Geometry Readiness: Slope

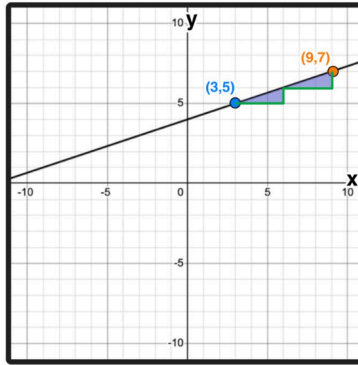### Formula

Given two points with coordinates:

(x_1, y_1) ← The 1st point has the 1 subscript

(x_2, y_2) ← The 2nd point has the 2 subscript

The slope, m, of the line that passes through them is equal to:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Graph

Example

Using the points:

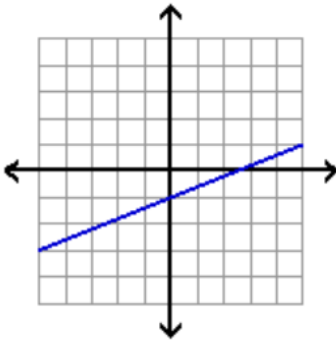$(3, 5)$ & $(9, 7)$
  ↑ ↑   ↑ ↑
 $x_1\ y_1$ $x_2\ y_2$

The slope, m, is equal to:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-5}{9-3} = \frac{2}{6}$$
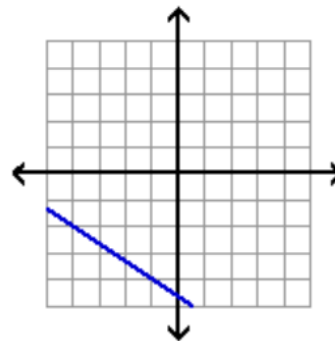
$$m = \frac{2}{6} \rightarrow m = \frac{1}{3}$$

mashupmath ▶

Directions: Find the slope of each line given two points or the graph.

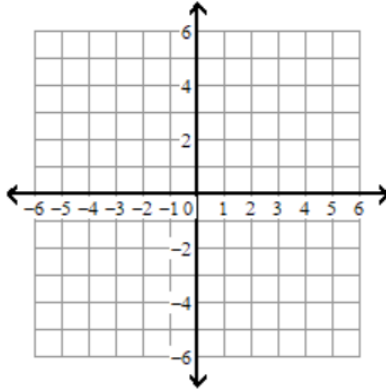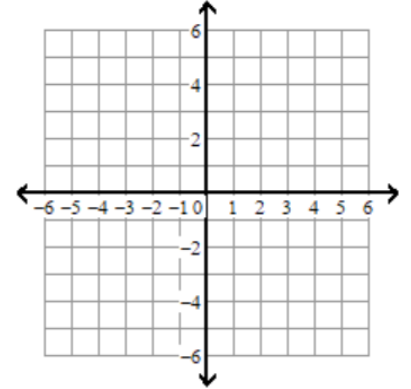| 1.	2.
3. (−20, −7) and (0, 0)	4. (−5, 15) and (15, 11)
5. (−13, −10) and (−19, −10)	6. (10, −8) and (1, −7)
7. (−11, −11) and (−20, −12)	8. (12, −4) and (12, −16)

Geometry Readiness: Linear Equations (y = mx + b)

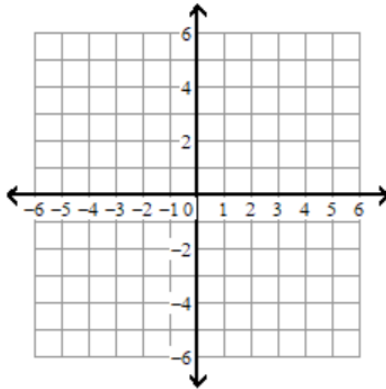**Directions: Graph each line on the coordinate plane given the equation in slope-intercept form.**
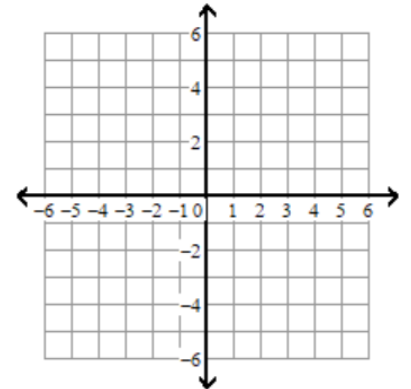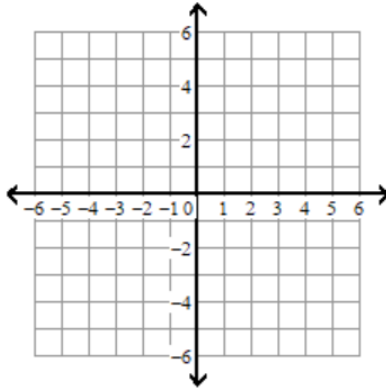
1. $y = x - 1$
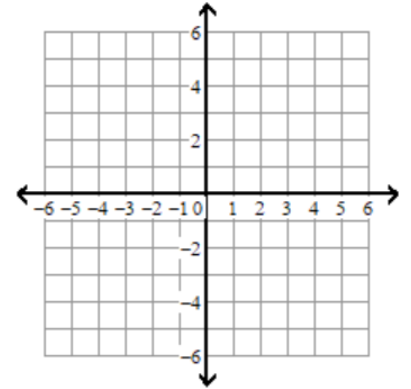
2. $y = -6x + 1$

