

$$1) y = x^2 + 5x + 4 \rightarrow \text{Quadratic Equation}$$

$$y = x - 8 \rightarrow \text{Linear Equation}$$

Unit 2 Lesson 13

Step 1) Are both equations in "y=" format?

(Yes) or No

Step 2) Set equations equal to each other

$$x^2 + 5x + 4 = x - 8$$

Step 3) Set the equation equal to zero by combining like terms

$$\begin{array}{r|l} x^2 + 5x + 4 & x - 8 \\ -x + 8 & -x + 8 \\ \hline x^2 + 4x + 12 & 0 \end{array}$$

Step 4) Solve for x by either factoring or quadratic formula

Try factoring: $A \cdot C = 12$

$\begin{array}{l} 4 \cdot 3 \\ 6 \cdot 2 \\ 1 \cdot 12 \end{array}$

No factors add up to B
which is 4

Try quadratic formula: $A=1, B=4, C=12$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(12)}}{2(1)}$$
$$x = \frac{-4 \pm \sqrt{-32}}{2}$$

STOP!! Since there is a
negative under the square root \rightarrow
imaginary number

! Which means this system has **NO SOLUTION, NO INTERSECTIONS!**

$$2) \begin{aligned} y &= x^2 + 8x + 12 && \rightarrow \text{Quadratic Equation} \\ y + 3x &= -6 && \rightarrow \text{Linear Equation} \end{aligned}$$

Step 1) Are both equations in "y=" format?

Yes or **No**

The Linear Equation needs to be changed

$$\begin{array}{r|l} y + 3x & = -6 \\ -3x & \quad -3x \\ \hline y & \end{array}$$

$$y = -3x - 6 \rightarrow \text{New Linear Equation}$$

Step 2) Set equations equal to each other

$$x^2 + 8x + 12 = -3x - 6$$

Step 3) Set the equation equal to zero by Combining Like Terms

$$\begin{array}{r|l} x^2 + 8x + 12 & = -3x - 6 \\ +3x + 6 & \quad +3x + 6 \\ \hline x^2 + 11x + 18 & = 0 \end{array}$$

Step 4) Solve for x by either factoring or quadratic formula

Can be factored!

$$(x+9)(x+2) = 0$$

$$x+9=0$$

$$\begin{array}{r} -9 \quad -9 \\ \hline x = -9 \end{array}$$

$$x+2=0$$

$$\begin{array}{r} -2 \quad -2 \\ \hline x = -2 \end{array}$$

Step 5) Plug x into Linear Equation to find y

$$\begin{aligned} \text{When } x &= -9 \\ y &= -3x - 6 \\ y &= -3(-9) - 6 \\ y &= 27 - 6 \\ y &= 13 \end{aligned}$$

$$\begin{aligned} \text{When } x &= -2 \\ y &= -3x - 6 \\ y &= -3(-2) - 6 \\ y &= 6 - 6 \\ y &= 0 \end{aligned}$$

Answer) Two Intersection Points @ $(-9, 13)$ and $(-2, 0)$