NAME: _____ PERIOD: _____ TEACHER: _____

Geometry Readiness: Slope – ANSWER KEY

Formula
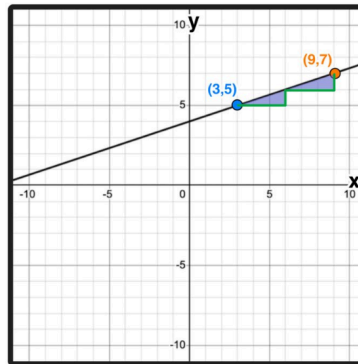
Given two points with coordinates:

(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:

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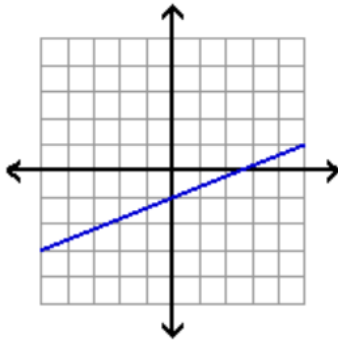 ↑ ↑   ↑ ↑
 x_1 y_1 x_2 y_2

The slope, m, is equal to:

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

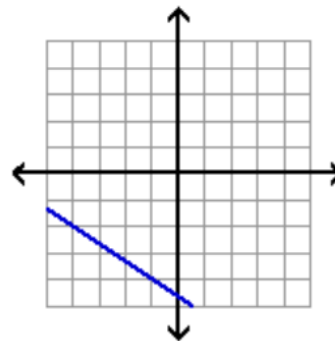$$m = \frac{2}{6} \rightarrow \boxed{m = \frac{1}{3}}$$

mashupmath ▶

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

1. m = 2/5	**2.** m = −2/3

3. (−20, −7) and (0, 0)

$$m = \frac{-7-0}{-20-0} = \frac{-7}{-20}$$

$$m = \frac{7}{20}$$

4. (−5, 15) and (15, 11)

$$m = \frac{15-11}{-5-15} = \frac{4}{-20}$$

$$m = -\frac{1}{5}$$

5. (−13, −10) and (−19, −10)

$$m = \frac{-10-(-10)}{-13-(-19)} = \frac{0}{6}$$

$$m = 0$$

6. (10, −8) and (1, −7)

$$m = \frac{-8-(-7)}{10-1} = \frac{-1}{9}$$

$$m = -\frac{1}{9}$$

7. (−11, −11) and (−20, −12)

$$m = \frac{-11-(-12)}{-11-(-20)} = \frac{1}{9}$$
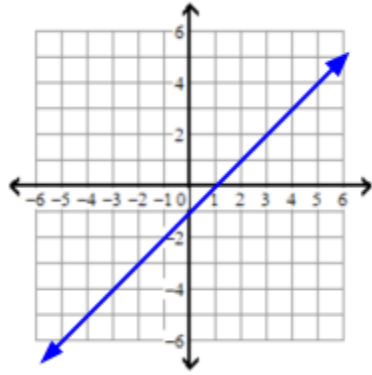
$$m = \frac{1}{9}$$

8. (12, −4) and (12, −16)

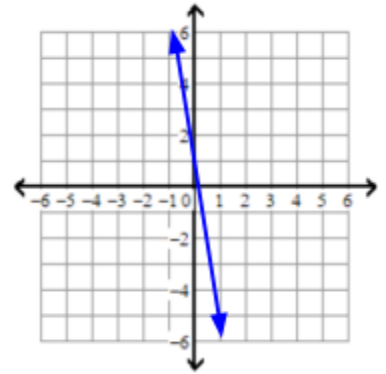$$m = \frac{-4-(-16)}{12-12} = \frac{12}{0}$$

