# Concepts on Test #3 – Math 311 Sp 2011

See all concepts on Test #2 and extend each to integers

## Adding & Subtracting Integers

Addition Rules

If the signs are the SAME: Add the numbers & keep the common sign

Ex. $-5 + -2 = -(5 + 2) = -7$

If the signs are OPPOSITE: Subtract big minus small number & keep big sign

Ex. $-5 + 2 = -(5 - 2) = -3$

Subtraction

Addition of the opposite: Copy the 1st number & add the opposite of the second

Ex: $-5 - (-2) = -5 + 2$

Use Addition Rules

## Multiplying Integers

$+ \cdot + = +$ $\quad - \cdot - = +$ $\quad + \cdot - = -$ $\quad - \cdot + = -$

Multiplying factors of 10 integers

Multiply #'s & add total # of zeros:

Ex. -5,000,000 x 4,000 → -5x4 = -20 and tack on 9 zeros (000000000)

= -20,000,000,000

## Dividing Integers

$+ \div + = +$ $\quad - \div - = +$ $\quad + \div - = -$ $\quad - \div + = -$ (Same as Multiplication)

Division Rules

Any Number Divided by Itself is 1 $\quad a \div a = 1$

Zero Divided by Any non-Zero is ZERO $\quad 0 \div a = 0 \quad a \neq 0$

Any non-Zero Divided by Zero is UNDEFINED $\quad a \div 0 =$ undefined $\quad a \neq 0$

## Exponents

Negative Inside parentheses vs Not in parentheses

$-a^2$ means "the opposite of $a^2$" Ex. $-2^2 = -(2 \cdot 2) = -4$

$(-a)^2$ means "a negative number used as a factor 2 times" Ex. $(-2)^2 = -2 \cdot -2 = 4$

Negative to an EVEN Power is POSITIVE Ex. $(-2)^4 = -2 \cdot -2 \cdot -2 \cdot -2 = +16$

Negative to an ODD Power is NEGATIVE Ex. $(-2)^3 = -2 \cdot -2 \cdot -2 = -8$

Anything to the 1st Power is the number Ex. $1057^1 = 1057$

Anything to the 0 Power is 1 Ex. $(\sqrt{144})^0 = 1$

## Radicals

Basic Definition – The answer is the number that when raised to the second power is what is under the radical symbol "√"

Ex. $\sqrt{16} = 4$ because $(?)^2 = 16$ and $? = 4$

The Opposite of a Radical: $-\sqrt{a} = -$(answer to $\sqrt{a}$) Ex. $-\sqrt{16} = -4$

The Square Root of a Negative Number: $\sqrt{-a}$ = No Real Solution

Ex. $\sqrt{-4} \neq -2$ since there is no number that when multiplied by itself will equal a negative number.

The Cube Root of a Negative Number EXISTS

$\sqrt[3]{-a}$ = a negative number!! Since $- \cdot - \cdot - = -$

Ex. $\sqrt[3]{-8} = -2$

They are Parentheses!! Evaluate inside first then take the root.

Ex. $\sqrt{2 + 2} = \sqrt{4} = 2$

After radical is evaluated it is a parentheses!

Ex. $-2\sqrt{2 + 2} = -\sqrt{4} = -2(2) = -4$

**Opposites**

Written like a negative -a means the opposite of a

Ex. -(-2) is the opposite of -2 = 2

**Absolute Values**

Straight lines | a | means the distance from zero (the number without a sign)

Ex. | -2 | = 2

They are parentheses!! Evaluate inside first, then take absolute value.

Ex. $| -2 - 2| = | -2 + -2 | = | -(2 + 2)| = | -4 | = 4$

After absolute values are evaluated they are parentheses!

Ex. $5|-2 + -2| = 5 \cdot |-2 + -2| = 5 \cdot |-4| = 5 \cdot (4) = 20$

$-|-2 + -2| = -|-4| = -(4) = -4$

This 2nd one reads the opposite of the absolute value of …

**Order of Operations**

PEMDAS (or GEMDAS)

Don't forget that radicals and absolute values are special parentheses

Do the inside, evaluate and then replace with ( ); see examples above

**Word Problems with Integers**

Check book type problem (#47&48 p. 111; #43 & 44 p. 121)

Temperature Type (#53&54 p. 111; #53&54&59 p. 122-123)

Diving/Digging Type (#55&56 p. 112)

Average of Integers (Add all #'s up & divide by number of numbers; Golf Score Example)

Profit (Net Profit) = Revenue – Cost (#9 p. 146)

$D = R \cdot T$ (#19, 21 & 23 p. 146)

**Solving Algebraic Equations**

Addition: Add the opposite of the constant to both sides

Multiplication: Divide by numeric coefficient on both sides

**Evaluation of Algebraic Expressions**

Parentheses → Insert Value → Order of Operations Problem

Ex. Evaluate $-x + -y^2$ for x = -2 and y = -3

➔ $-(-2) + -(-3)^2 = 2 + -(-3 \cdot -3) = 2 + -(9) = 2 + -9 = -7$

**Restrictions**

What causes an expression to be undefined?

Ex. $\frac{5}{x + 7}$ $x + 7 = 0$ will cause it to be undefined (division by zero)

so solve for x & get answer

when **x = -7** it will be undefined

**Polynomials**

Definitions: Monomial, Binomial, Polynomial, Trinomial, Term, Constant, Numeric Coeff.

Like Terms

Degree of a Term & of a Polynomial

Adding Polynomials (combining like terms; simplifying algebraic expressions)