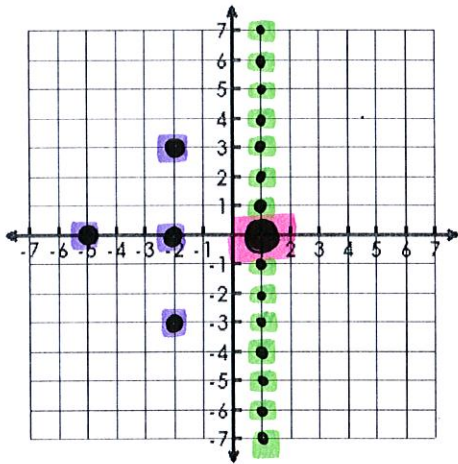Name: _____ Date: _____
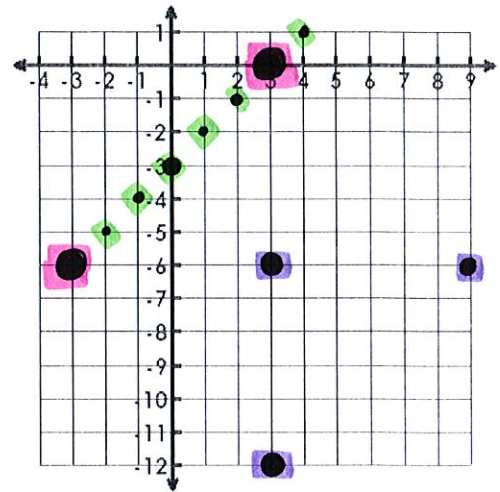
Intersections of Circles & Lines -- Homework

Solve by graphing and find the point(s) of intersection. If there are none, write "none."

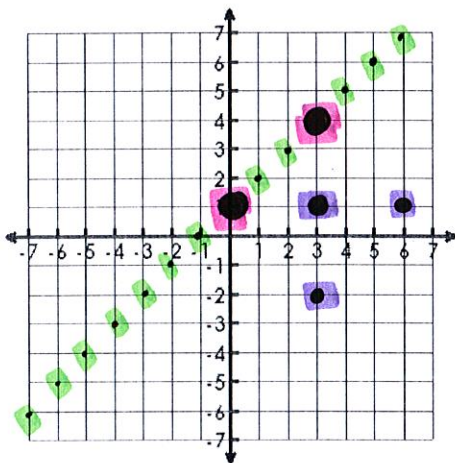1. $(x+2)^2 + y^2 = 9 \rightarrow (-2,0)\ r=3$
   $x = 1\ \updownarrow$

Point(s) of Intersection: $(1,0)$

2. $(x-3)^2 + (y+6)^2 = 36 \rightarrow (3,-6)\ r=6$
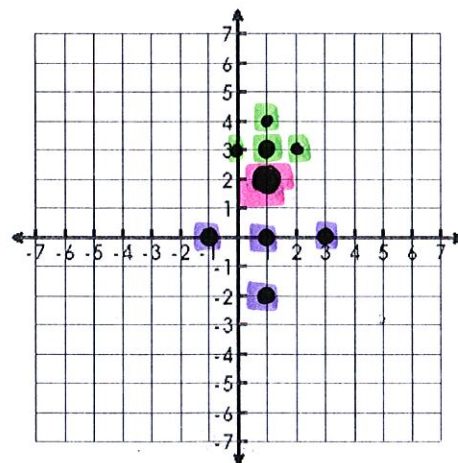 $y + 3 = x \rightarrow y = x-3\ \ b=-3\ m=\frac{1}{1}$

Point(s) of Intersection: $(-3,-6) + (3,0)$

3. $(x-3)^2 + (y-1)^2 = 9 \rightarrow (3,1)\ r=3$
   $y - 1 = x \rightarrow y = x+1\ \ b=1\ m=\frac{1}{1}$

Point(s) of Intersection: $(0,1) + (3,4)$

4. $(x-1)^2 + y^2 = 4 \rightarrow (1,0)\ r=2$
   $(x-1)^2 + (y-3)^2 = 1 \rightarrow (1,3)\ r=1$

Point(s) of Intersection: $(1,2)$

Find the point(s) of intersection by solving algebraically. Show all of your work.

5.
$$x^2 + y^2 = 25$$
$$2x + y = 10 \rightarrow y = -2x + 10$$

$$x^2 + (-2x + 10)^2 = 25$$

$$x^2 + 4x^2 - 40x + 100 - 25 = 0$$

$$5x^2 - 40x + 75 = 0$$

$$x^2 - 8x + 15 = 0$$

$$(x - 3)(x - 5) = 0$$

$$x = 3 \quad x = 5$$

$$y = -2(5) + 10$$
$$y = 0$$

$$y = -2(3) + 10$$
$$y = 4$$

Point(s) of Intersection: $(3,4) + (5,0)$

6.
$$x^2 + y^2 = 9$$
$$x + y = 3 \rightarrow y = -x + 3$$

$$x^2 + (-x + 3)^2 = 9$$

$$x^2 + x^2 - 6x + 9 - 9 = 0$$

$$2x^2 - 6x = 0$$

$$2x(x - 3) = 0$$

$$2x = 0 \quad x - 3 = 0$$

$$x = 0 \quad x = 3$$

$$y = -3 + 3$$
$$y = 0$$

$$y = -0 + 3$$
$$y = 3$$

Point(s) of Intersection: $(0,3) + (3,0)$

Word Problem

7. A circle is centered at the origin and has a radius of $2\sqrt{5}$ units. A line with a slope of 3 passes through the origin and intersects the circle in two places. Where does the line intersect the circle?

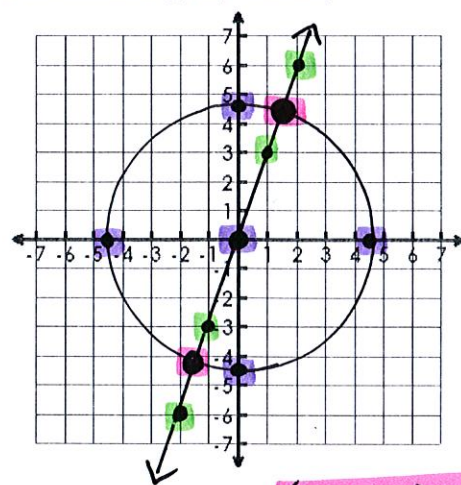Write the equation of the circle: $x^2 + y^2 = 20 \rightarrow (0,0), r \approx 4.5$

Write the equation of the line: $y = 3x \rightarrow b = 0, m = \dfrac{3}{1}$

Find solutions algebraically

$$x^2 + (3x)^2 = 20$$

$$x^2 + 9x^2 = 20$$

$$10x^2 = 20$$

$$x^2 = 2$$

$$x = \pm\sqrt{2}$$

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

$$y = 3(-\sqrt{2})$$
$$y = -3\sqrt{2}$$

$$\star\sqrt{2} \approx 1.4$$
$$\star 3\sqrt{2} \approx 4.2$$

Point(s) of Intersection: $(\sqrt{2}, 3\sqrt{2}) + (-\sqrt{2}, -3\sqrt{2})$

Find solutions graphically

Point(s) of Intersection: $(1.4, 4.2) + (-1.4, -4.2)$