

Solving Systems of Equations Review

1. When solving a system of equations you are finding the P.O.I.

2. Three methods used to solve a system of equations are:

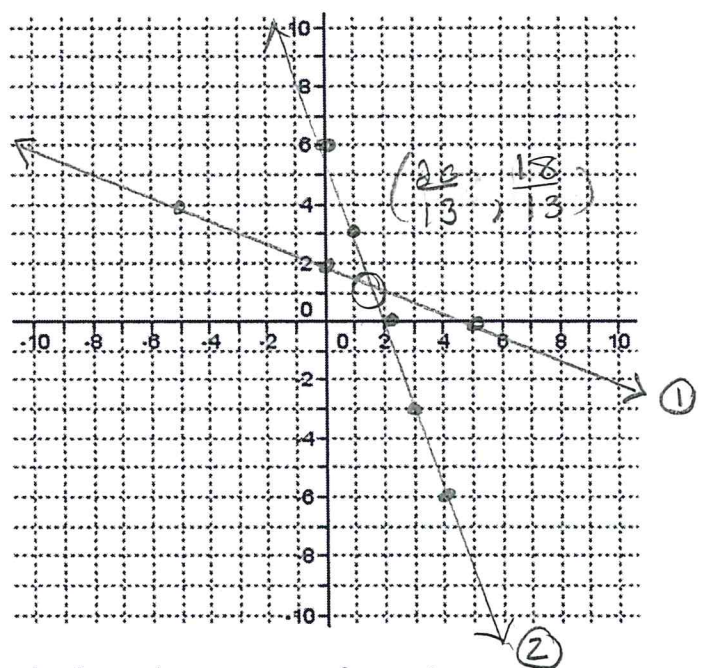
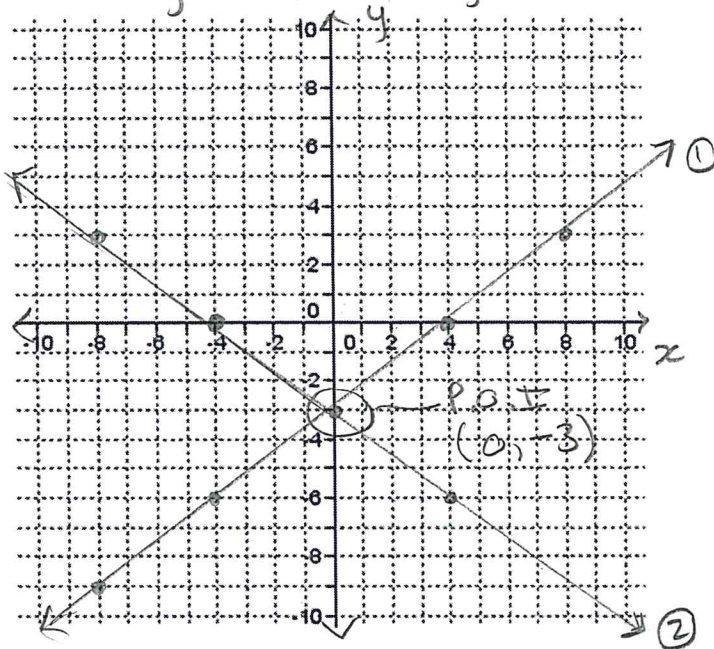
1. Graphing
2. Substitution
3. Elimination

3. List the three different ways lines can intersect and describe how you can tell, **without solving**, which situation exists.
 ○ 2 same slope 1 diff slope many same slope
 diff y int same y int

4. Solve the following systems by graphing:

a) $3x - 4y = 12 \rightarrow \frac{3}{4}x - 3 = y$ ①
 $6x + 8y = -24 \rightarrow 8y = -6x - 24 \rightarrow y = -\frac{3}{4}x - 3$

b) $2x + 5y = 10$ ① $5y = -2x + 10 \rightarrow y = -\frac{2}{5}x + 2$
 $3x + y = 6$ ② $y = -3x + 6$



c) Explain the problem with using the graphing method to solve a system of equations.