$$m = \text{undefined}$$

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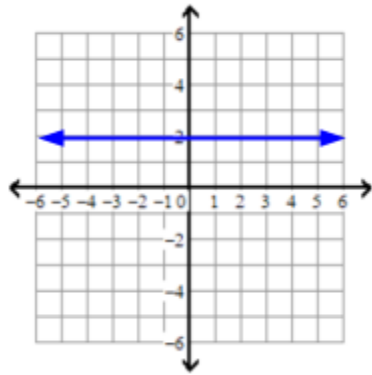
1. $y = x - 1$
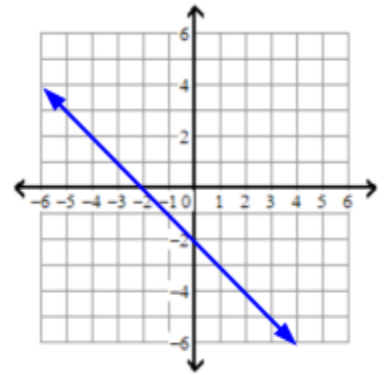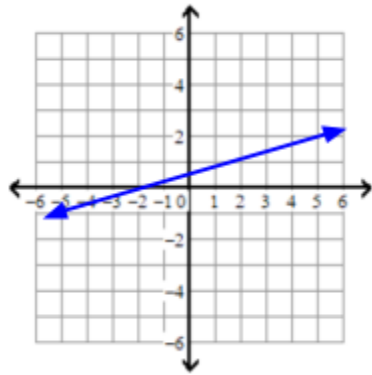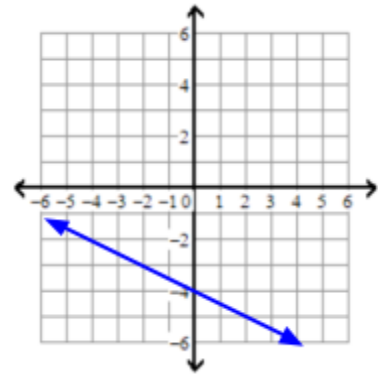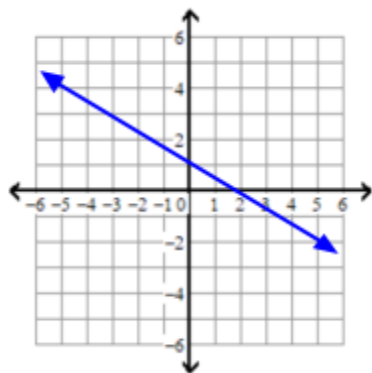
2. $y = -6x + 1$
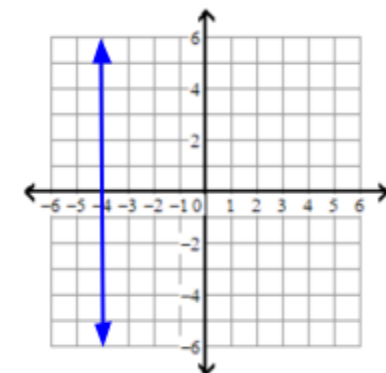
3. $y = 2$

4. $y = -x - 2$

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

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

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

8. $x = -4$

Parallel

Parallel lines have the SAME slope

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

Perpendicular

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

Perpendicular lines have slopes that are OPPOSITE RECIPROCALS

$y=-2x+4$

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:

$$15 + 6(-15) \overset{?}{=} 45 + 8(-15)$$
$$15 + (-90) \overset{?}{=} 45 + (-120)$$
$$-75 = -75 ✔$$

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

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

Check:

$$3(5+2(\tfrac{-25}{2})) \overset{?}{=} 8(5+(\tfrac{-25}{2}))$$
$$3(5-25) \overset{?}{=} 8(\tfrac{10}{2} - \tfrac{25}{2})$$
$$3(-20) \overset{?}{=} 8(-\tfrac{15}{2})$$
$$-60 = -60$$

Directions: Solve each equation

1. $1 - 5n = 5 - 7n$
   $1 + 2n = 5$
   $\quad 2n = 4$
   $\quad \boxed{n = 2}$

2. $-7 - 8m = 1 - 7m$
   $-7 = 1 + m$
   $\boxed{-8 = m}$

3. $6(r + 2) = -4(r + 7)$
   $6r + 12 = -4r - 28$
   $10r + 12 = -28$
   $\quad 10r = -30$
   $\quad \boxed{r = -3}$

4. $2(2a + 6) = -2 + 5(2 + a)$
   $4a + 12 = -2 + 10 + 2a$
   $4a + 12 = 8 + 2a$
   $2a + 12 = 8$
   $\quad 2a = -4$
   $\quad \boxed{a = -2}$

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

   $6(v + 8) = 4(v - 9)$
   $6v + 48 = 4v - 36$
   $2v + 48 = -36$
   $\quad 2v = -84$
   $\quad \boxed{v = -42}$

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

   $9(7x + 5) = 5(5x + 9)$
   $63x + 45 = 25x + 45$
   $38x + 45 = 45$
   $38x = 0$
   $\quad \boxed{x = 0}$

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

   $3(5x - 3) = 7(x+5)$
   $15x - 9 = 7x + 35$
   $8x - 9 = 35$
   $\quad 8x = 44$
   $\quad \boxed{x = 11/2}$

