

Lesson 92 Objective: SWBAT solve a system of equations by substituting.

Kickoff

Solve the equation

$$6n^2 - 18n - 18 = 6$$

$$\underline{-6 - 6}$$

$$6n^2 - 18n - 24 = 0$$

$$6(n^2 - 3n - 4) = 0$$

$$6(n+1)(n-4) = 0$$

$$\cancel{6 \neq 0} \quad n+1=0 \quad n-4=0$$

$$\boxed{n = -1 \quad n = 4}$$

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Homework

① a) $(-4, 0)$ c) $(4, 5)$ e) $(0, -10)$
 $r = \sqrt{17}$ b) $(4, 5)$ d) $(3, -2)$ f) $6\sqrt{5}$

② a) $V(0, 0)$ b) $V(3, -2)$
 $y^2 - 20x = 0$ F $(5, 0)$ F $(3, -2)$
 d) $x = 5$ d) $y = 0$
 LOS $y = 0$ LOS $x = 3$

③ $(y-4)^2 = -12(x+1)$

④ $\frac{(x+1)^2}{20} + \frac{(y-2)^2}{16} = 1$
 Vertices $(-1 \pm 2\sqrt{5}, 2)$ Foci $(1, 2) + (-3, 2)$
 $(-1, 2)$ $(1, 2)$
 $(-1, -2)$

⑤ $\frac{(x+3)^2}{9} + \frac{(y-2)^2}{25} = 1$

⑥ $\frac{(y+3)^2}{9} - \frac{(x-1)^2}{27} = 1$

⑦ $\frac{(y-1)^2}{2} - \frac{(x+4)^2}{4} = 1$

Vertices $C(-4, 1)$
 $(-4, 1 \pm \sqrt{2})$ Foci $(-4, 1 \pm \sqrt{6})$

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Systems of Equations-Substituting

Steps to Solving a System by Substituting

- Put one of the equations in $y = \text{form}$.
- Substitute that equation in for y in the other equation.
- Solve (might have to complete the square or use quadratic formula).
- Substitute x in to find each y .
- Write the solutions as POINTS.

Check:

Example 1:

$$\begin{cases} x^2 - 6x + 5 = 2x \\ y + 7 = 2x \end{cases}$$

$$(x^2 - 6x + 5) + 7 = 2x + 7$$

$$x^2 - 8x + 12 = 0$$

$$(x-6)(x-2) = 0$$

$$x = 6 \quad x = 2$$

$$y + 7 = 2x$$

$x = 6$	$x = 2$
$y + 7 = 2(6)$	$y + 7 = 2(2)$
$y + 7 = 12$	$y + 7 = 4$
$y = 5$	$y = -3$

$(6, 5)$ $(2, -3)$

$y = x^2 - 6x + 5$	$y = x^2 - 6x + 5$
$5 = 6^2 - 6(6) + 5$	$-3 = 2^2 - 6(2) + 5$
$5 = 5$	$-3 = -3$
$y + 7 = 2x$	$y + 7 = 2x$
$5 + 7 = 2(6)$	$-3 + 7 = 2(2)$
$12 = 12$	$4 = 4$

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Example 2:

$$\begin{cases} x^2 + y^2 = 36 \\ y = 2x - 3 \end{cases}$$

$$x^2 + (2x-3)^2 = 36$$

$$x^2 + 4x^2 - 12x + 9 = 36$$

$$5x^2 - 12x + 9 = 36$$

$$5x^2 - 12x - 27 = 0$$

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{12 \pm \sqrt{(12)^2 - 4(5)(-27)}}{2(5)}$$

$$= \frac{12 \pm \sqrt{360}}{10} = \frac{12 \pm \sqrt{36 \cdot 10}}{10}$$

$$= \frac{12 \pm 6\sqrt{10}}{10} = \frac{12 \pm 6\sqrt{10}}{10}$$

$$y = 2x + 3 \quad y = 2x - 3$$

$$y = 2\left(\frac{12 + 6\sqrt{10}}{5}\right) + 3 = \frac{12 + 6\sqrt{10}}{5} - 3 + 3 = \frac{12 + 6\sqrt{10} - 15}{5} = \frac{-3 + 6\sqrt{10}}{5}$$

$$y = 2\left(\frac{12 - 6\sqrt{10}}{5}\right) - 3 = \frac{12 - 6\sqrt{10}}{5} - 3 + 3 = \frac{12 - 6\sqrt{10} - 15}{5} = \frac{-3 - 6\sqrt{10}}{5}$$

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