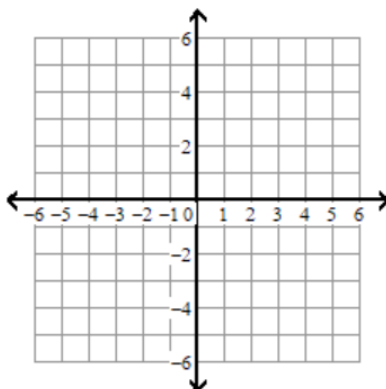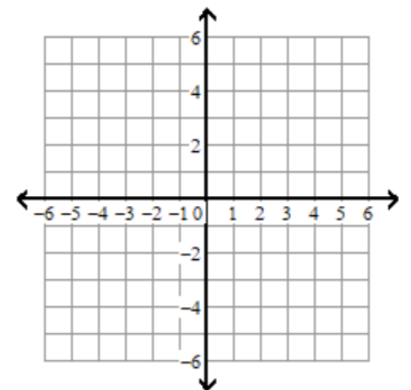3. $y = 2$

4. $y = -x - 2$

5. $y = \frac{1}{3}x + 1$

6. $y = -\frac{1}{2}x - 4$

7. $y = -\frac{3}{5}x + 1$

8. $x = -4$

Geometry Readiness: Parallel & Perpendicular Lines

Parallel lines have the SAME slope

Parallel

$y = 2x + 4$
$y = 2x - 3$

Perpendicular

$y = \frac{1}{2}x - 1$
$y = -2x + 4$

Perpendicular lines have slopes that are OPPOSITE RECIPROCALS

Directions: Determine if each set of lines is parallel, perpendicular or neither.

1.
$$y = \frac{1}{2}x - 3$$
$$y = 5 - 2x$$

     parallel   perpendicular   neither

2.
$$y = \frac{2}{3}x + 7$$
$$y = \frac{2}{3}x - 6$$

     parallel   perpendicular   neither

3.
$$y = \frac{3}{5}x - 1$$
$$y = \frac{5}{3}x - 2$$

     parallel   perpendicular   neither

4.
$$y = x + 5$$
$$y = -x - 3$$

     parallel   perpendicular   neither

5.
$$y = 3$$
$$x = -2$$

     parallel   perpendicular   neither

6.
$$3x - 4y = 12$$
$$6x - 8y = 5$$

     parallel   perpendicular   neither

7.
$$y = 5$$
$$y = -3$$

     parallel   perpendicular   neither

8.
$$3x + 5y = 10$$
$$5x - 3y = 9$$

     parallel   perpendicular   neither

$$15 + 6x = 45 + 8x$$

$$15 + 6x = 45 + 8x$$
$$\underline{-6x \qquad\quad -6x}$$
$$15 = 45 + 2x$$
$$\underline{-45 \quad -45}$$
$$\frac{-30}{2} = \frac{2x}{2}$$
$$\boxed{-15 = x}$$

Check your answer:
$$15 + 6(-15) \overset{?}{=} 45 + 8(-15)$$
$$15 + (-90) \overset{?}{=} 45 + (-120)$$
$$-75 = -75 \ \checkmark$$

$$3(5+2x) = 8(5+x)$$

$$15 + 6x = 40 + 8x$$
$$\underline{-8x \qquad\quad -8x}$$
$$15 - 2x = 40$$
$$\underline{-15 \qquad -15}$$
$$\frac{-2x}{-2} = \frac{25}{-2}$$
$$x = \frac{-25}{2}$$

Check:
$$3\left(5+2\left(\frac{-25}{2}\right)\right) \overset{?}{=} 8\left(5+\left(\frac{-25}{2}\right)\right)$$
$$3(5-25) \overset{?}{=} 8\left(\frac{10}{2} - \frac{25}{2}\right)$$
$$3(-20) \overset{?}{=} 8\left(-\frac{15}{2}\right)$$
$$-60 = -60$$