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

   $3(x + 6) = 2(x - 5)$
   $3x + 18 = 2x - 10$
   $\quad x + 18 = -10$
   $\quad \boxed{x = -28}$

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

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

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

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

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

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

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

−x + (8x − 4) = 3
7x − 4 = 3
7x = 7
x = 1

y = 8(1) − 4 = 4

(1, 4)

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

−4x − 3(3x + 6) = −18
−4x − 9x − 18 = −18
−13x = 0
x = 0

y = 3(0) + 6 = 6

(0, 6)

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

4x − 5(2x + 3) = 3
4x − 10x − 15 = 3
−6x − 15 = 3
−6x = 18
x = −3

y = 2(−3) + 3 = −3

(−3, −3)

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

x − 3(−3x + 18) = −4
x + 9x − 54 = −4
10x = 50
x = 5

Y = −3(5) + 18 = 3

(5, 3)

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

−5(2y + 12) − 6y = 4
−10y − 60 − 6y = 4
−16y − 60 = 4
−16y = 64
y = −4

x = 2(−4) + 12 = 4

(4, −4)

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

7x − 6(−5x − 15) = 16
7x + 30x + 90 = 16
37x + 90 = 16
37x = −74
x = −2
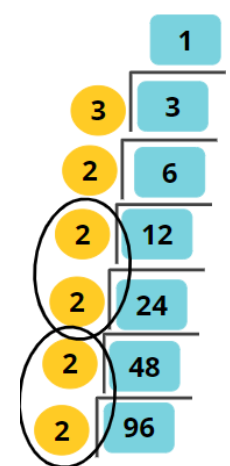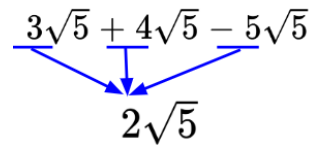
y = −5(−2) − 15 = −5

(−2, −5)
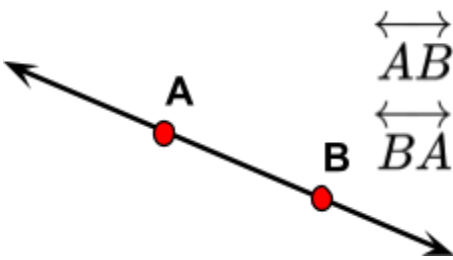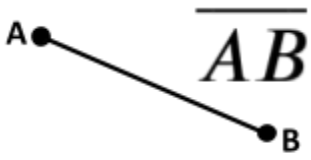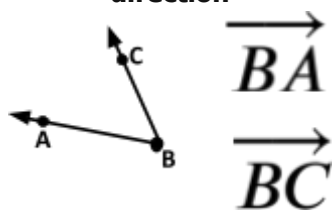
Simplifying

$$\sqrt{96}$$

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

$$4\sqrt{6}$$

	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. $\sqrt{108}$ $\sqrt{36}\cdot\sqrt{3}$ $6\sqrt{3}$	**2.** $\sqrt{32}$ $\sqrt{16}\cdot\sqrt{2}$ $4\sqrt{2}$	**3.** $\sqrt{384}$ $\sqrt{64}\cdot\sqrt{6}$ $8\sqrt{6}$
4. $5\sqrt{63}$ $5\sqrt{9}\cdot\sqrt{7}$ $15\sqrt{7}$	**5.** $6\sqrt{288}$ $6\sqrt{144}\cdot\sqrt{2}$ $72\sqrt{2}$	**6.** $-3\sqrt{24}$ $-3\sqrt{4}\cdot\sqrt{6}$ $-6\sqrt{6}$
7. $-6\sqrt{2} + 4\sqrt{3} - 3\sqrt{2}$ $-5\sqrt{2}$	**8.** $\sqrt{8} + \sqrt{18} + \sqrt{20}$ $2\sqrt{2} + 3\sqrt{2} + 2\sqrt{5}$ $5\sqrt{2} + 2\sqrt{5}$	**9.** $\sqrt{48} + \sqrt{3} + \sqrt{75}$ $4\sqrt{3} + \sqrt{3} + 5\sqrt{3}$ $10\sqrt{3}$
10. $\left(4\sqrt{6}\right)\left(3\sqrt{2}\right)$ $12\sqrt{12}$ $12\sqrt{4}\cdot\sqrt{3}$ $24\sqrt{3}$	**11.** $\left(3\sqrt{5}\right)\left(4\sqrt{3}\right)$ $12\sqrt{15}$	**12.** $\left(7\sqrt{6}\right)\left(5\sqrt{10}\right)$ $35\sqrt{60}$ $35\sqrt{4}\sqrt{15}$ $70\sqrt{15}$

