Name: **KEY**

Topic: **Rational Numbers, Properties, & Order of Operations**

Rational VS Irrational

Examples of rational numbers: $\dfrac{1}{2}$, $-0.\overline{3}$, $\dfrac{3}{1}$, $\dfrac{-14}{-11}$, -5, -1.23568994141, $\dfrac{2}{3}$, $\sqrt{16}$
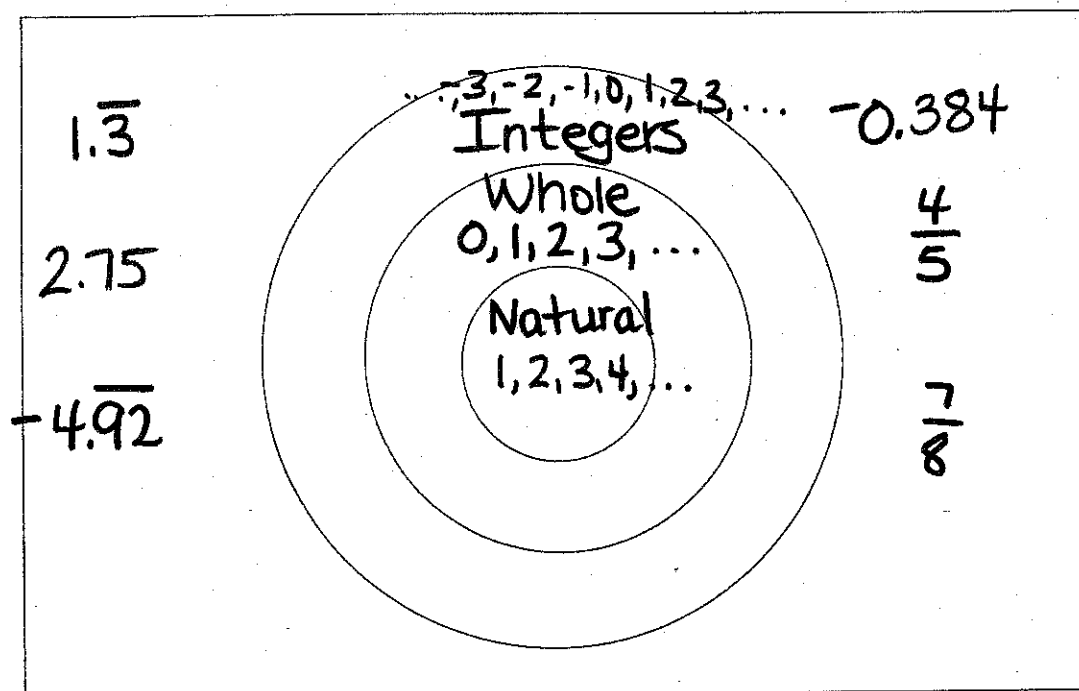
Examples of irrational numbers: $\sqrt{56}$, π, $\sqrt{17}$, $\sqrt{2}$, e,

What do you think is the difference between rational and irrational numbers? (If you are having difficulty thinking of anything change everything into a decimal and compare the two groups)

*Rational numbers are any numbers that can be written as a fraction.
— Includes repeating + terminating decimals.

*Irrational numbers are decimals that never end and have no particular pattern.

Rational Numbers

$1.\overline{3}$

2.75

$-4.\overline{92}$

...-3,-2,-1,0,1,2,3,...
Integers
Whole
0,1,2,3,...
Natural
1,2,3,4,...

-0.384

$\dfrac{4}{5}$

$\dfrac{7}{8}$

Properties of Real Numbers

Property	Addition	Multiplication
Closure	$a+b$ is a real number. $4+3 = 7$ (real #)	ab is a real number. $4(3) = 12$ (real #)
Commutative **Commute**	$a+b = b+a$ $4+3 = 3+4$ *order doesn't matter	$ab = ba$ $2(3) = 3(2)$
Associative **Associate** **Groups**	$(a+b)+c = a+(b+c)$ $(1+2)+5 = 1+(2+5)$ *Same order, but different grouping	$(ab)c = a(bc)$ $(3\cdot4)2 = 3(4\cdot2)$
Identity	$a+0=a, 0+a=a$ $2+0=2, 0+2=2$	$a(1)=a, 1(a)=a$ $2(1)=2, 1(2)=2$
Distributive	$a(b+c) = ab+ac$ $2(4+1) = 2(4)+2(1)$ $2(5) \qquad = 8+2$ $10=10$	

Order of Operations

① P **Parentheses** $(\ )\ [\ ]$

② E **Exponents** x^2

③ { M **Multiply and Divide**
    D **from left to right**

④ { A **Add and Subtract**
    S **from left to right**

What are some ways you can remember the order of operations?

Please Excuse My Dear Aunt Sally

Examples: Simplify the following expressions:

1. $3(2-5)^2 - 4 \cdot 2$

$3(-3)^2 - 4 \cdot 2$
$3(9) - 4 \cdot 2$
$27 - 8$
$\boxed{19}$

2. $5 - 2(3+1)^2$

$5 - 2(4)^2$
$5 - 2(16)$
$5 - 32$
$\boxed{-27}$

3. $39 \div 3 - 4(2)^2$

$39 \div 3 - 4(4)$
$13 - 16$
$\boxed{-3}$

4. $\frac{1}{2}(4 \cdot 3) - (2)^3$

$\frac{1}{2}(12) - 8$
$6 - 8$
$\boxed{-2}$

5. $6x^2 - 12x - 7x^2$

$\boxed{-x^2 - 12x}$

6. $3(x-2) - 5(x-8)$

$3x - 6 - 5x + 40$
$\boxed{-2x + 34}$

Solve the following word problems.

7. You want to buy either a CD or a cassette as a gift for each of 10 people. CDs cost $13 each and cassettes costs $8 each. Write an expression for the total amount you must spend. Then evaluate the expression when 4 of the people get CDs.

x = CDs
y = Cassettes

$13x + 8y$

$13(4) + 8(6)$

$52 + 48$

$\$100$

8. Write an expression for the total monthly cost of phone service if you pay $5 fee and 8¢ per minute. Find the cost if you talk 6 hours during the month.

$5 + .08m$

$5 + .08(360)$

$5 + 28.80$

$\$33.80$

6 hours (60) = 360 mins.