Geometry

Topics of emphasis:

1. Midpoint Formula
2. Distance Formula
3. Parallel Lines
    - Corresponding Angles
    - Alternate Interior Angles
    - Alternate Exterior Angles
    - Same - Side Interior Angles
    - Vertical Angles
4. Graphing ordered pairs
    - Coordinate Plane Project

Midpoint Formula

What is the Midpoint Formula for?

- The midpoint formula is used to find the order pair that falls directly in the middle between two given points.

Midpoint Formula:

Given the ordered pairs (x_1, y_1) and (x_2, y_2)

$$\left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2} \right)$$

Procedure:

1. Add the two values of x together, and divide by 2.
2. Add the two values of y together, and divide by 2.
3. Write the ordered pair (Step 1, Step 2)

Examples

Identify the midpoint of each of the following:

1. (-10, 8) & (-8, -8)

2. (-98, 5) & (-77, 64)

Distance Formula

What is the Distance Formula used for?

This is an equation that will calculate the length of a line that directly connects 2 ordered pairs on the coordinate plane.

Distance Formula:

Given (x_1, y_1) & (x_2, y_2)

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Procedure:

1. Label the given ordered pairs as (x_1, y_1) & (x_2, y_2)
2. Subtract the two x values, and square that result.
3. Subtract the two y values, and square that result.
4. Add Step 2 + Step 3
5. Take the Square Root of Step 4. Leave it as a root!

Examples

Find the distance between the given points:

1. (-4, 7) & (3, 9)

2. (1, -4) & (-5, 7)

Parallel Lines

Definitions:

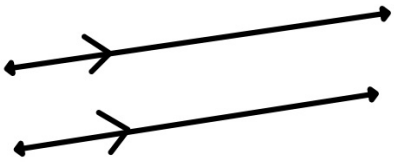
1. Parallel Lines - 2 coplanar lines that never intersect.

2. Transversal - A line that intersects two or more coplanar lines at different points.

Denoted by:

1. a | | b means "a is parallel to b"

2. Arrows in the middle of two or more lines implies that the lines are parallel.

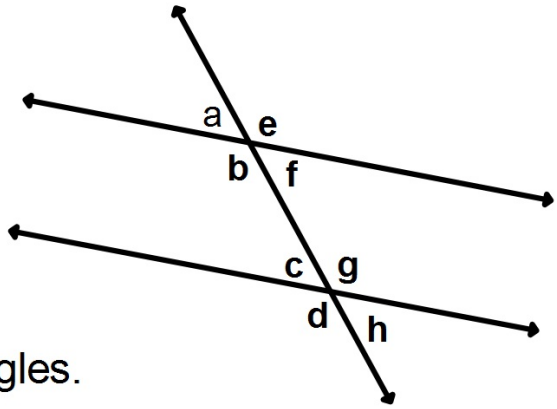


Parallel Lines Continued

Angles formed by lines cut by a transversal:

1. Cooresponding Angles:
   2 angles with corresponding positions.
2. Alternate Interior Angles:
   2 angles inside the 2 lines but on opposite sides of the transversal.
3. Alternate Exterior Angles:
   2 angles outside the 2 lines an on opposite sides of the transversal
4. Same Side Interior Angles:
   2 angles inside the 2 lines and on the same side of the transversal.
5. Vertical Angles:
   Opposite angles of 2 intersecting lines.

Example



Identify each of the following:

1. List all the pairs of Corresponding Angles.

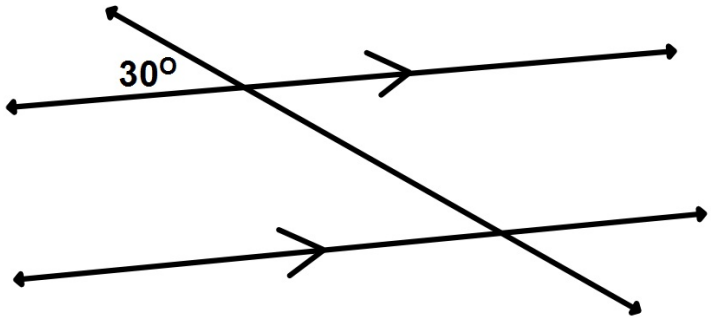
2. List all the pairs of Alternate Interior Angles.

3. List all the pairs of Alternate Exterior Angles.

4. List the Same-Side Interior Angles.

5. List all of the Vertical Angles.

Example



Find the measure of each of the missing angles.

Parallel Lines Continued

If 2 parallel lines are cut by a transversal:

1. Corresponding Angles Postulate:
   Then pairs of corresponding angles are congruent.

2. Alternate Interior Angles Theorem:
   Then pairs of alternate interior angles are congruent.

3. Alternate Exterior Angles Theorem:
   Then pairs of alternate exterior angles are congruent.

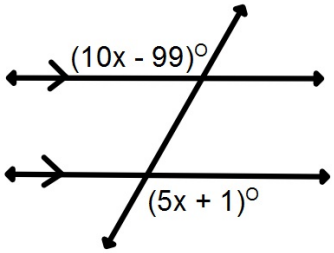
4. Same-Side Interior Angles Theorem:
   Then same-side interior angles are supplementary.

5. Vertical Angles Congruence Theorem:
   Vertical angles are contruent

Examples

Find the value of each variable:

1.



2.