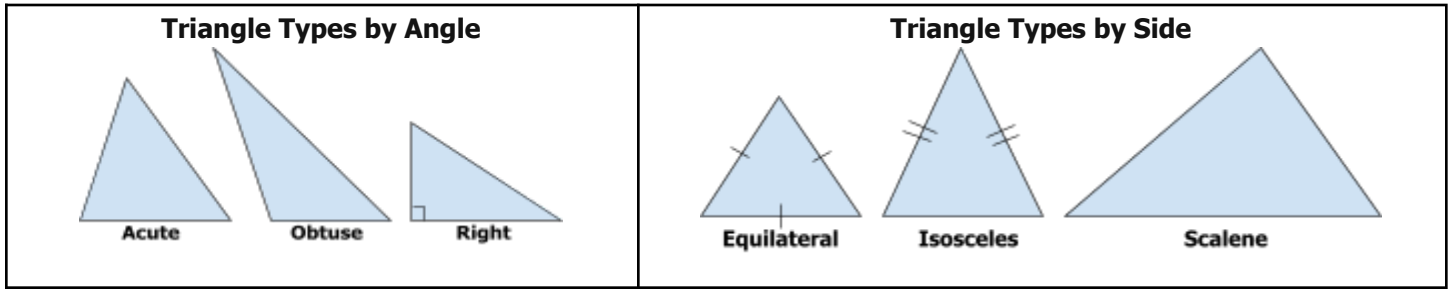| Line	Segment	Ray
Made of an infinite number of points and extends indefinitely in both directions	Part of a line defined by two points called "endpoints"	Part of a line defined by a point and extends indefinitely in one direction

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
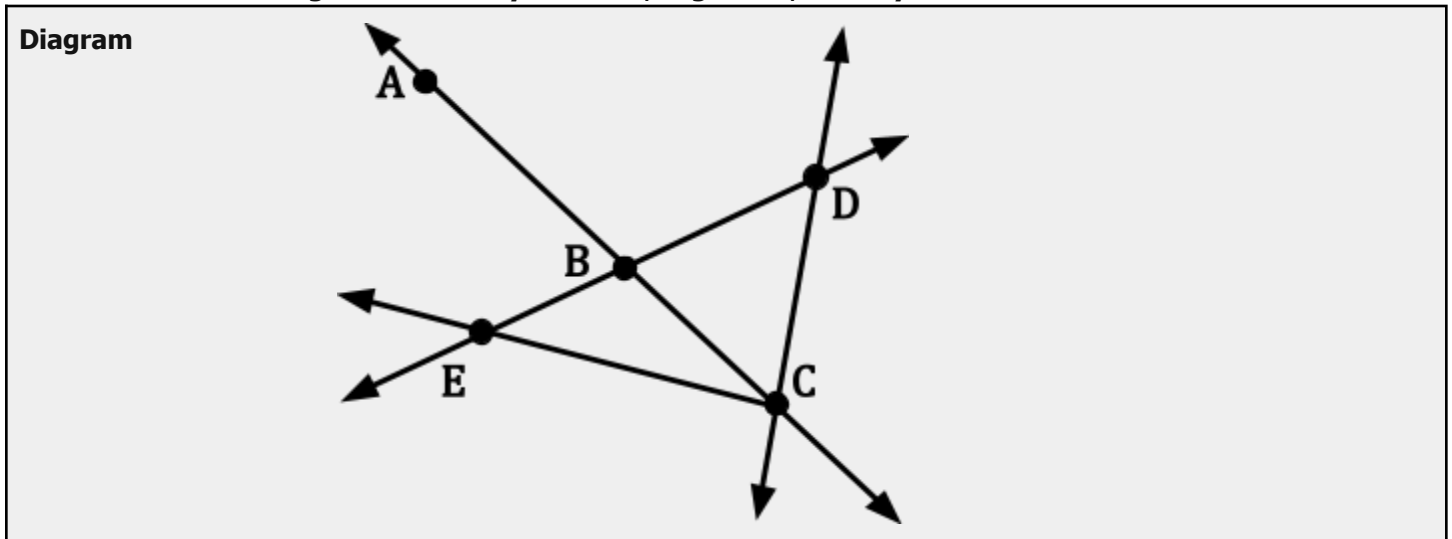
Lines	Segments	Rays
$\overleftrightarrow{AC}$ (other names $\overleftrightarrow{BC},\ \overleftrightarrow{BA},\ \overleftrightarrow{CB},\ \overleftrightarrow{CA}$)	$\overline{AB}$	$\overrightarrow{BA}$
$\overleftrightarrow{EB}$ (other names $\overleftrightarrow{BE},\ \overleftrightarrow{BD},\ \overleftrightarrow{DB},\ \overleftrightarrow{DE},\ \overleftrightarrow{ED}$)	$\overline{BC}$	$\overrightarrow{CE}$
$\overleftrightarrow{DC}$ (other name $\overleftrightarrow{CD}$)	$\overline{EB}$	$\overrightarrow{CD}$
	$\overline{BD}$	$\overrightarrow{DC}$
	$\overline{DC}$	$\overrightarrow{BC}$
	$\overline{EC}$	$\overrightarrow{CA}$ (or $\overrightarrow{CB}$)
		$\overrightarrow{AC}$ (or $\overrightarrow{AB}$)
		$\overrightarrow{DE}$ (or $\overrightarrow{DB}$)
		$\overrightarrow{ED}$ (or $\overrightarrow{EB}$)