Directions: Solve each equation

1. $1 - 5n = 5 - 7n$

2. $-7 - 8m = 1 - 7m$

3. $6(r + 2) = -4(r + 7)$

4. $2(2a + 6) = -2 + 5(2 + a)$

5. $\dfrac{v + 8}{4} = \dfrac{v - 9}{6}$

6. $\dfrac{9}{5x + 9} = \dfrac{5}{7x + 5}$

7. $\dfrac{5x - 3}{7} = \dfrac{x + 5}{3}$

8. $\dfrac{x + 6}{2} = \dfrac{x - 5}{3}$

Factoring

$6x^2 - x - 15$

$6x^2 - 10x + 9x - 15$ un-CLT

$2x(3x-5) + 3(3x-5)$ factor by grouping

$(3x-5)(2x+3)$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-2 \pm \sqrt{2^2 - 4(1)(-15)}}{2(1)}$$

$$= \frac{-2 \pm \sqrt{4 + 60}}{2} = \frac{-2 \pm \sqrt{64}}{2} = \frac{-2 \pm 8}{2}$$

$$x = \frac{-2 + 8}{2} = \frac{6}{2} = 3$$

$$x = \frac{-2 - 8}{2} = \frac{-10}{2} = -5$$

Directions: Solve each quadratic equation algebraic (factoring or quadratic formula)

1. $a^2 + 3a - 28 = 0$	2. $n^2 + 2n - 35 = 0$
3. $r^2 + 2r - 15 = 0$	4. $p^2 + 2p - 48 = 0$
5. $x^2 - 5x = 14$	6. $m^2 - 2m = 8$
7. $n^2 - 4n = 5$	8. $x^2 - 3x = 4$

Geometry Readiness: Solving Systems of Equations using Substitution

$y = 2x - 1$
$2x + 3y = -7$

$y = 2(-\tfrac{1}{2}) - 1$
$y = -1 - 1$
$y = -2$

$2x + 3(2x - 1) = -7$
$2x + 6x - 3 = -7$
$8x - 3 = -7$
$\underline{ +3 \mid +3}$
$8x = -4$
$\underline{\div 8 \mid \div 8}$
$x = -\tfrac{1}{2}$

$\boxed{(-\tfrac{1}{2}, -2)}$
Solution

Directions: Find the solution of each system of equations using substitution.

1.
$$\begin{cases} y = 8x - 4 \\ -x + y = 3 \end{cases}$$

2.
$$\begin{cases} -4x - 3y = -18 \\ y = 3x + 6 \end{cases}$$

3.
$$\begin{cases} y = 2x + 3 \\ 4x - 5y = 3 \end{cases}$$

4.
$$\begin{cases} x - 3y = -4 \\ y = -3x + 18 \end{cases}$$

5.
$$\begin{cases} x - 2y = 12 \\ -5x - 6y = 4 \end{cases}$$

6.
$$\begin{cases} 5x + y = -15 \\ 7x - 6y = 16 \end{cases}$$
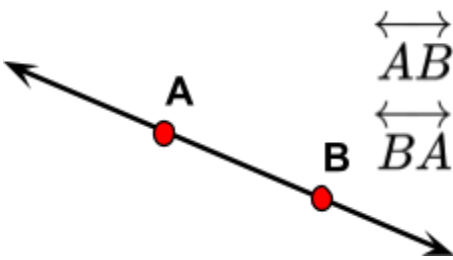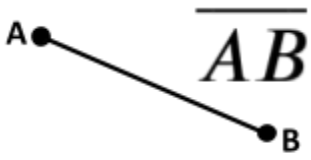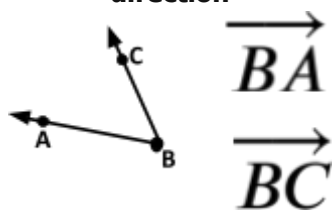
Simplifying

$$\sqrt{96}$$

$$(2)(2)\sqrt{(2)(3)}$$

$$4\sqrt{6}$$

3	1
3	3
2	6
2	12
2	24
2	48
2	96

Adding/Subtracting
Combine like terms

$$3\sqrt{5} + 4\sqrt{5} - 5\sqrt{5}$$

$$2\sqrt{5}$$

Simplifying first, then combining

$$\sqrt{18} + 2\sqrt{98}$$

$$3\sqrt{2} + (2)(7)\sqrt{2}$$

$$3\sqrt{2} + 14\sqrt{2}$$

$$17\sqrt{2}$$

Multiplying

$$\left(4\sqrt{3}\right)\left(2\sqrt{8}\right)$$

$$(4)(2)\sqrt{(3)(8)}$$

$$8\sqrt{24}$$

$$(8)(2)\sqrt{(2)(3)}$$

$$16\sqrt{6}$$

Directions: Simplify each expression

1. $\sqrt{108}$	**2.** $\sqrt{32}$	**3.** $\sqrt{384}$
4. $5\sqrt{63}$	**5.** $6\sqrt{288}$	**6.** $-3\sqrt{24}$
7. $-6\sqrt{2} + 4\sqrt{3} - 3\sqrt{2}$	**8.** $\sqrt{8} + \sqrt{18} + \sqrt{20}$	**9.** $\sqrt{48} + \sqrt{3} + \sqrt{75}$
10. $\left(4\sqrt{6}\right)\left(3\sqrt{2}\right)$	**11.** $\left(3\sqrt{5}\right)\left(4\sqrt{3}\right)$	**12.** $\left(7\sqrt{6}\right)\left(5\sqrt{10}\right)$

