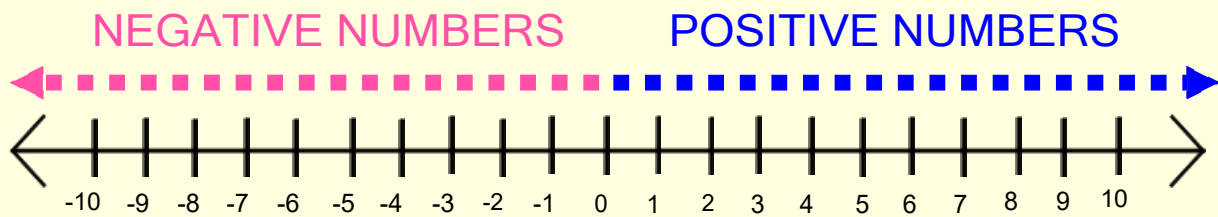
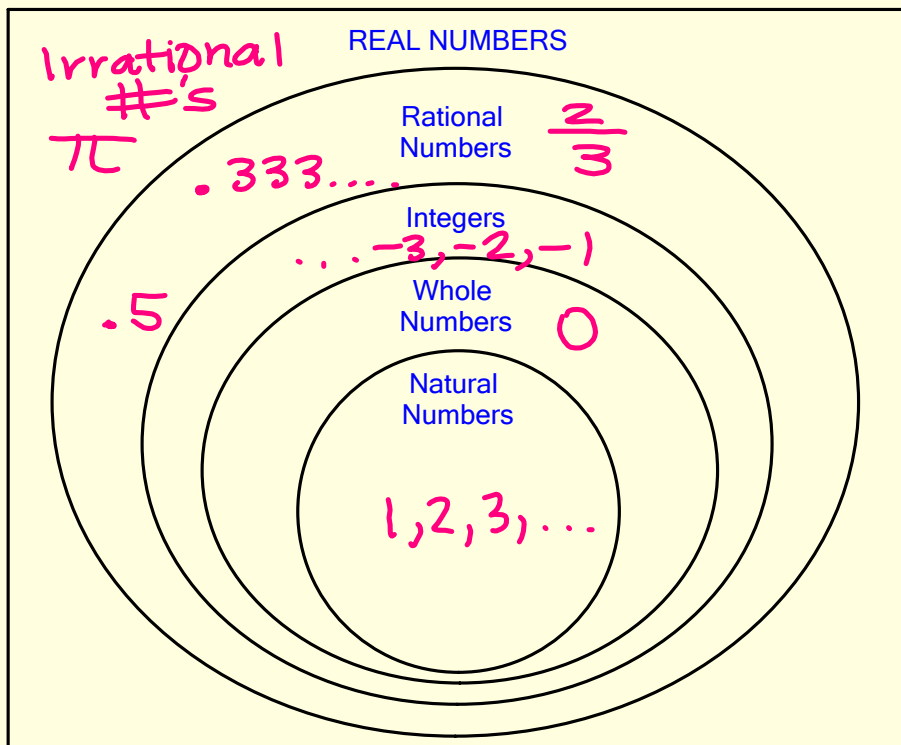


REAL NUMBER LINE



Zero is neither
positive or negative



Natural Numbers

1, 2, 3, ...

Whole Numbers

0, 1, 2, 3, ...

Integers

... -3, -2, -1, 0, 1, 2, 3, ...

Rational Numbers

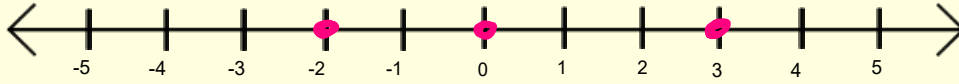
include numbers that
can be written as a
fraction

Real Numbers

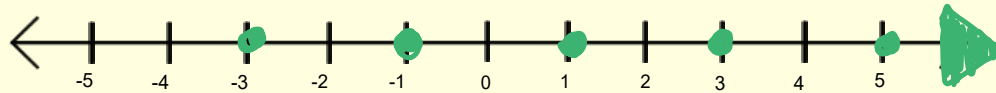
all of the above

EXAMPLES: Graph the following on a number line.

1. -2, 0, 3



2. -3, -1, 1, 3, 5, ... *pattern continues*



Graph on a number line.

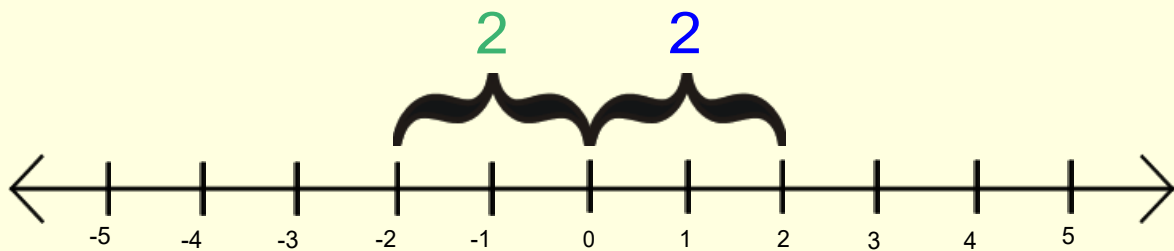
3. $-1\frac{3}{4}$ and 2.7



4. -0.3 and $3\frac{4}{5}$



Two numbers that are the same distance away from 0 on a number line but on opposite sides of 0 are opposites.



