

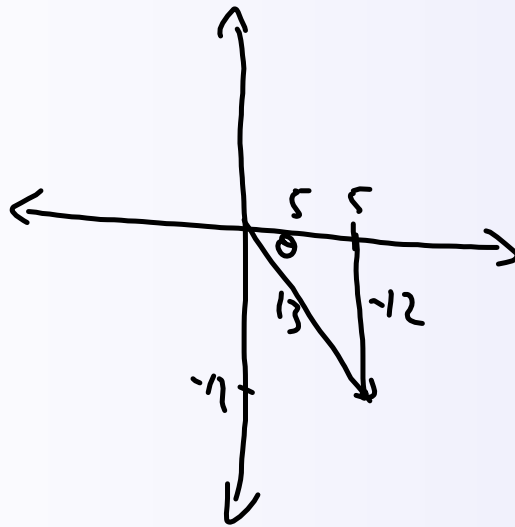


The point (5, -12) is on the terminal arm of an angle in standard position. What are the three primary trigonometric ratios for the angle?

$$\sin \theta = \frac{-12}{13}$$

$$\cos \theta = \frac{5}{13}$$

$$\tan \theta = \frac{-12}{5}$$



$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= 5^2 + (-12)^2 \\ &= 25 + 144 \\ c^2 &= 169 \\ c &= \sqrt{169} = 13 \end{aligned}$$

Pre-Calculus 110
Unit 7: Systems of Equations

May 30, 2019: Day #1

1. Begin New Unit

Curriculum Outcomes

RF6. Solve, algebraically and graphically, problems that involve systems of linear-quadratic and quadratic-quadratic equations in two variables.

Grade 9, 10 and Foundations Review

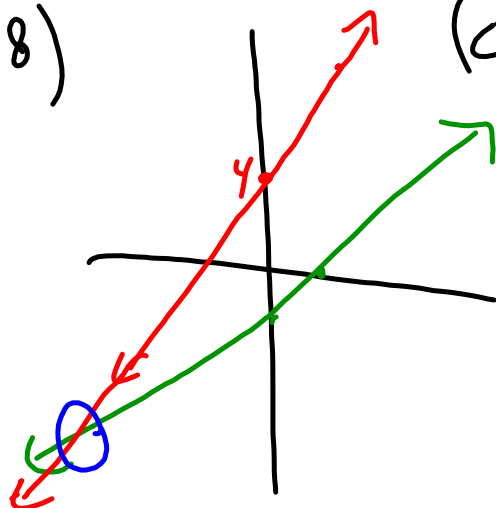
What does it mean to solve a system of equations graphically?
What does it mean to solve a system of equations algebraically?

Solve the following system of equations graphically.

$$y = 2x + 4$$
$$(0, 4)$$
$$(2, 8)$$

$$4x - 6y = 12$$
$$(3, 0)$$
$$(0, -2)$$

$$\frac{4x - 12}{6} = y$$



Solve the following system of equations by substitution.

$$y = 2x + 4$$

$$4x - 6y = 12$$

$$\begin{aligned} y &= 2\left(-\frac{9}{2}\right) + 4 \\ y &= -9 + 4 \\ &= -5 \end{aligned}$$
$$\begin{aligned} 4x - 6(2x + 4) &= 12 \\ 4x - 12x - 24 &= 12 \\ -8x &= 36 && \left(-\frac{9}{2}, -5\right) \\ x &= \frac{-36}{8} = -\frac{9}{2} \end{aligned}$$

Solve the following system of equations by comparison.

$$y = 3x - 5$$

$$y = 4x + 2$$

$$3x - 5 = 4x + 2$$

$$-x = 7$$

$$x = -7$$

$$(-7, -26)$$

$$\begin{aligned} y &= 3(-7) - 5 \\ &= -21 - 5 \\ &= -26 \end{aligned}$$

Solve the following system of equations by elimination.

$$\begin{array}{r} 2x + 3y = 8 \\ \times 2 \quad x - 2y = 5 \\ \hline 2x + 3y = 8 \\ - \quad 2x - 4y = 10 \\ \hline 7y = -2 \\ \frac{7y}{7} = \frac{-2}{7} \\ y = -\frac{2}{7} \end{array}$$

$$\begin{array}{l} x - 2\left(-\frac{2}{7}\right) = 5 \\ x + \frac{4}{7} = 5 \\ x = 5 - \frac{4}{7} \\ x = 4\frac{3}{7} \\ \textcircled{x = 3\frac{1}{7}} \end{array}$$

