Name: **Key** _____ Date: _____

1. **Study** the handout on the properties of quadrilaterals and triangles.
2. Given that a rectangle has **opposite sides congruent** and has **4 right angles**, prove the following shape is a rectangle.
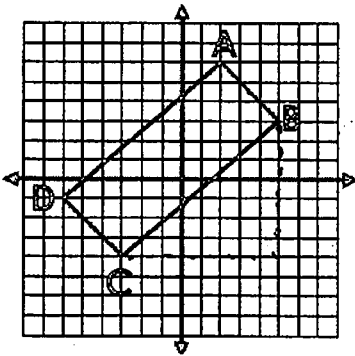
$3^2 + 3^2 = c^2$
Length of AB: **4.24**

$8^2 + 7^2 = c^2$
Length of BC: **10.63**

Length of CD: **4.24**

Length of DA: **10.63**

What do you notice about the **lengths?** opposite sides $\cong$

Slope of **AB**: **−1**

Slope of **BC**: $\frac{7}{8}$

Slope of **CD**: **−1**

Slope of **DA**: $\frac{7}{8}$

What do you notice about the **slopes?** opposite sides parallel

3. Find the **midpoint** of the points.

a. (-5, 3) (2, 6) $\frac{3+6}{2} = 4.5$ b. (3, -2) (-1, 5) $\frac{-2+5}{2} = 1.5$

$\frac{-5+2}{2} = -1.5$ $(-1.5, 4.5)$ $\frac{3-1}{2} = 1$ $(1, 1.5)$

4. Find the coordinates of **the other endpoint** of a segment with an endpoint of (−1,5) and a midpoint (2,−3).

$\frac{-1+x}{2} = 2$ $-1+x = 4$ $\frac{5+y}{2} = -3$ $(5, 1)$

$x = 5$ $5+y = 6$ $y = 1$

5. Find the coordinates of **both of the endpoints** of a segment with a midpoint of (8, 13.5) and an endpoint at (2x + 4, 5y – 3) → (12, 22) $\frac{12+x}{2} = 8$ $\frac{22+y}{2} = 13.5$

$\frac{2x+4+x}{2} = 8$ $3x+4 = 16$ $\frac{5y-3+y}{2} = 13.5$ $x = 4$ $y = 5$

$\frac{3x+4}{2} = 8$ $x = 4$ $6y-3 = 27$ $y = 5$ $(4, 5)$

6. Justin and Austin decide to play catch after school. They start at the same point. Justin walks 50 feet north and 20 feet west. Austin walks 40 feet south and 10 feet east. How far apart are they? $(-20, 50)$ $(10, -40)$
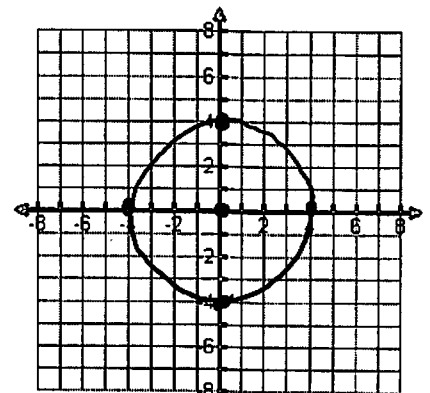
$D = \sqrt{(10+20)^2 + (-40-50)^2}$

94.87 ft

7. Determine whether Point A lies on the circle whose center is Point C and which contains the Point P(0, 4). Justify your answer algebraically showing work.