** All triangles contain 180 degrees **

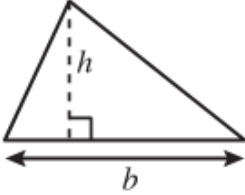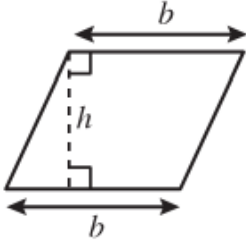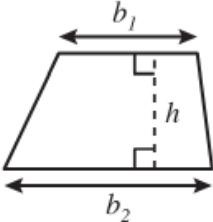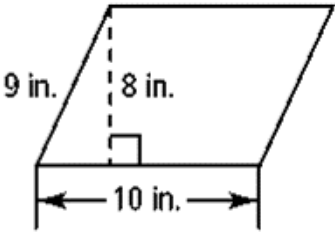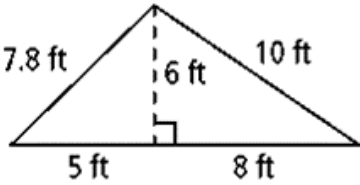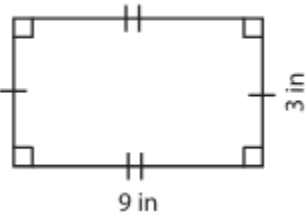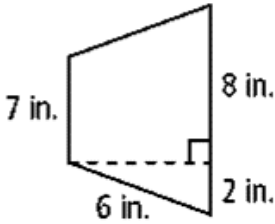| Triangle Types by Angle	Triangle Types by Side
Acute Obtuse Right	Equilateral Isosceles Scalene
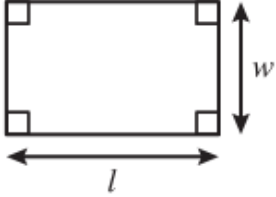
Directions: Classify each triangle by its angles and sides.

1.	**Right, Isosceles**	2.	**Acute, Equilateral**	3.	**Obtuse, Scalene**
4.	**Acute, Scalene**	5.	**Obtuse, Isosceles**	6.	**Right, Scalene**