Geometry Readiness: Lines, Segments, and Rays

Line	Segment	Ray
Made of an infinite number of points and extends indefinitely in both directions	Part of a line defined by two points called "endpoints"	Part of a line defined by a point and extends indefinitely in one direction

Line

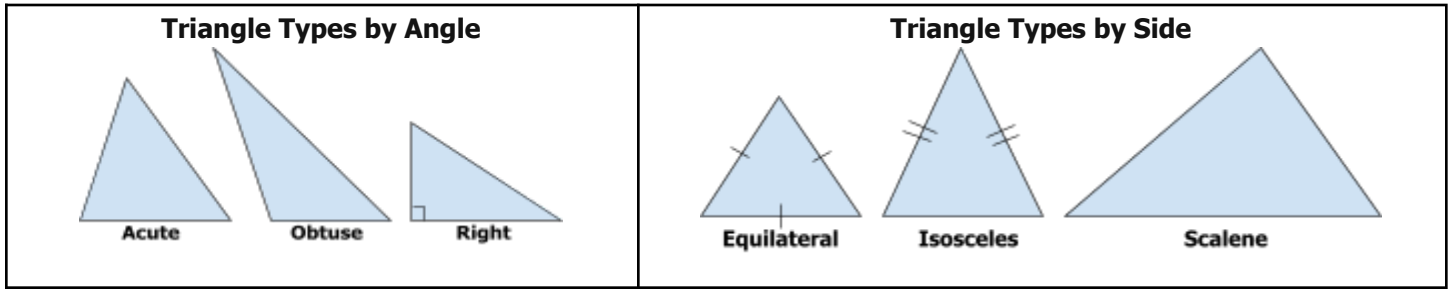$\overleftrightarrow{AB}$

$\overleftrightarrow{BA}$

Segment

$\overline{AB}$

Ray

$\overrightarrow{BA}$

$\overrightarrow{BC}$

Directions: Use the diagram to identify the lines, segments, and rays.

Diagram
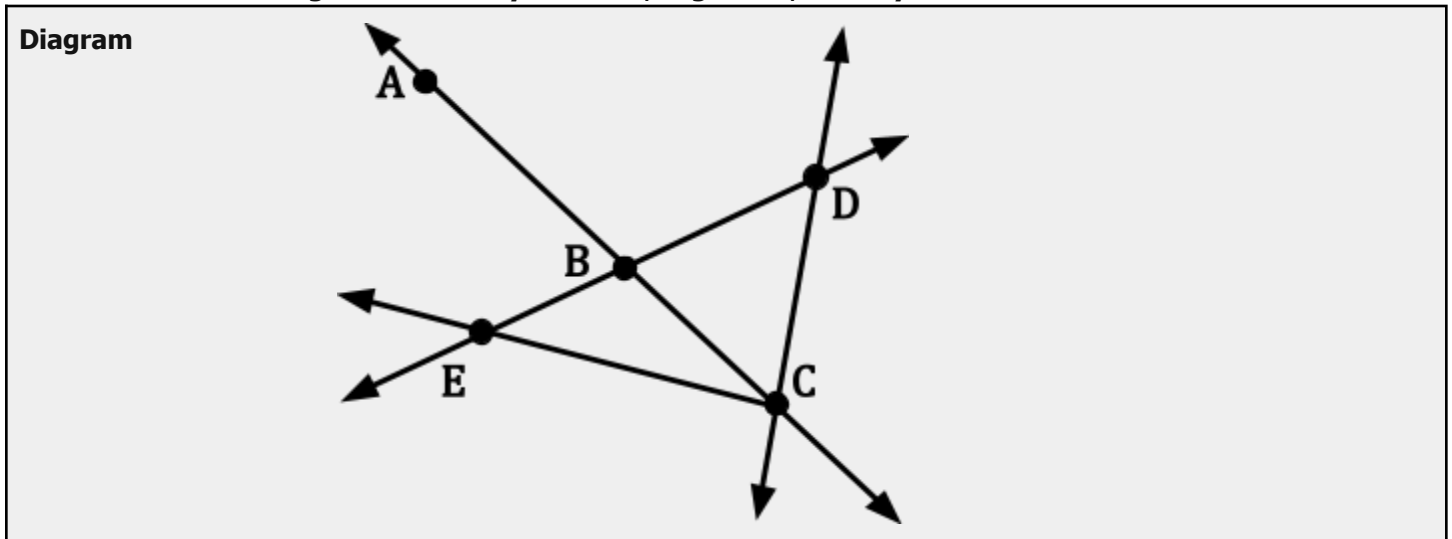
Lines	Segments	Rays

Geometry Readiness: Types of Triangles and Quadrilaterals
** All triangles contain 180 degrees **