inaccurate, time consuming

5. Solve the following systems using the method of substitution.

a) $2x + 3y - 9 = 0$
 $x - y - 2 = 0$

b) $x + 5y = 11$
 $4x - y = 2$

c) $x - 7 = y$
 $\frac{1}{4}x - 1 = y$

6. Solve each of the following systems using the elimination method.

a) $x + y - 5 = 0$
 $x - y - 3 = 0$

b) $x - 2y - 10 = 0$
 $3x + 5y + 3 = 0$

7. In question 6b), which variable did you eliminate? Solve the system again, this time eliminate the **OTHER** variable. How does your method have to change? Is one way of doing this question easier than the other? Why?
8. IN YOUR OWN WORDS, explain:
- how the elimination method works
 - when to add and when to subtract
 - when to multiply equations and how to choose which numbers to multiply by
9. Solve each of the following system of equations using the elimination method. Some of these systems have twists to them. Working through them will help you to develop an even deeper understanding of the elimination method.
- a) $4x - 3y - 17 = 0$
 $3x + 2y = 0$
- b) $8x = 24 - 3y$
 $10 - 4x = y$
- c) $0.4x + 0.3y = 5$
 $10x + 5y = 100$
- d) $\frac{x}{4} + \frac{y}{5} = 5$
 $x + y = 22$
10. Solve the following systems using the method of your choice.
- a) $2(x - 4) + y = 6$
 $3x - 2(y - 3) = 13$
- b) $\frac{4x}{3} - \frac{y}{4} = 6$
 $\frac{5x}{6} + y = 13$
- c) $\frac{x - 5}{3} + \frac{y + 1}{2} = 1$
 $\frac{x - 1}{5} + \frac{y + 2}{3} = 2$
11. Compare the methods of graphing, substitution and elimination. Is there one method that is better than the others? In what situation would you choose to use one method over another?

ANSWERS

4a) $(0, -3)$

b) $(\frac{20}{13}, \frac{18}{13})$

5a) $(3, 1)$

b) $(1, 2)$

c) $(8, 1)$

6a) $(4, 1)$

b) $(4, -3)$

7. $(4, -3)$

9a) $(2, -3)$

b) $(\frac{3}{2}, 4)$

c) $(5, 10)$

d) $(12, 10)$

10a) $(5, 4)$

b) $(6, 8)$

c) $(-4, 7)$

$$\begin{aligned} 5a) \quad & 2x + 3y - 9 = 0 \quad (1) \\ & x - y - 2 = 0 \quad (2) \\ & x = y + 2 \quad (2) \end{aligned}$$

sub (2) into (1)

$$\begin{aligned} 2(y+2) + 3y - 9 &= 0 \\ 2y + 4 + 3y - 9 &= 0 \\ 5y &= 5 \\ y &= 1 \end{aligned}$$

sub $y=1$ into (2)

$$\begin{aligned} x &= 1 + 2 \\ x &= 3 \end{aligned}$$

∴ (3, 1) is the solⁿ

$$\begin{aligned} b) \quad & x + 5y = 11 \quad (1) \\ & 4x - y = 2 \quad (2) \\ & 4x - 2 = y \quad (2) \end{aligned}$$

sub (2) into (1)

$$\begin{aligned} x + 5(4x - 2) &= 11 \\ x + 20x - 10 &= 11 \\ 21x &= 21 \\ x &= 1 \end{aligned}$$

sub $x=1$ into (2)

$$\begin{aligned} 4(1) - 2 &= y \\ 2 &= y \end{aligned}$$

∴ (1, 2) is the solⁿ

$$\begin{aligned} c) \quad & x - 7 = y \quad (1) \\ & \frac{1}{4}x - 1 = y \quad (2) \end{aligned}$$

sub (1) into (2)

$$\begin{aligned} (x - 7 = \frac{1}{4}x - 1) \times 4 \\ 4x - 28 = x - 4 \\ 3x &= 24 \\ x &= 8 \end{aligned}$$

sub $x=8$ into (1)

$$\begin{aligned} 8 - 7 &= y \\ 1 &= y \end{aligned}$$

∴ (8, 1) is the solⁿ

$$\begin{aligned} 6a) \quad & x + y - 5 = 0 \quad (1) \\ & x - y - 3 = 0 \quad (2) \\ \hline & 2y - 2 = 0 \quad (1) - (2) \\ & 2y = 2 \\ & y = 1 \end{aligned}$$

sub $y=1$ into (2)

$$\begin{aligned} x - 1 - 3 &= 0 \\ x &= 4 \end{aligned}$$

∴ (4, 1) is the solⁿ

$$\begin{aligned} b) \quad & x - 2y = 10 \quad (1) \\ & 3x + 5y = -3 \quad (2) \\ \hline & 3x - 6y = 30 \quad (1) \times 3 \\ & 3x + 5y = -3 \quad (2) \\ \hline & -11y = 33 \quad (1) - (2) \\ & y = -3 \end{aligned}$$

sub $y=-3$ into (1)

