

WARM UP

{1, 2, 3, 4, 5, 11, 12, 13, 14, 15}

If all of the numbers in the following are in the above the answer is "True", if not "False".

{3, 5, 12, 14} *True*

{1, 2, 3, 4, 5, ~~6~~} *FALSE*

{2, 4, 12, 14} *TRUE*

{~~6~~, ~~7~~, ~~8~~, ~~9~~, 10} *FALSE*

{1, 3, 5, 14, 15} *TRUE*

{2, 3, 4, 5, ~~6~~} *FALSE*

ESSENTIAL QUESTION

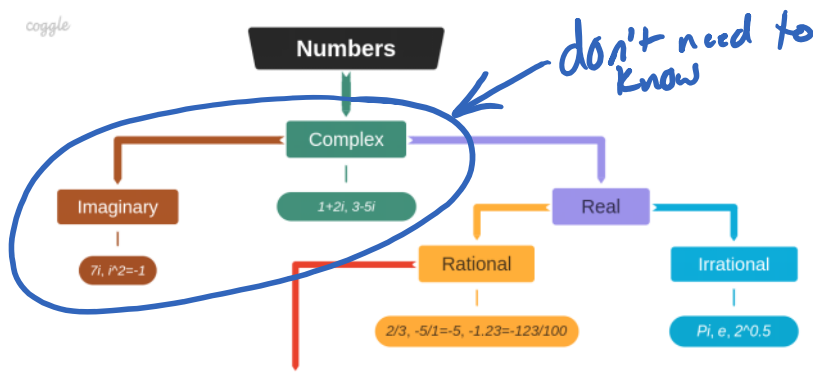
How can we classify numbers? How do we solve absolute value equations?

NEEDED VOCAB:

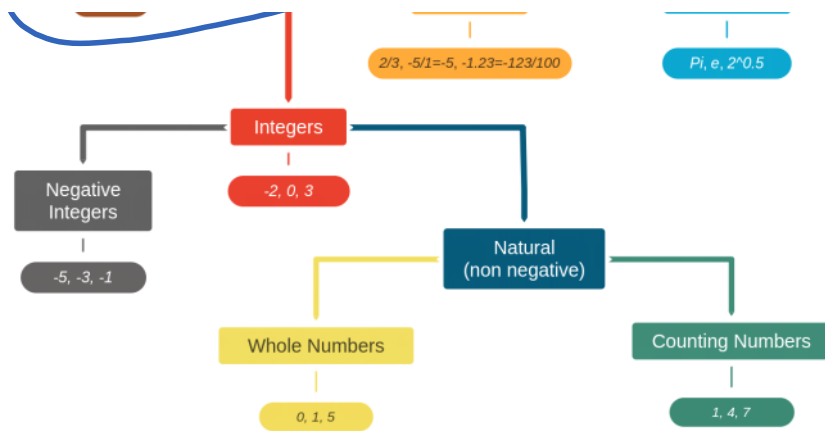
- ▶ Elements of a set
- ▶ Set
- ▶ Subset
- ▶ Real Numbers
- ▶ Whole Numbers/Integers
- ▶ Rational Numbers
- ▶ Irrational Numbers
- ▶ Natural Numbers
- ▶ Absolute Value

GOAL: "I CAN. . .

Classify numbers as well as write and solve absolute value equations."



This is a number tree. The numbers you will need to be able to classify fall under the heading of **REAL Numbers**. Two types of real numbers, **Rational** and **Irrational**. Rational Numbers include **Fractions** and **Integers**.



Rational Numbers include **Fractions** and **Integers**. Irrational numbers are numbers that have no end or are not repeating. Integers are numbers that are in their entirety. Integers can be negative, **Negative Integers**, or **Natural Numbers**, Non-negative. **Natural Numbers** are 0 and up.

EXAMPLE 1 Classify the following numbers

-1 <i>Negative Integer</i> <i>Rational #</i>	$\frac{1}{3}$ <i>Rational #</i>	$\frac{\pi}{2}$ <i>Irrational #</i>
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Classify the following numbers

$\frac{-4}{2}$ <i>Rational #</i> $-\frac{4}{2} = -2$ <i>negative integer</i>	$-0.\overline{12}$ <i>Rational #</i>	$\sqrt{64}$ <i>Rational #</i> $\sqrt{64} = 8$ <i>Integer</i>
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EXAMPLE 2

A. What is the value of x in $7 = |x| + 2$?

$$\begin{array}{ccc} -2 & & -2 \\ 5 = |x| & \leftarrow & \end{array}$$

$|x|$ of any # means the distance from 0.
2 #s are 5 from 0. 5 and -5

B. What is the value of x in $|2x - 3| = 1$?

needs to be 1 from 0. so 1 or -1

$$\begin{array}{l} 2x - 3 = 1 \\ +3 \quad +3 \\ \hline 2x = 4 \\ \frac{2x}{2} = \frac{4}{2} \\ x = 2 \end{array} \quad \text{and} \quad \begin{array}{l} 2x - 3 = -1 \\ +3 \quad +3 \\ \hline 2x = 2 \\ \frac{2x}{2} = \frac{2}{2} \\ x = 1 \end{array}$$