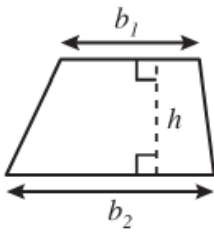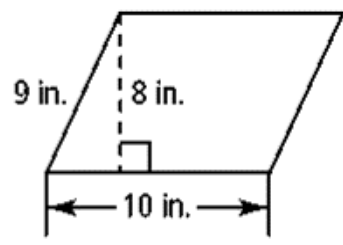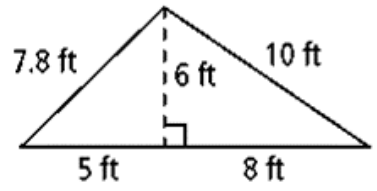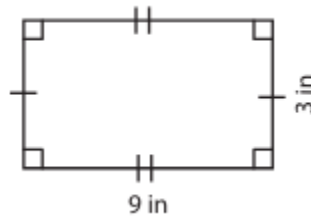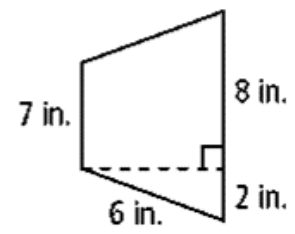| Triangle Types by Angle	Triangle Types by Side
Acute Obtuse Right	Equilateral Isosceles Scalene
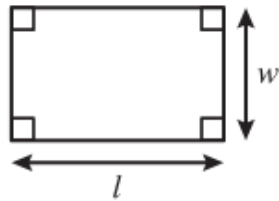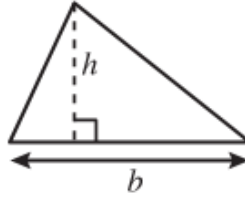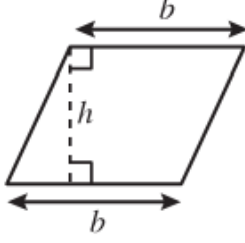
Directions: Classify each triangle by its angles and sides.

1.

2.

3. $106°$, 15, 18, 25
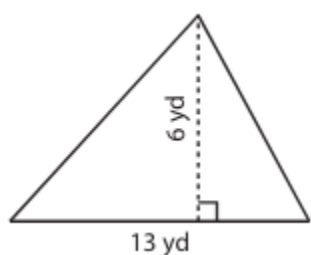
4. $80°$, 7, 5, $40°$, 8

5. $100°$

6. 3, 5, 4
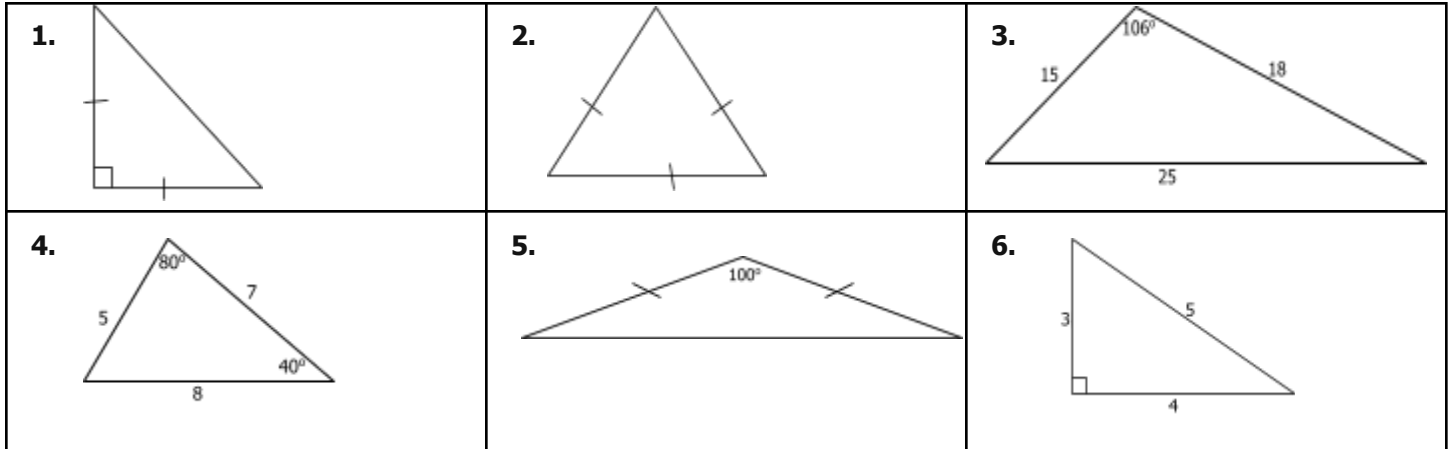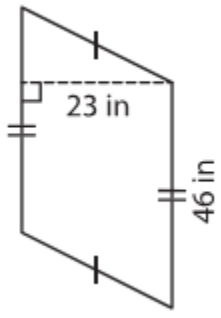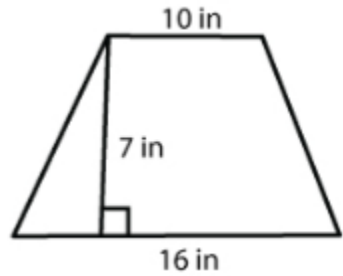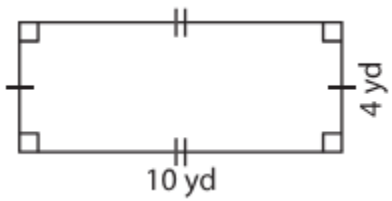
Directions: Determine if each is a square, rectangle, rhombus, parallelogram, trapezoid or more than name.

