Integer Unit Notes

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Vocabulary

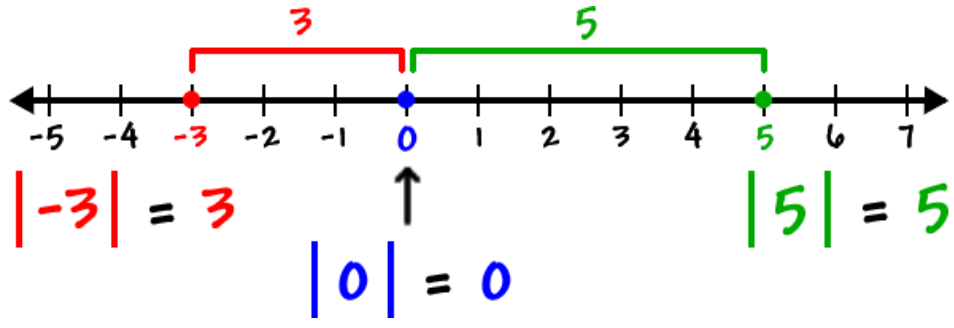
Integer:
Positive or negative whole numbers including zero.

Negative Integers:
-5, -4, -3, -2, -1

Positive Integers:
+1, +2, +3, +4, +5

Opposite Value:
Two numbers that add up to zero. The opposite of -5 is +5 because -5 +5 =0

The absolute value is how far a number is from 0 (zero) on a number line, on either side of 0 (zero). The absolute value of a number is always positive. The absolute value of $|2|$ and of $|-2|$ are both 2 as they are both 2 units from 0 (zero).
The symbol for absolute value is $| \ |$



Operations on Integers:

Adding Integers:

Always try to make integer expressions into a little story. For Example:

- +3-6 could mean that you had $3 and then you spent $6. Now you owe $3. (+3-6=-3)

- +6+7 could mean that you had $6 and then you earned $7 more. Now you have $13. (+6+7=+13)

- -2+4 could mean that you owed $2 and then you earned $4. You paid off your dept and now have $2 left. (-2+4=+2)

- -6-4 could mean that you borrowed $6 and then you borrowed $4 more. You now owe $10. (-6-4=-10)

General Rules for Adding Integers:

If the signs are the Same:

✓ Keep the sign and add the two numbers together.

-11-6 = -17 OR +12+7 = +19

If the signs are different:

✓ Take the sign of the number with the largest absolute value and then find the difference (subtract) the numbers.

-15+12 = -3 OR +12-9 = +3

Visual Strategy for Adding Integers:

Question: (-8) + (+2)

Strategy #1: Tug of War

Visualize a tug of war between 2 sides. On the negative side there are 8 and on the positive side there are 2. This means that the negative side wins by 6 so the answer is -6.

Stategy #2: Numbers in Boxes

1) place the numbers each in a box with the sign above it.
2) Ask yourself 2 questions: which box is greater and by how much.

+	-
2	8

The negative sign wins by 6 so -6 is the answer.

Multiplying and Dividing Integers:

- ✓ **When Signs are different (1 positive, 1 negative), the product or quotient (answer) always ends up with a negative (-) sign.**

Multiplying (X):

- You borrow $6 from your mother on Monday, Tuesday and Wednesday. Now you owe her $18.
  (-6) X (+3) = -18

Dividing (÷):

- You need to borrow $6. You borrow even amounts from 2 different friends. How much will you owe each friend?
  (-6) ÷ (+2) = -3

- ✓ **When signs are the same (2 positives or 2 negatives), the product or quotient (answer) always ends up with a positive (+) sign.**

(+6) X (+4) = +24 (-5) X (-6) = +30

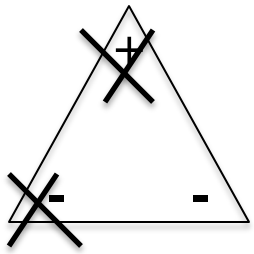
(+10) ÷ (+2) = (+5) (-12) ÷ (-3) = (+4)

Visual Strategy for Determining the Sign when Multiplying and Dividing Integers:

Question: (-6) x (+2)

Strategy #1: Triangle Signs

1) Draw the triangle as shown
2) Cross out the two signs given (- and +). The remaining sign (-) is your answer.



and 6 x 2 = 12 so the answer is -12.

Subtraction of Integers:

There are two ways to subtract integers:

Method 1: Change the sign and the operation. In other words: Add the opposite integer.

i.e. (-4) - (-4)

=(-4) + (+4)

= 0

i.e. (-6) - (+7)

=(-6) + (-7)

= -13

i.e. (+5) - (-6)

=(+5) + (+6)

= +11

i.e. (+5) - (+3)

= (+5) + (-3)

= +2

<u>Method 2</u>: Use the integer rules for multiplication to remove the brackets, then add the numbers.

i.e. (-4) - (-4)

= -4 + 4

= 0

i.e. (-6) - (+7)

= -6 - 7

= -13

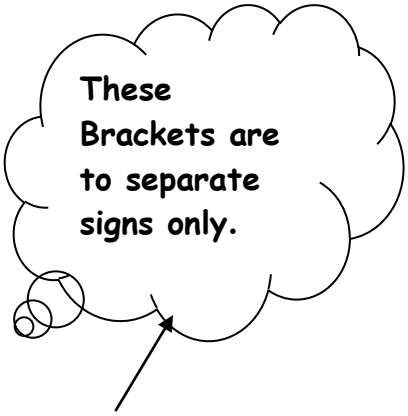
Exponents with Integers

$(-2)^3 = -2 \times -2 \times -2 = -8$

$(-2)^4 = -2 \times -2 \times -2 \times -2 = +16$

*If the base is negative and in brackets, then the answer is positive if the exponent is even and the answer is negative if the exponent is odd.

$-2^4 = -16$ * this answer is negative because it is negative 2^4 . You record the negative after because it is not in brackets.



Order of Operations (BEDMAS)

i.e. $(4-7)^2 \times (6-7)^2$

B	$(-3)^2 \times (-1)^2$
E	$+9 \times +1$
M	$+9$

i.e. $-12-(-5) \times (-2)$

M	$-12 -(+10)$
S	$-12 -10$
A	-22