3. $106°$, 15, 18, 25

4. $80°$, 7, 5, $40°$, 8

5. $100°$

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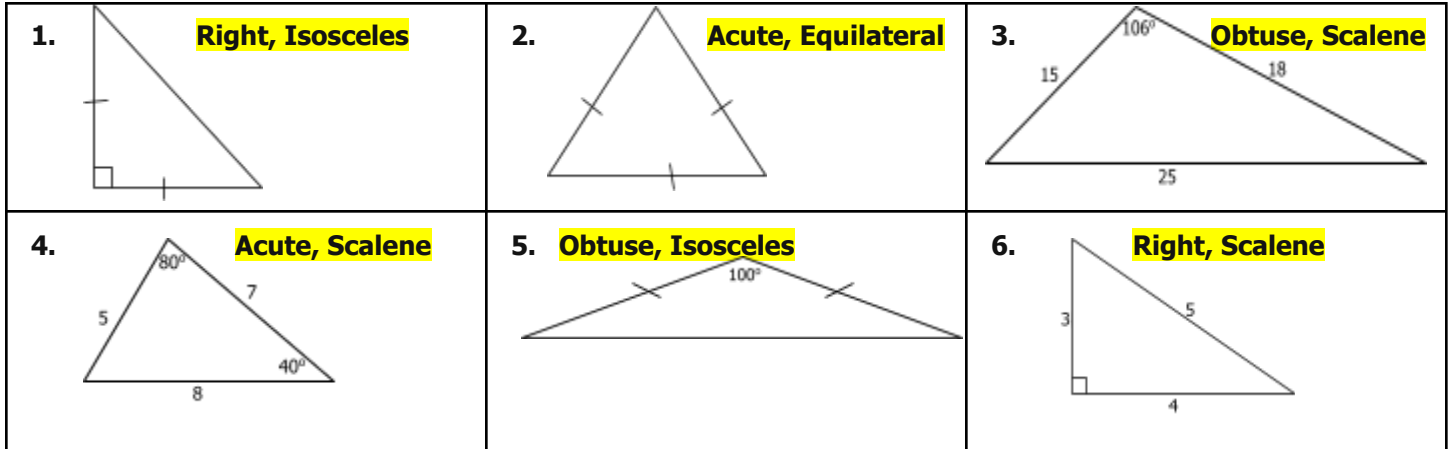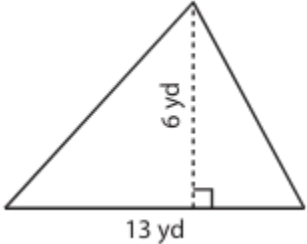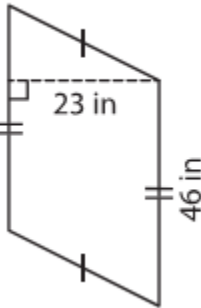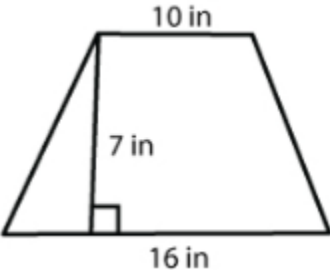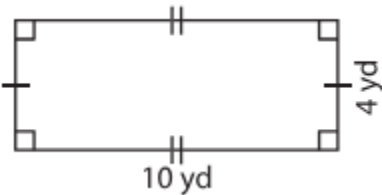
Directions: Determine if each is a square, rectangle, rhombus, parallelogram, trapezoid or more than name.

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.	**Square, Rhombus, Parallelogram**	8.	**Trapezoid**
9.	**Parallelogram**	10.	**Rhombus, Parallelogram**

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

Directions: Find the area for each figure

1.
9 in. / 8 in. / 10 in.

A = 8(10)
A = 80 in²

2.
7.8 ft / 6 ft / 10 ft / 5 ft / 8 ft

A = ½(13)(6)
A = 39 ft²

3.
3 in / 9 in

A = (3)(9)
A = 27 in²

4.
7 in. / 8 in. / 2 in. / 6 in.

h = $\sqrt{6^2 - 2^2}$ = 5.66

A = ½(5.66)(10 + 7)
A = 48.11 in²

5.
6 yd / 13 yd

A = ½(13)(6)
A = 39 yd²

6.
23 in / 46 in

A = 46(23)
A = 1058 in²

7.
10 in / 7 in / 16 in

A = ½(7)(10 + 16)
A = 91 in²

8.
10 yd / 4 yd

A = 10(4)
A = 40 yd²

PYTHAGOREAN THEOREM

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

c = hypotenuse, a, b, $90°$
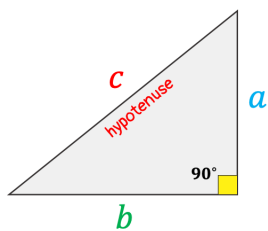
⭐ $c = \sqrt{a^2 + b^2}$

⭐ $a = \sqrt{c^2 - b^2}$

⭐ $b = \sqrt{c^2 - a^2}$

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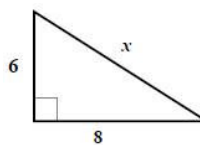
$6^2 + 8^2 = x^2$
$36 + 64 = x^2$
$100 = x^2$
$\sqrt{100} = \sqrt{x^2}$
$\boxed{x = 10}$
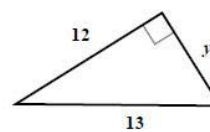
$12^2 + y^2 = 13^2$
$144 + y^2 = 169$
$y^2 = 25$
$\sqrt{y^2} = \sqrt{25}$
$\boxed{y = 5}$