Point A(3, √7); Point C(0, 0); Point P(0, 4) $D = 4$

$D = \sqrt{(3-0)^2 + (\sqrt{7}-0)^2}$

$D = 4$

Yes

$3y = 6x - 12$

$5y = -10x + 5$

8. Determine if each of the following lines are parallel, perpendicular, or neither.

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

$y = -2x + 5$

a. $y = 4x - 1$
$8x + 2y = -6$ $y = -4x - 3$

b. $x + 2y = 4$
$6x - 3y = 12$
$y = 2x - 4$

c. $2x + y = 5$
$10x + 5y = 5$
$y = -2x + 1$

__Neither__

__Perpendicular__

__Parallel__

9. Find the equation of the line between the points (-1, 4) and (3, 12).

$\frac{12-4}{3+1} = 2$ $4 = 2(1) + b$
$4 = 2 + b$ $b = 2$

$\boxed{y = 2x + 2}$

10. Find the equation of the line that is **parallel** to $y = 2x + 8$ that passes through (-6, 1).

$1 = 2(-6) + b$
$1 = -12 + b$ $b = 13$

$\boxed{y = 2x + 13}$

11. Find the equation of the line that is **perpendicular** to $y = 3x + 1$ that passes through (9, -2).
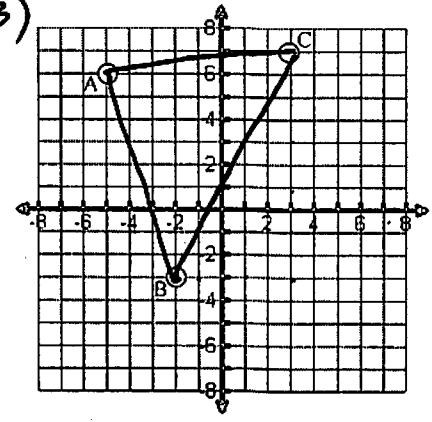
$-2 = -\frac{1}{3}(9) + b$

$-2 = -3 + b$
$b = 1$

$\boxed{y = -\frac{1}{3}x + 1}$

For Question 11-13, refer to the graph below. $A(-5, 6)$ $B(-2, -3)$

12. Find a point P on the segment $\overline{AB}$ that partitions it in a 1:2 ratio.

$(-2 + 5)(\frac{1}{3}) - 5$ $(-3 - 6)(\frac{1}{3}) + 6$

-4 3 $\boxed{(-4, 3)}$

13. Find a point Q on the segment $\overline{BC}$ that partitions it in a 3:2 ratio. $B(-2, -3)$ $C(3, 7)$

$(3 + 2)(\frac{3}{5}) - 2$ $(7 + 3)(\frac{3}{5}) - 3$ $\boxed{(1, 3)}$

1 3

14. Connect the three points. Is this a right triangle? (**Hint**: Find the slopes**)
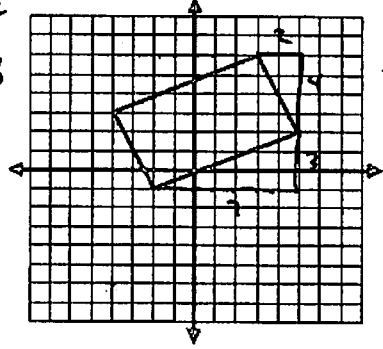
$m = -3$ $m = 2$ __Not a right triangle__
$m = \frac{1}{8}$

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15. Use the following figures to answer the questions.

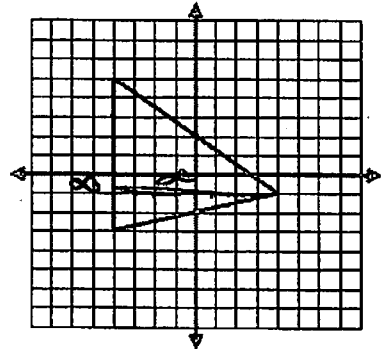a. Find the perimeter.

b. Find the area.

$7^2 + 3^2 = c^2$
$c = \sqrt{58}$

$4^2 + 2^2 = c^2$
$c = 2\sqrt{5}$

$\sqrt{58} + \sqrt{58} + 2\sqrt{5} + 2\sqrt{5}$

$\boxed{24.18 \text{ units}}$

$A = \frac{1}{2}(8)(8)$

$\boxed{A = 32 \text{ units}^2}$