

LESSON #4: LINEAR AND PARABOLA SYSTEM OF EQUATIONS

DO NOW: A circular pond is modeled by the equation $x^2 + y^2 = 225$. A bridge over the pond is modeled by a segment of the equation $x - 7y = -75$. What are the coordinates of the points where the bridge meets the edge of the pond?

GUESS + CHECK!

~~(2)~~ (9, 12) and (12, 9)

(3) (9, 12) and (-12, 9)

~~(2)~~ (9, -12) and (-12, -9)

~~(4)~~ (-9, 12) and (12, -9)

1) Solve the following system of equations *algebraically*:

$$\begin{array}{r} x + y = 4 \\ -x \quad -y \\ \hline y = x^2 - 6x + 8 \end{array}$$

$$y = -x + 4$$

$$\begin{array}{r} -x + 4 = x^2 - 6x + 8 \\ +x - 4 \quad \quad \quad +x - 4 \\ \hline 0 = x^2 - 5x + 4 \end{array}$$

$$\begin{array}{r} (x-4)(x-1) \\ \hline x=4 \quad | \quad x=1 \end{array}$$

$x + y = 4$	$x + y = 4$
$4 + y = 4$	$1 + y = 4$
$y = 0$	$y = 3$

$(4, 0) \quad (1, 3)$

STEPS

1. Solve the linear equation for y in terms of x.
 $y = mx + b$ form
2. SUBSTITUTE y in the quadratic equation with the expression involving x from the slope-intercept form of the linear equation. This will give you an equation with 1 variable to solve. "SET EQUATIONS EQUAL TO EACH OTHER!"
3. (FACTOR) SOLVE the quadratic equation for x.
4. SUBSTITUTE x into the linear equation to solve for the corresponding y value.
5. CHECK your POI in calculator or by plugging in coordinates in both original equations!

2) Solve the following system of equations *graphically*:

$$3 - y = 2x \quad ; \quad y = x^2 - 6x + 3$$

$$-3 \quad -3$$

$$-y = 2x - 3$$

$$y = -2x + 3$$

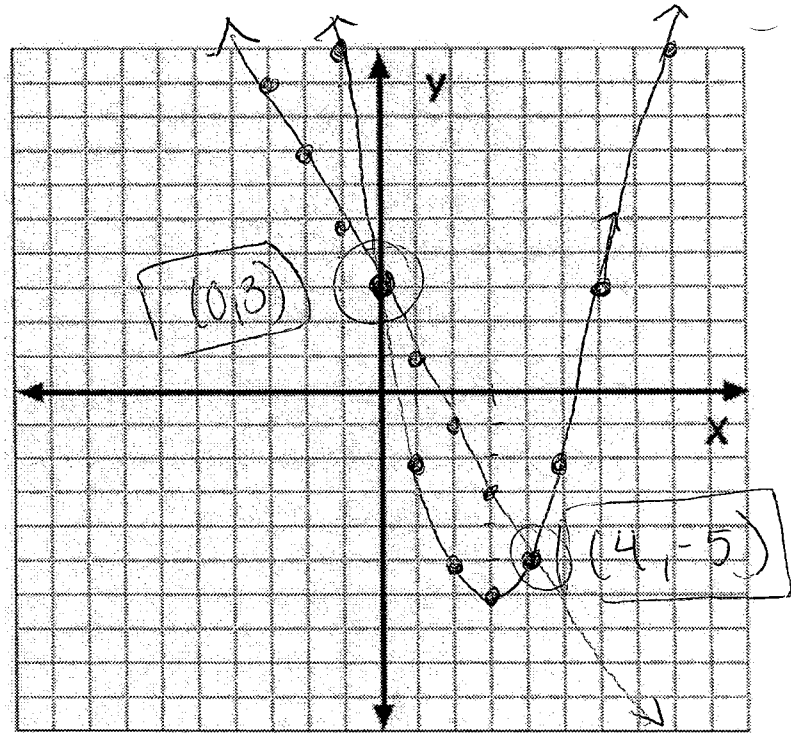
x	y
1	-2
2	-5
3	-6
4	-5
5	-2

Calculator Steps to find POI

- Type 1st equation in to y_1
- Type 2nd equation in to y_2
- 2nd graph to look at table where y-values are the same

If P.O.I. is a decimal:

- Graph (Zoom 6 if needed)
- 2nd Trace (Calc)
- #5 Intersect
- Use left and right arrows only to move cursor close to P.O.I
- Press enter 3 times
- If you do not see P.O.I. on screen-zoom out, enter, or adjust window



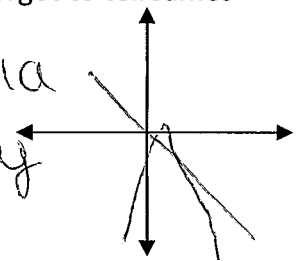
3)

a) James sets a course in his fishing boat that can be modeled by the equation: $-x^2 + 6x - 8 = 0$. Janice is on her jet ski and tries to find the location of James in his boat. She sets her course as $3x + y + 2 = 0$. Which solution represents the approximate location of where Janice will meet James? $y = -3x - 2$ calculator!

- a. (1, -1) b. (.7, -4.2) c. (3.8, 1.2) d. (-1, 4.8)

b) After their meeting, James left and continued on his path. Janice realized she forgot to tell James something and continued along her path. Will she meet James again? Explain.

yes at (8.3, -26.8) Both the parabola and the line continue to extend so they will meet again. calculator!



• **Cubic and Linear**

4) Which value, to the nearest tenth, is *not* a solution of $p(x) = q(x)$ if $p(x) = x^3 + 5x^2 - 2x - 1$ and $q(x) = 2x + 9$?

- a) -1.2 b) 1.6 c) 2.1 d) -5.4

calculator!