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

1. $a = 5$, $b = 12$, $c = ?$
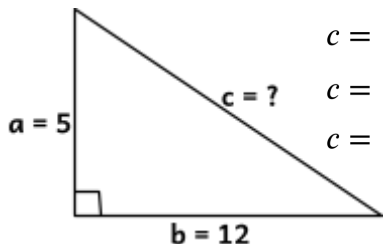
$c = \sqrt{5^2 + 12^2}$
$c = \sqrt{25 + 144} = \sqrt{169}$
$c = 13$

2. $a = 6$, $b = 8$, $c = ?$
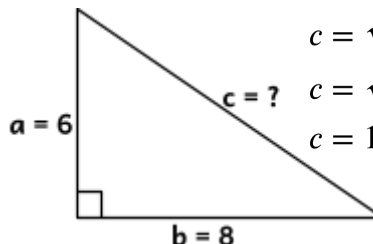
$c = \sqrt{6^2 + 8^2}$
$c = \sqrt{36 + 64} = \sqrt{100}$
$c = 10$

3. $a = 7$, $b = 24$, $c = ?$
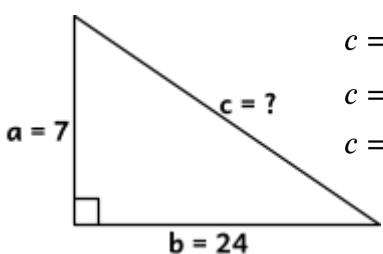
$c = \sqrt{7^2 + 24^2}$
$c = \sqrt{49 + 576} = \sqrt{625}$
$c = 25$

4. $a = 8$, $b = 15$, $c = ?$
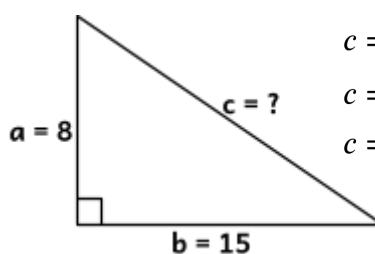
$c = \sqrt{8^2 + 15^2}$
$c = \sqrt{64 + 225} = \sqrt{289}$
$c = 17$

5. $a = ?$, $c = 20$, $b = 12$
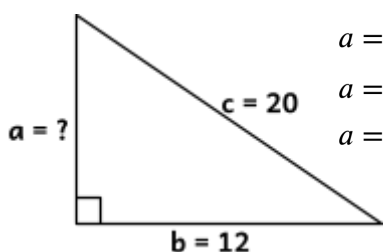
$a = \sqrt{20^2 - 12^2}$
$a = \sqrt{400 - 144} = \sqrt{256}$
$a = 16$

6. $a = 18$, $c = 30$, $b = ?$
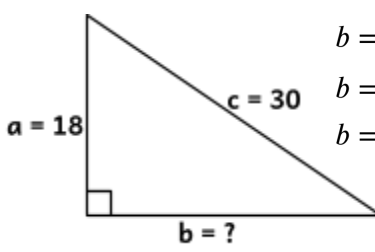
$b = \sqrt{30^2 - 18^2}$
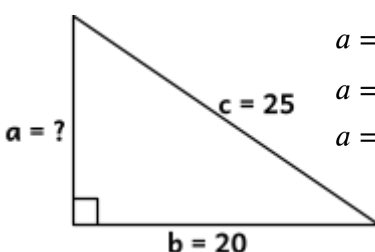$b = \sqrt{900 - 324} = \sqrt{576}$
$b = 24$

7. $a = ?$, $c = 40$, $b = 24$
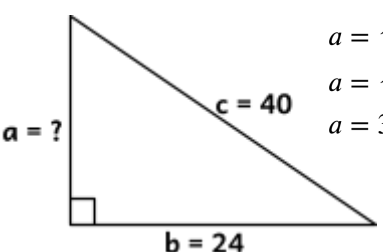
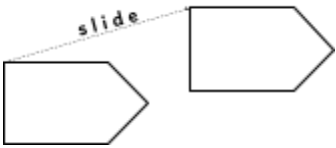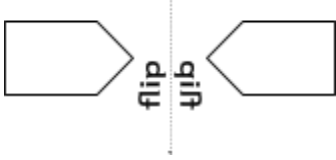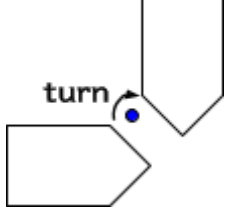$a = \sqrt{40^2 - 24^2}$
$a = \sqrt{1600 - 576} = \sqrt{1024}$
$a = 32$