8.1

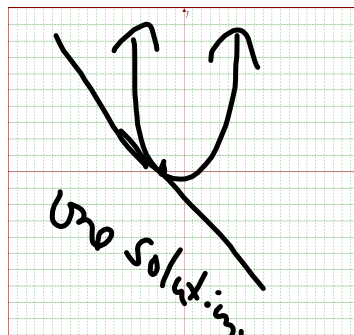
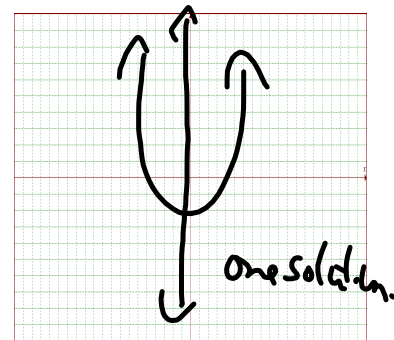
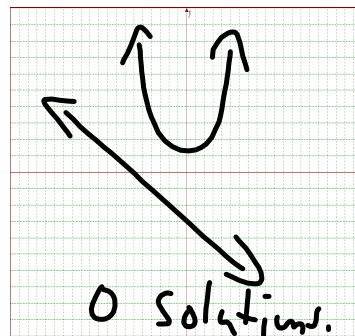
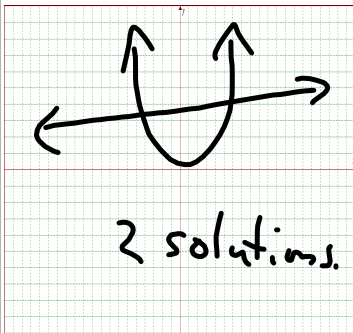
Solving Systems of Equations Graphically

Focus on ...

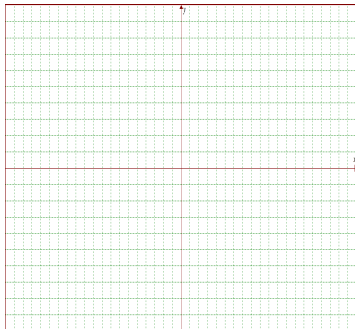
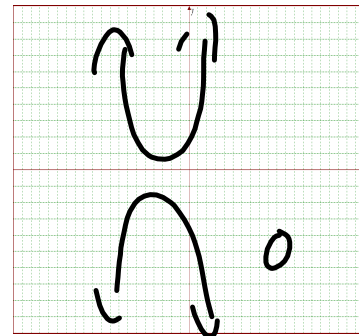
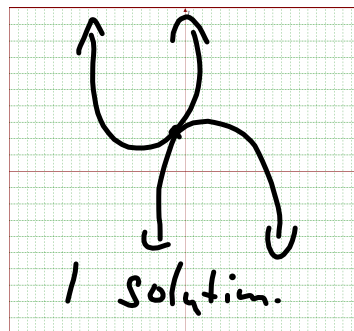
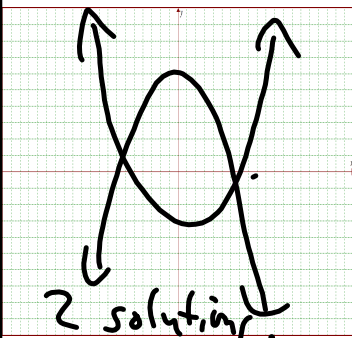
- modelling a situation using a system of linear-quadratic or quadratic-quadratic equations
- determining the solution of a system of linear-quadratic or quadratic-quadratic equations graphically
- interpreting points of intersection and the number of solutions of a system of linear-quadratic or quadratic-quadratic equations
- solving a problem that involves a system of linear-quadratic or quadratic-quadratic equations

Unit 7 - Systems of Equations

How many solutions are possible when solving a linear-quadratic system of equations? Use diagrams to assist.



How many solutions are possible when solving a quadratic-quadratic system of equations? Use diagrams to assist.

