Name:_____ Date:_____ Per._____

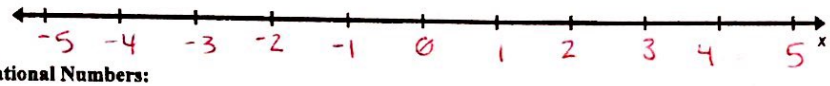
U8 CWK #4 *The Rational Number System*

Our number system has evolved over time. On the following pages, you will review the subsets of numbers that are included in the set of **rational numbers**.

Whole Numbers:

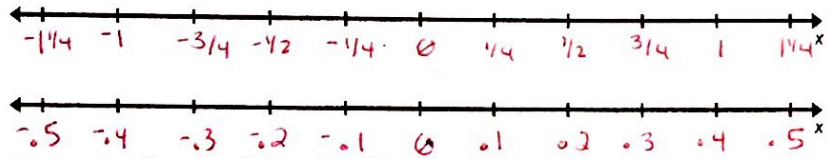
All whole numbers & 0

Integers:



All + & − whole #s & 0

Rational Numbers:



Any # that can be written as a fraction.

Over the years, you have expanded your knowledge of the number system, gradually incorporating the sets of numbers mentioned above. These sets of numbers are all part of the **rational number system.**

> A **rational number** is any number that can be expressed as a quotient $\frac{p}{q}$ of two integers where q does not equal 0.

1. Begin to fill out the table below with different subsets, including equivalent forms, of **rational numbers** you know about so far and give a few examples of each. You will continue to add to this list throughout this section.

Subsets of the Rational Numbers	Examples
Rational	
Integers	
Whole	
Natural	

2. Change the following rational numbers into decimals **without** the use of a calculator.

a. $\frac{1}{2}$

$2\overline{)1} = .5$

b. $\frac{9}{5}$

$5\overline{)9.0} = 1.8$

c. $\frac{3}{8}$

$8\overline{)3} = .375$

d. $\frac{1}{3}$

$3\overline{)1} = .\overline{33}$

e. $\frac{4}{15}$

$15\overline{)4.0000} = .2\overline{6}$

f. $\frac{1}{7}$

$7\overline{)1.0000000} = .\overline{142857}$

3. What do you notice about the decimal expansion of any rational number? Why is this true?

Either ends or repeats

So are all numbers rational numbers? Are there numbers that cannot be written as a quotient of two integers?

What about $\sqrt{2}$? Can you write $\sqrt{2}$ as a fraction? Why or why not? (try on your calculator)

NO

Numbers like $\sqrt{2}$, which do not have a terminating or repeating decimal expansion are **irrational numbers**. Irrational numbers **cannot** be expressed as a quotient.

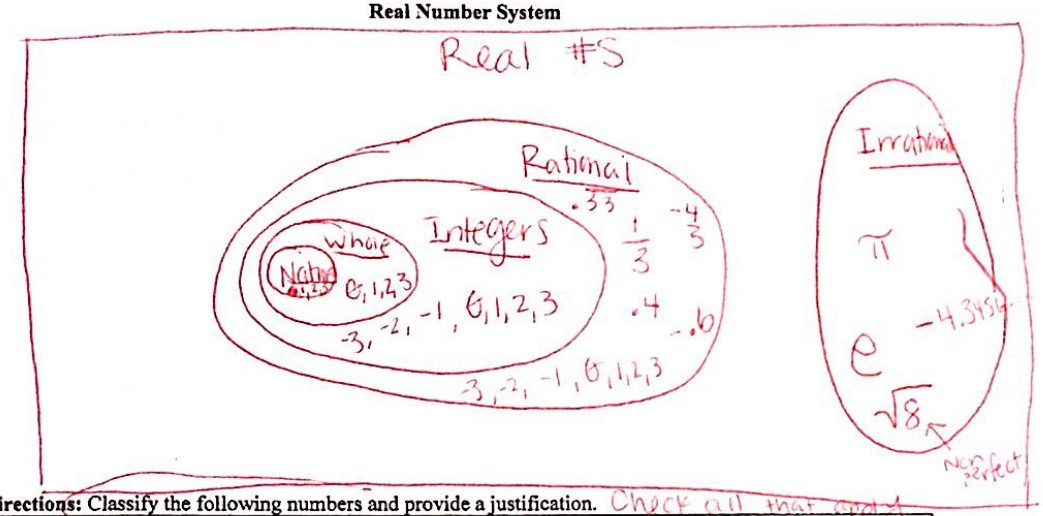
Irrational #s: * NON terminating & Not repeating decimals

* Non-perfect square roots.

* π, e

Rational and Irrational numbers together form the set of **real numbers**. Real numbers can be thought of as points on an infinitely long line called the number line.

Real Number System



Directions: Classify the following numbers and provide a justification. Check all that apply

Number	Whole number	Integer	Rational number	Irrational number	Real	Justification
1. $\frac{2}{3}$			X		X	fraction
2. 0.25			X		X	Decimal ends
3. -2		X	X		X	- whole #
4. $\sqrt{5}$				X	X	non-perfect square
5. 10	X	X	X		X	+ whole #
6. 0	X	X	X		X	whole #
7. $\sqrt{10}$				X	X	non-perfect square
8. $\sqrt{36}$ $=6$	X	X	X		X	perfect square = + 6
9. $-\sqrt{121}$ $=-11$		X	X		X	perfect square = -11
10. $2\frac{1}{2}$			X		X	fraction
11. $0.08\overline{3}$			X		X	repeating decimal

Number	Whole number	Integer	Rational number	Irrational number	Real	Justification
12. $\frac{10}{13}$			X		X	fraction
13. π				X	X	π = non terminating/repeat
14. -3π				X	X	π
15. $0.26\overline{54}$			X		X	repeated dec
16. $\sqrt[3]{27}$	X	X	X		X	perfect cube = +3
17. 1.2122122212222...				X	X	non-repeat / non-term
18. $\sqrt[3]{30}$				X	X	non-perfect cube
19. $\frac{\sqrt{2}}{2}$				X	X	non-perfect square
20. The side length of a square with an area of 2 $\sqrt{2}$				X	X	non-perfect square
21. The side length of a square with an area of 9 $\sqrt{9}=3$	X	X	X		X	$\sqrt{9}=3$ perfect square
22. The number half-way between 3 and 4 3.5			X		X	decimal ends.
23. The number that represents a loss of 5 yards -5		X	X		X	- whole #