8. $a = ?$, $c = 25$, $b = 20$

$a = \sqrt{25^2 - 20^2}$
$a = \sqrt{625 - 400} = \sqrt{225}$
$a = 15$
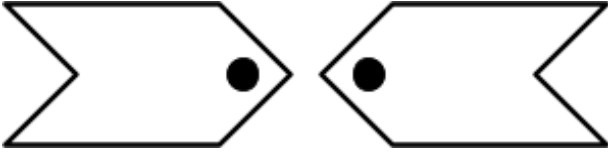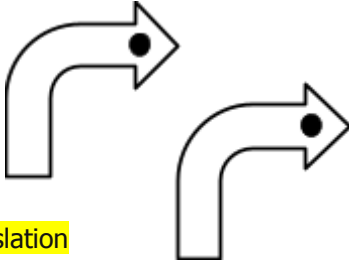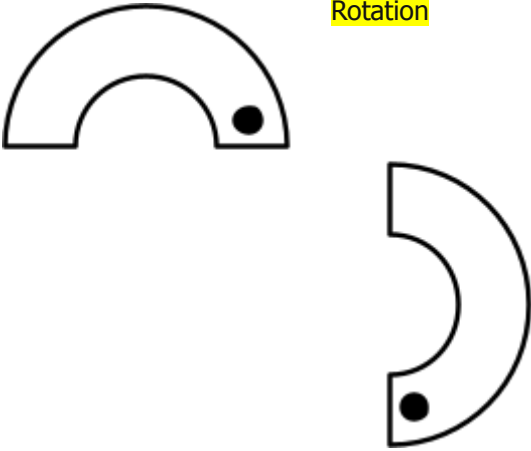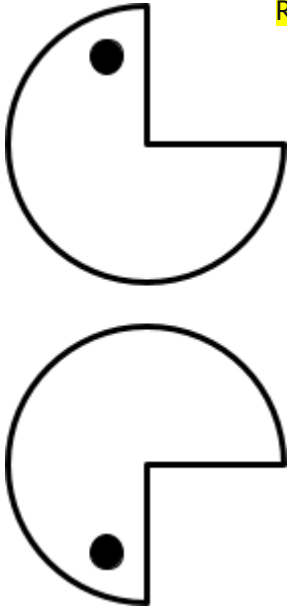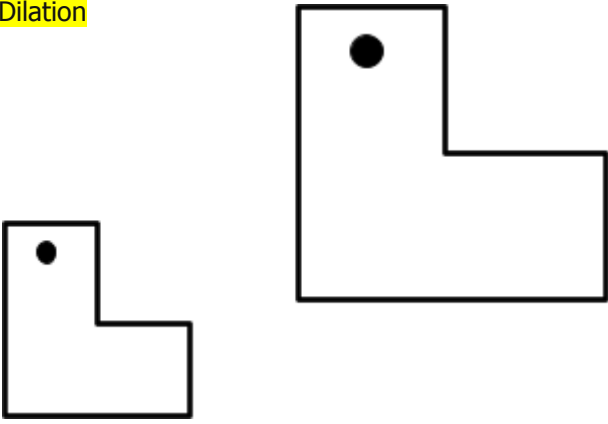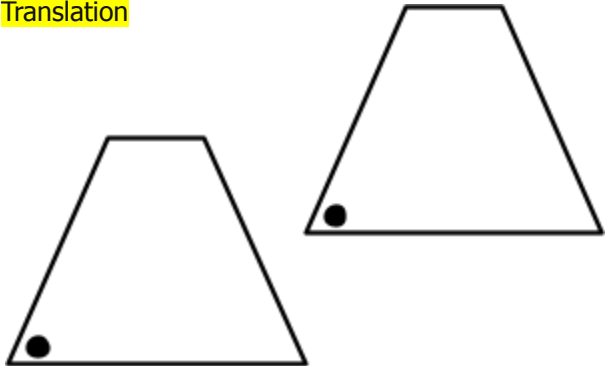
Translation (SLIDE)	Reflection (FLIP)	Rotation (TURN)	Dilation (RESIZE)
slide	flip / flip	turn	resize

Directions: Identify the type of transformation that occurred.

1. Reflection

2. Translation

3. Rotation

4. Reflection

5. Dilation

6. Translation