2 and 1

C. What is the value of x in $3|x + 6| + 8 = 5$?

make this look like example 2B.

$$\begin{array}{l} 3|x+6| + 8 = 5 \\ -8 \quad -8 \\ \hline 3|x+6| = -3 \\ \frac{3|x+6|}{3} = \frac{-3}{3} \\ |x+6| = -1 \end{array}$$

No sol
Absolute values \neq negative integers.

1. Solve each equation.

a. $6 = |x| - 2$

$$8 = |x|$$

$x = 8 \quad x = -8$

b. $\frac{2|x+5|}{2} = \frac{4}{2}$

$$|x+5| = 2$$

$$\begin{array}{l} x+5 = 2 \\ -5 \quad -5 \\ \hline x = -3 \end{array}$$

$$\begin{array}{l} x+5 = -2 \\ -5 \quad -5 \\ \hline x = -7 \end{array}$$

Solve $|3x + 9| - 10 = -4$.

$$|3x+9| = 6$$

$$\begin{array}{r}
 3x + 9 = 6 \\
 \cancel{-9} \quad \cancel{-9} \\
 \hline
 3x = -3 \\
 \cancel{3} \quad \cancel{3} \\
 \hline
 \boxed{x = -1}
 \end{array}$$

$$\begin{array}{r}
 3x + 9 = -6 \\
 \cancel{-9} \quad \cancel{-9} \\
 \hline
 3x = -15 \\
 \cancel{3} \quad \cancel{3} \\
 \hline
 \boxed{x = -5}
 \end{array}$$

Solve (a) $|3x - 4| = |x|$ and (b) $|4x - 10| = 2|3x + 1|$.

change the sign on one side only

$$\begin{array}{r}
 3x - 4 = x \\
 \cancel{-x} + 4 \quad \cancel{-x} + 4 \\
 \hline
 2x = 4 \\
 \cancel{2} \quad \cancel{2} \\
 \hline
 \boxed{x = 2}
 \end{array}$$

$$\begin{array}{r}
 3x - 4 = -x \\
 \cancel{-x} + 4 \quad \cancel{-x} + 4 \\
 \hline
 4x = 4 \\
 \cancel{4} \quad \cancel{4} \\
 \hline
 \boxed{x = 1}
 \end{array}$$

solve normally

$$\begin{array}{r}
 -4x + 10 = 2(3x + 1) \\
 \cancel{-4x} + 10 = \cancel{6x} + 2 \\
 \cancel{4x} - 2 \quad \cancel{4x} + 2 \\
 \hline
 8 = 10x \\
 \frac{8}{10} = \frac{10x}{10} \\
 \hline
 \boxed{.8 = x}
 \end{array}$$

$$\begin{array}{r}
 4x - 10 = 2(3x - 1) \\
 \cancel{4x} - 10 = \cancel{6x} + 2 \\
 \cancel{-4x} - 2 \quad \cancel{-4x} + 2 \\
 \hline
 -12 = 2x \\
 \frac{-12}{2} = \frac{2x}{2} \\
 \hline
 \boxed{-6 = x}
 \end{array}$$

Solve the equation. Check your solutions.

8. $|x + 8| = |2x + 1|$

$$\begin{array}{r}
 -x - 8 = 2x + 1 \\
 \cancel{+x} - 1 \quad \cancel{+x} - 1 \\
 \hline
 -9 = 3x \\
 \frac{-9}{3} = \frac{3x}{3} \\
 \hline
 \boxed{-3 = x}
 \end{array}$$

$$\begin{array}{r}
 x + 8 = 2x + 1 \\
 \cancel{-x} - 1 \quad \cancel{-x} - 1 \\
 \hline
 \boxed{7 = x}
 \end{array}$$

9. $3|x - 4| = |2x + 5|$

$$\begin{array}{r}
 3(-(x - 4)) = 2x + 5 \\
 \cancel{-3(x - 4)} = 2x + 5 \\
 \cancel{-3x} + 12 = 2x + 5 \\
 7 = 5x \\
 \frac{7}{5} = \frac{5x}{5} \\
 \hline
 \boxed{\frac{7}{5} = x}
 \end{array}$$

$$\begin{array}{r}
 3(x - 4) = 2x + 5 \\
 3x - 12 = 2x + 5 \\
 \hline
 \boxed{x = 17}
 \end{array}$$



HOMework

Pg. 9

16-21

Pg. 48

10, 15-23 ODD, 43
