

Perimeter
Triangle, Rectangle, Square, Trapezoid, Parallelogram

Area
Triangle, Rectangle, Square, Parallelogram

Volume
Cube, Rectangular Solid

**Multiplying Factors of 10**

**Exponents & Radicals**

Writing factors of 10 using exponents
Writing repeated multiplication using exponents
Expanding & Simplifying exponents
Anything to $1^{st}$ power is the base
Anything to ZERO power is one
Notation for Radicals – Radical Symbol, Radicand, Index, Root
Finding a Radical

**Division Facts**

Division of a number by itself
Division by one
Zero divided by anything – ZERO
Anything divided by zero – UNDEFINED

$a \div b$ $\quad \frac{a}{b} \quad$ $a/b$ $\quad b\overline{)a}$

*In each of these the a is called the dividend, the b is called the divisor and the answer is called the quotient*

**Order of Operations**

**PEMDAS** (or **GERMDAS)**

Parentheses are grouping symbols & include: ( ), [ ], { }, | |, √ and fraction bars
Exponents and Radicals are done at the same time (Remember radicals become parentheses to represent multiplication if something is outside radical)
Multiplication & Division come in left to right order (not multiply before divide just because it is listed that way)
Addition & Subtraction come in left to right order (not add before subtract just because it is listed that way)

**SHOW EACH STEP IN ORDER OF OPERATIONS!**

Division by zero doesn't end a problem until the entire problem is simplified

**Integers**

Real world application as temperatures, bank balances, elevation, golf scores
As a set of numbers that is a subset of the real numbers
Relationship to whole numbers & natural/counting numbers

Integers – Positive, Negative & Zero
Whole #'s – Includes zero
Natural #'s – No Zero & ≥ 1

Graphing on a real number line
Points – Use a solid dot & label

Comparison using < , > or equal

Addition of Integers using a Number Line

Addition of Integers using Rules
Same sign – Add #'s & keep like sign
Opposite Sign – Subtract & keep sign of larger

Word problems that include integers

Multiplication & Division of integers
"Christmas tree" diagram **or**

$+ \bullet + = +$ $\quad\quad$ $- \bullet - = +$
$+ \bullet - = -$ $\quad\quad$ $- \bullet + = -$

Changing subtraction to addition

**Opposites**

Definition & Symbol
Same number, opposite sign

Evaluation of an opposite

Comparison of numbers
> Greater Than & < Less Than or = Equal to

**Absolute Value**

Definition & Symbol
Distance (∴ no sign) from zero regardless of direction (sign)

Evaluation

Comparison of numbers

**Evaluation Problems**

Evaluate an algebraic expression
Parentheses for variables & plug in
Basic addition, subtraction, multiplication & division skills
Exponents & radical skills
Order of operation skills

**Properties of /R**

| | | |
|---|---|---|
| Multiplication: | Associative | $a(b \bullet c) = (a \bullet b)c$ |
| | Commutative | $a \bullet b = b \bullet c$ |
| | Identity | $a \bullet 1 = a$ |
| | Inverse | $a \bullet {}^{1}/_{a} = 1$ |
| Addition: | Associative | $a + (b + c) = (a + b) + c$ |
| | Commutative | $a + b = b + c$ |
| | Identity | $a + 0 = a$ |
| | Inverse | $a + -a = 0$ |

Subtraction & Division have no such properties
Subtraction is addition of the inverse (opposite)
Division is multiplication by the inverse (reciprocal)

| | | |
|---|---|---|
| Properties of Zero: | Multiplication | $a \bullet 0 = 0$ |
| | Division by Zero | ${}^{a}/_{0}$ = undefined |
| | Zero ÷ Anything | ${}^{0}/_{a} =$ Zero |
| Distributive Prop. | $a(b + c) = ab + ac$ | |