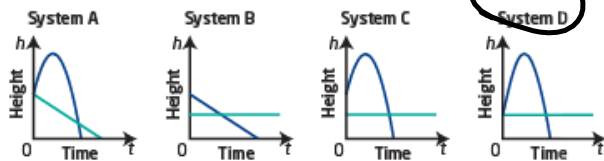


Example 1

Relate a System of Equations to a Context

Blythe Hartley, of Edmonton, Alberta, is one of Canada's best springboard divers. She is doing training dives from a 3-m springboard. Her coach uses video analysis to plot her height above the water.

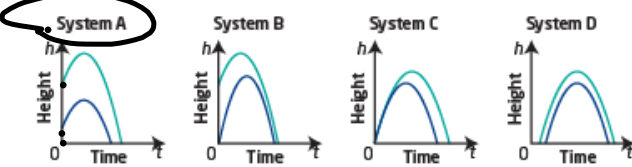
- a) Which system could represent the scenario? Explain your choice and why the other graphs do not model this situation.
- b) Interpret the point(s) of intersection in the system you chose.



Your Turn

Two divers start their dives at the same time. One diver jumps from a 1-m springboard and the other jumps from a 3-m springboard. Their heights above the water are plotted over time.

- a) Which system could model this scenario? Explain your choice. Tell why the other graphs could not model this situation.
- b) Explain why there is no point of intersection in the graph you chose.



Example 2**Solve a System of Linear-Quadratic Equations Graphically**

a) Solve the following system of equations graphically:

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

$$2x^2 + 8x - y + 3 = 0$$

b) Verify your solution.

$$y = 4x + 3$$

$$y = 2x^2 + 8x + 3$$

$$(0, 3) \quad (-2, -5)$$

$$4x + 3 = 2x^2 + 8x + 3$$

$$0 = 2x^2 + 4x$$

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

$$x = 0 \text{ or } -2$$

Example 3**Solve a System of Quadratic-Quadratic Equations Graphically**

a) Solve:

$$2x^2 - 16x - y = -35$$

$$2x^2 - 8x - y = -11$$

b) Verify your solution.

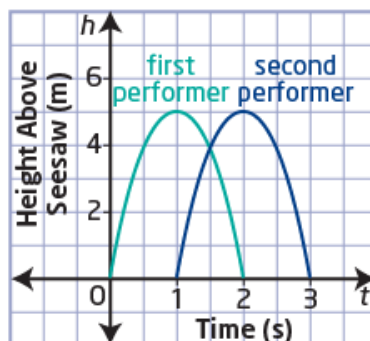
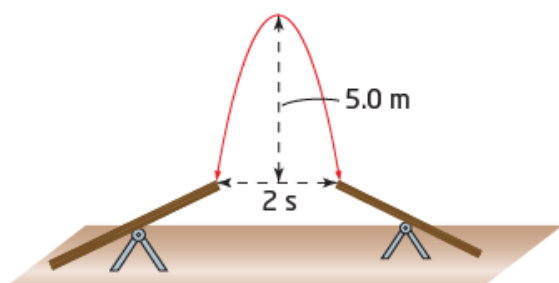
How many solutions do you think are possible in this situation?

Example 5

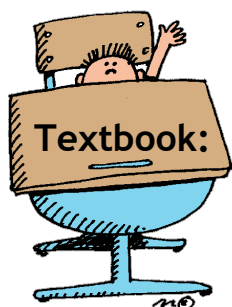
Model a Situation Using a System of Equations



Suppose that in one stunt, two Cirque du Soleil performers are launched toward each other from two slightly offset seesaws. The first performer is launched, and 1 s later the second performer is launched in the opposite direction. They both perform a flip and give each other a high five in the air. Each performer is in the air for 2 s. The height above the seesaw versus time for each performer during the stunt is approximated by a parabola as shown. Their paths are shown on a coordinate grid.



- Determine the system of equations that models the performers' height during the stunt.
- Solve the system graphically using technology.
- Interpret your solution with respect to this situation.



Minimum Preparation:

 p. 435-439

1, 2, 4ace, 5ace, 6, 7, 8, 9, 12,
challenge! 13, 15

Attachments

Standard Form Demor.GSP

Warm ups.notebook