

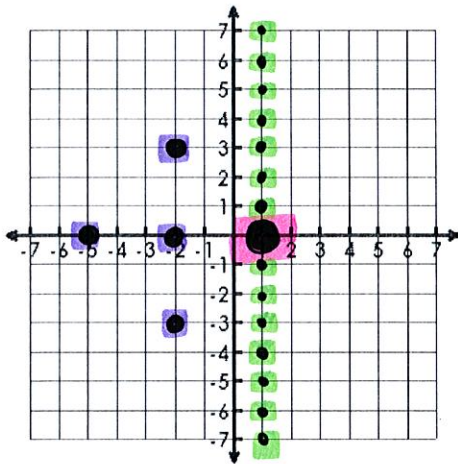
Name: _____

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Intersections of Circles & Lines – Homework

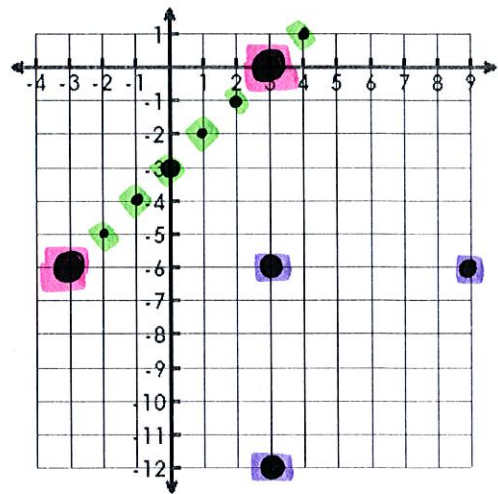
Solve by graphing and find the point(s) of intersection. If there are none, write "none."

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



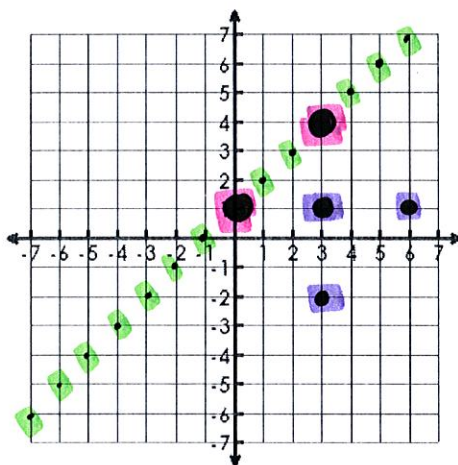
Point(s) of Intersection: $(1, 0)$

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



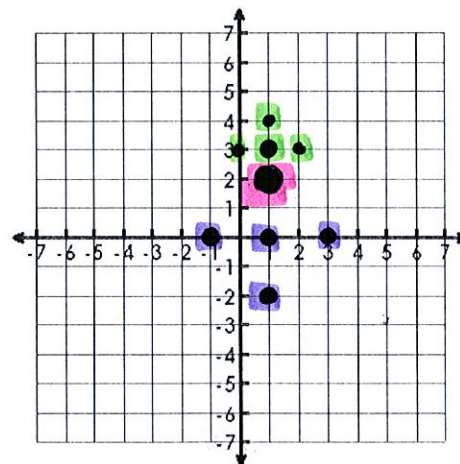
Point(s) of Intersection: $(-3, -6) + (3, 0)$

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



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.

$$\begin{aligned}
 5. \quad & x^2 + y^2 = 25 \\
 & 2x + y = 10 \rightarrow y = -2x + 10 \\
 & x^2 + (-2x + 10)^2 = 25 \\
 & x^2 + 4x^2 - 40x + 100 - 25 = 0 \\
 & 5x^2 - 40x + 75 = 0 \\
 & x^2 - 8x + 15 = 0 \\
 & (x - 3)(x - 5) = 0 \\
 & x = 3 \quad x = 5 \\
 & y = -2(3) + 10 = 4 \\
 & y = -2(5) + 10 = 0
 \end{aligned}$$

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

$$\begin{aligned}
 6. \quad & x^2 + y^2 = 9 \\
 & x + y = 3 \rightarrow y = -x + 3 \\
 & x^2 + (-x + 3)^2 = 9 \\
 & x^2 + x^2 - 6x + 9 - 9 = 0 \\
 & 2x^2 - 6x = 0 \\
 & 2x(x - 3) = 0 \\
 & 2x = 0 \quad x - 3 = 0 \\
 & x = 0 \quad x = 3 \\
 & y = -0 + 3 = 3 \\
 & y = -3 + 3 = 0
 \end{aligned}$$

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: $y = 3x \rightarrow b = 0, m = \frac{3}{1}$

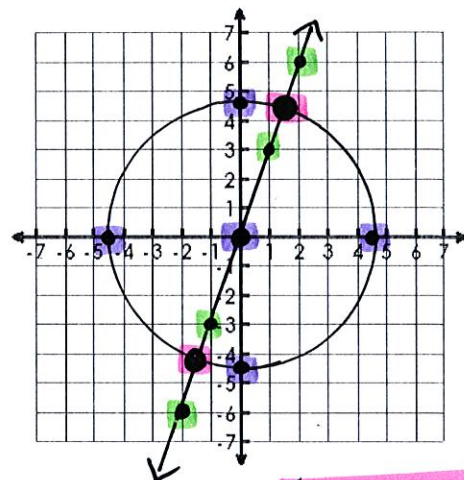
Find solutions algebraically

$$\begin{aligned}
 & x^2 + (3x)^2 = 20 \\
 & x^2 + 9x^2 = 20 \\
 & 10x^2 = 20 \\
 & x^2 = 2 \\
 & x = \pm\sqrt{2} \\
 & y = 3(\sqrt{2}) \\
 & y = 3\sqrt{2} \\
 & y = 3(-\sqrt{2}) \\
 & y = -3\sqrt{2}
 \end{aligned}$$

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

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

Find solutions graphically



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