Trapezoid 1 pair of parallel sides			**Parallelogram** Opposite sides parallel	
Isosceles Trapezoid Legs are congruent	**Rhombus** All sides congruent	**Square** All sides congruent and angles 90°	**Rectangle** All right angles	

7.

8.

9.

10.
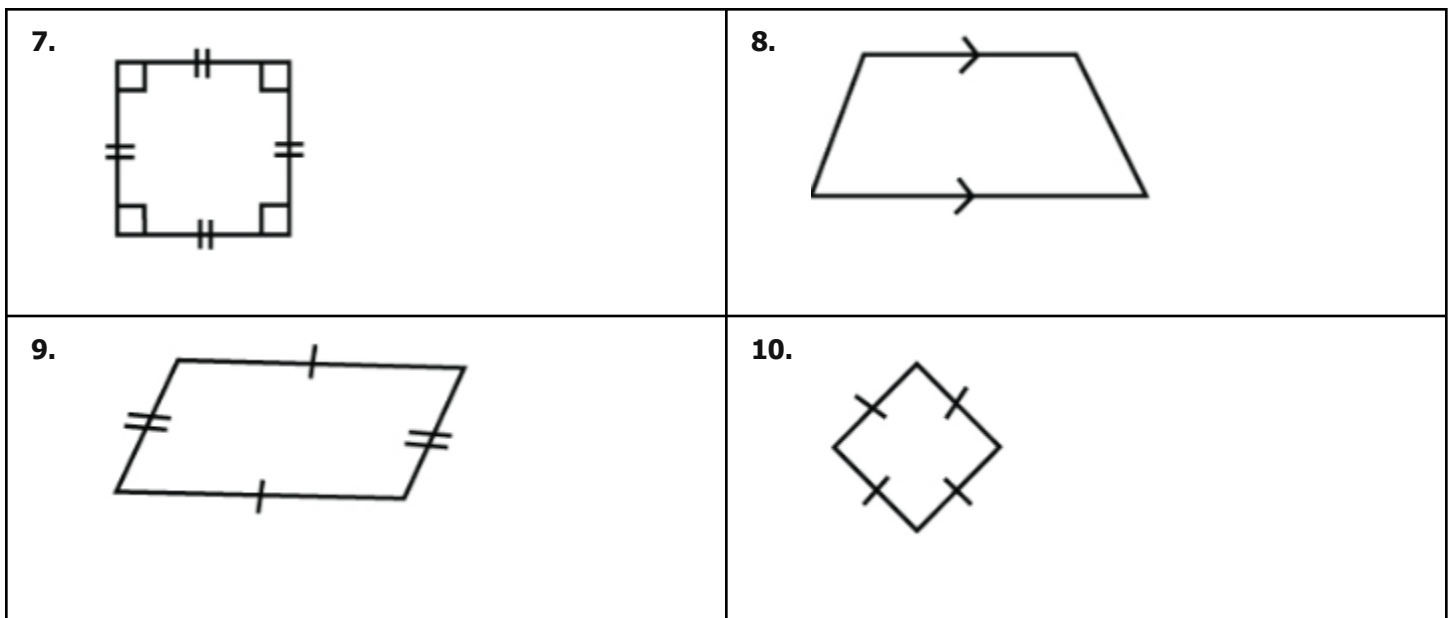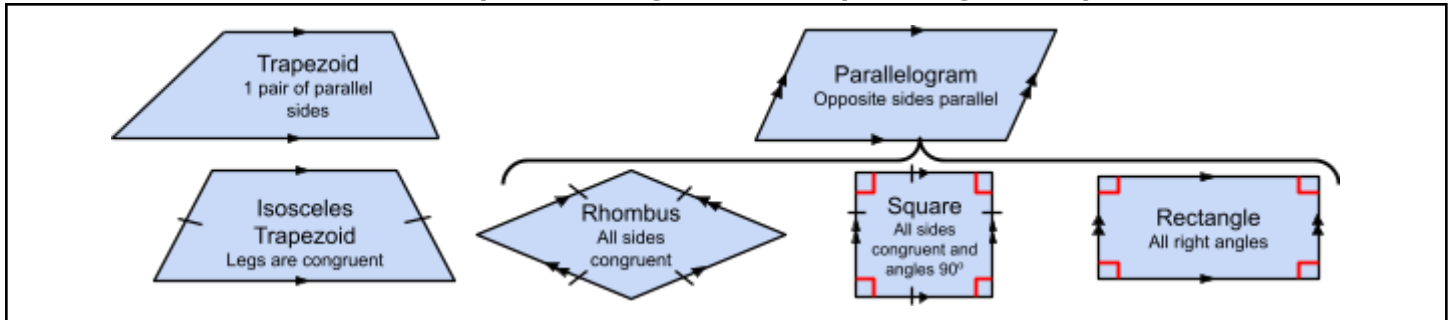
Geometry Readiness: Area of Basic Shapes

Rectangle	Triangle	Parallelogram	Trapezoid
$A = lw$	$A = \frac{1}{2}bh$	$A = bh$	$A = \frac{1}{2}h(b_1 + b_2)$

Directions: Find the area for each figure

1.