The numbers 2 and -2 are **opposites** because each is two units away from 0.

What is the opposite of -4?
4

The absolute value of a number is its distance from zero on a number line.

Evaluate each expression.

$$5. |7|$$

7

$$6. |-4.6|$$

4.6

$$7. \left| \frac{1}{2} \right|$$

$\frac{1}{2}$

$$8. -|2.8|$$

-2.8

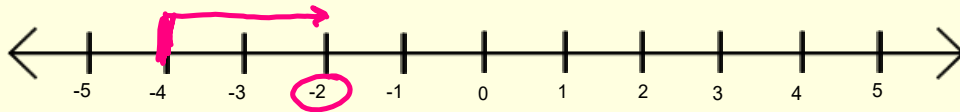
$$9. -\left| -\frac{3}{2} \right|$$

$-\frac{3}{2}$

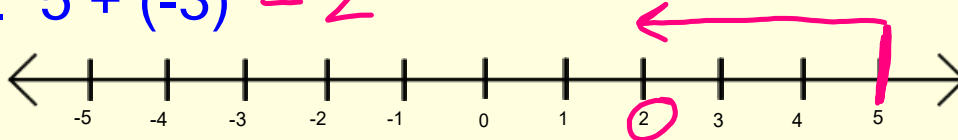
ADDING REAL NUMBERS

EXAMPLES: Use a number line to find the sum.

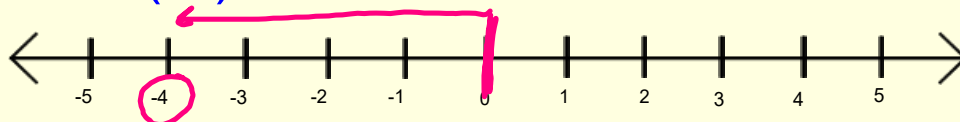
10. $-4 + 2 = -2$



11. $5 + (-3) = 2$



12. $0 + (-4) = -4$



RULES OF ADDITION

To add two numbers with the **same sign** :

1. Add their absolute values.
2. Attach the common sign.

To add two numbers with **opposite signs** :

1. Subtract the smaller absolute value from the larger one.
2. Attach the sign of the number with the larger absolute value.

Add the following.

$$-4 + (-5)$$

Step 1: Add their absolute values. $4 + 5 = 9$

Step 2: Attach common sign. -9

Answer: $-4 + (-5) = -9$

$$3 + (-9)$$

Step 1: Subtract the absolute values. $9 - 3 = 6$

Step 2: Attach sign of the number
with larger absolute value. -6

Answer: $3 + (-9) = -6$

$$1. \quad -3 + (-7)$$

$$-10$$

$$2. \quad -1 + 3$$

$$2$$

$$3. \quad 8 + (-3)$$

$$5$$

$$4. \quad 4 - (-7)$$

$$11$$

Find the sum.

$$5. \quad \underbrace{9 + (-4)}_5 + 1$$

$$6$$

$$9 + 1 + (-4)$$

$$10 + (-4)$$

$$6$$

$$7. \quad 8k + (-12k) = -4k.$$

$$8. \quad -4x + (-15x) = -19x$$

$$6. \quad 4 + \underbrace{(-8) + (-7)}_{-15}$$

$$4 + -15$$

$$-11$$

$$9. \quad 16y - 20y = -4y$$

RULES OF SUBTRACTION

Change subtraction to
"add the opposite."

EXAMPLES: Find the difference.

$$10. \quad 10 - 11 \longrightarrow 10 + (-11) \longrightarrow ? \quad -1$$

$$11. \quad -4 - (-2) \longrightarrow -4 + 2 \longrightarrow ? \quad -2$$

$$12. \quad -6 - 7 \longrightarrow -6 + (-7) \longrightarrow ? \quad -13$$

$$13. \quad 9 - (-2) \longrightarrow 9 + 2 \longrightarrow ? \quad 11$$

$$14. \quad -13 \overset{-}{+} 9 \\ \quad \quad \quad -22$$

$$15. \quad 12 \overset{-}{+} 26 \\ \quad \quad \quad -14$$

$$16. \quad 1 \overset{-}{-} (-2) \overset{-}{+} 6 \\ \quad \quad \quad 3 \overset{-}{+} -6 \\ \quad \quad \quad -3$$

$$17. \quad -9 \overset{-}{-} (-4) \overset{-}{+} 2 \\ \quad \quad \quad -5 \overset{-}{+} -2 \\ \quad \quad \quad -7$$

When an expression is written as a sum, the parts that are added are the **terms** of the expression.

$-5 - x \xrightarrow{\hspace{2cm}} -5 + (-x) \xrightarrow{\hspace{2cm}}$ so the terms are -5 and $-x$

What are the terms of the following?
Simplify each expression.

$$18. \quad 9x - 2x \quad 19. \quad -6m + 7m \quad 20. \quad -2t - (-5t)$$

$$21. \quad 34f - 25f + 31f \quad 22. \quad 91d - (-45d) - 23d$$