9 in. / 8 in. / 10 in.

2.

7.8 ft / 6 ft / 10 ft / 5 ft / 8 ft

3.

3 in / 9 in

4.

7 in. / 8 in. / 6 in. / 2 in.

5.

6 yd / 13 yd

6.

23 in / 46 in

7.

10 in / 7 in / 16 in

8.

10 yd / 4 yd

PYTHAGOREAN THEOREM

$$c^2 = a^2 + b^2$$

c hypotenuse

a

b

90°
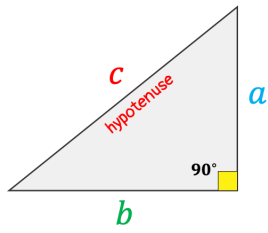
⭐ $c = \sqrt{a^2 + b^2}$

⭐ $a = \sqrt{c^2 - b^2}$

⭐ $b = \sqrt{c^2 - a^2}$

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6 x 8
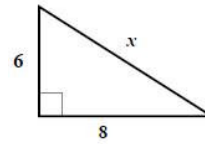
$6^2 + 8^2 = x^2$

$36 + 64 = x^2$

$100 = x^2$

$\sqrt{100} = \sqrt{x^2}$

$x = 10$

12 y 13
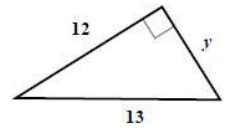
$12^2 + y^2 = 13^2$
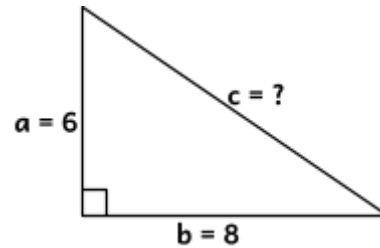
$144 + y^2 = 169$

$y^2 = 25$

$\sqrt{y^2} = \sqrt{25}$

$y = 5$

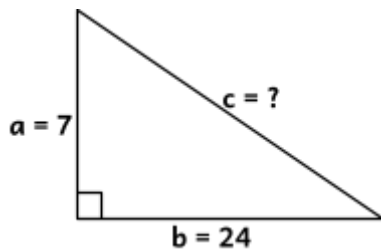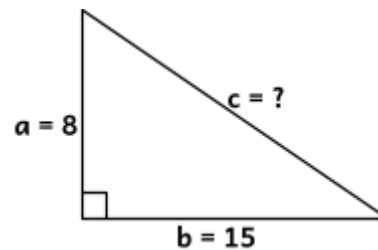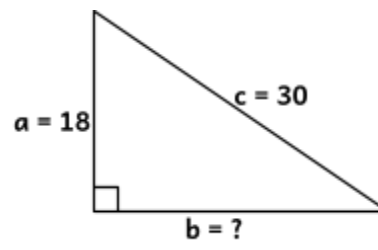**Directions:** Solve for the unknown value using the Pythagorean theorem. *Figures not drawn to scale*

1.

$a = 5$

$c = ?$

$b = 12$

2.

$a = 6$

$c = ?$

$b = 8$

3.

$a = 7$

$c = ?$

$b = 24$

4.

$a = 8$

$c = ?$

$b = 15$

5.

$a = ?$

$c = 20$

$b = 12$

6.

$a = 18$

$c = 30$

$b = ?$

7.

$a = ?$

$c = 40$

$b = 24$

8.
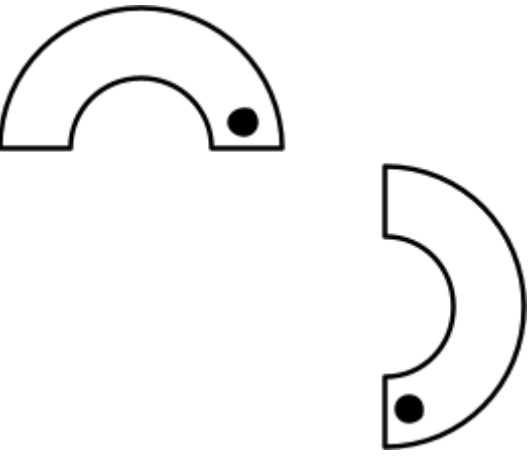
$a = ?$

$c = 25$

$b = 20$
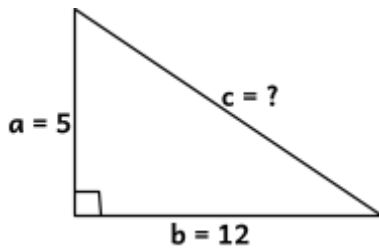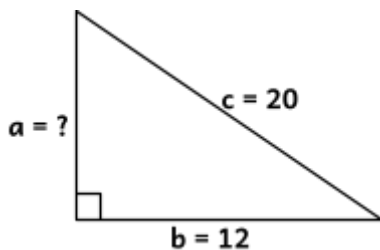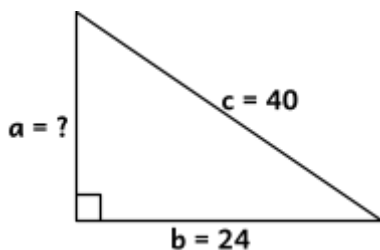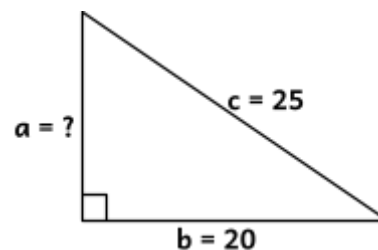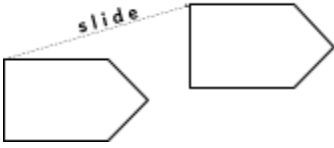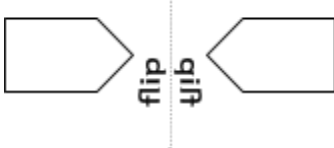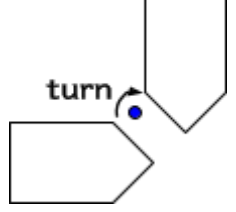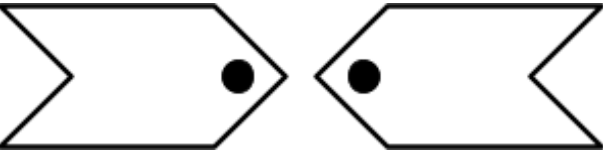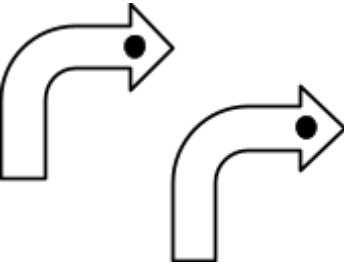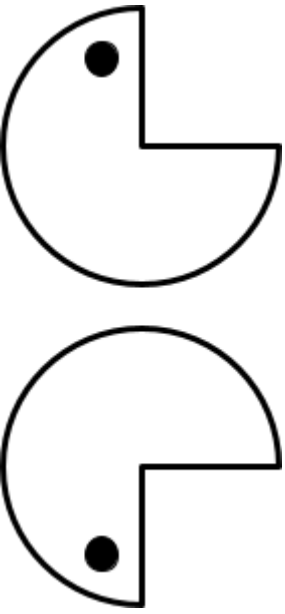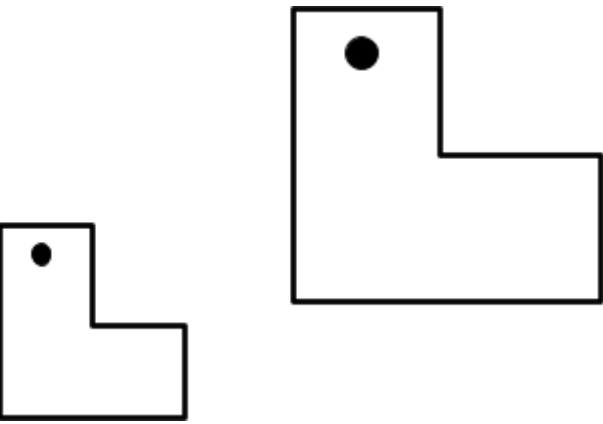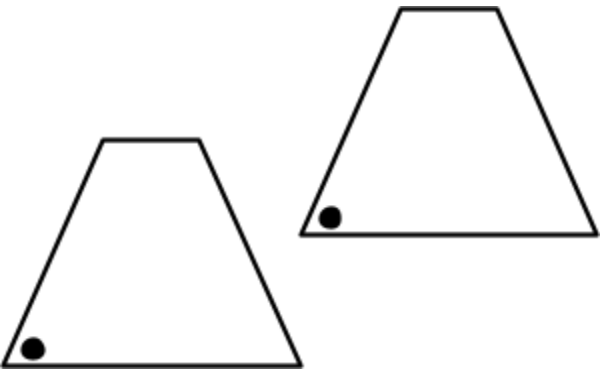
Geometry Readiness: Basic Transformations

Translation (SLIDE)	Reflection (FLIP)	Rotation (TURN)	Dilation (RESIZE)
slide	flip	turn	resize

Directions: Identify the type of transformation that occurred.

1.

2.

3.

4.

5.

6.