$$\begin{aligned} x - 2(-3) &= 10 \\ x &= 4 \end{aligned}$$

∴ (4, -3) is the solⁿ

$$\begin{array}{r}
 7) \quad x - 2y - 10 = 0 \quad \textcircled{1} \\
 \quad 3x + 5y + 3 = 0 \quad \textcircled{2} \\
 \hline
 \quad 5x - 10y - 50 = 0 \quad \textcircled{1} \times 5 \\
 \quad 6x + 10y + 6 = 0 \quad \textcircled{2} \times 2 \\
 \hline
 \quad 11x - 44 = 0 \\
 \quad 11x = 44 \\
 \quad x = 4
 \end{array}$$

$$\begin{array}{r}
 \text{sub } x = 4 \text{ into } \textcircled{1} \\
 (4) - 2y - 10 = 0 \\
 -2y = 6 \\
 y = -3
 \end{array}$$

∴ solⁿ is (4, -3)

8a) add/sub an equation to another $\textcircled{0}$
 once they have the same coefficient
 then 1 variable will be eliminated.

b) add when signs are diff
 subtract when signs are the same.

c) multiply to get the same
 coefficient in front of one of
 the variables.

$$\begin{array}{r}
 9) \quad a) \quad 4x - 3y - 17 = 0 \quad \textcircled{1} \\
 \quad 3x + 2y = 0 \quad \textcircled{2} \\
 \hline
 \quad 12x - 9y - 51 = 0 \quad \textcircled{1} \times 3 \\
 \quad 12x + 8y = 0 \quad \textcircled{2} \times 4 \\
 \hline
 \quad -17y = -51 \\
 \quad y = 3
 \end{array}$$

$$\begin{array}{r}
 \text{sub } y = 3 \text{ into } \textcircled{2} \\
 3x + 2(3) = 0 \\
 3x = -6 \\
 x = -2
 \end{array}$$

∴ (-2, 3) is the solⁿ

$$\begin{array}{r}
 b) \quad 8x + 3y = 24 \quad \textcircled{1} \\
 \quad +4x + y = 10 \quad \textcircled{2} \\
 \hline
 \quad 8x + 3y = 24 \quad \textcircled{1} \\
 \quad 8x + 2y = 20 \quad \textcircled{2} \times 2 \\
 \hline
 \quad y = 4
 \end{array}$$

sub $y = 4$ into $\textcircled{1}$

$$\begin{array}{r}
 8x + 3(4) = 24 \\
 8x = 12 \\
 x = \frac{3}{2}
 \end{array}$$

∴ solⁿ is $(\frac{3}{2}, 4)$

9c) $\frac{4}{10}x + \frac{3}{10}y = 5$ ①

$$\begin{array}{r} 10x + 5y = 100 \quad \text{②} \\ 4x + 3y = 50 \quad \text{①} \times 10 \\ \hline 10x + 5y = 100 \quad \text{②} \\ 20x + 15y = 250 \quad \text{①} \times 5 \\ 20x + 10y = 200 \quad \text{②} \times 2 \\ \hline 5y = 50 \quad \text{①} - \text{②} \\ y = 10 \end{array}$$

sub $y = 10$ into ②

$$10x + 5(10) = 100$$

$$10x = 50$$

$$x = 5$$

∴ $(5, 10)$ is the solⁿ

d) $\frac{x}{4} + \frac{y}{5} = 5$ ①

$$\begin{array}{r} x + y = 22 \quad \text{②} \\ 5x + 4y = 100 \quad \text{①} \times 20 \\ \hline x + y = 22 \quad \text{②} \\ 5x + 4y = 100 \quad \text{①} \\ \hline 5x + 5y = 110 \quad \text{②} \times 5 \\ -y = -10 \\ y = 10 \end{array}$$

sub $y = 10$ into ②

$$x + 10 = 22$$

$$x = 12$$

∴ $(12, 10)$ is the solⁿ

10) a) $2x - 8 + y = 16$ ①

$$\begin{array}{r} 3x - 2y + 6 = 13 \quad \text{②} \\ \hline 2x + y = 24 \quad \text{①} \\ 3x - 2y = 7 \quad \text{②} \\ \hline 4x + 2y = 48 \quad \text{①} \times 2 \\ 3x - 2y = 7 \quad \text{②} \\ \hline 7x = 55 \quad \text{①} + \text{②} \\ x = \frac{55}{7} \end{array}$$

sub $x = \frac{55}{7}$ into ①

$$2\left(\frac{55}{7}\right) + y = 24$$

$$\frac{110}{7} + y = 24$$

$$y = \frac{168}{7} - 110$$

$$y = \frac{58}{7} \quad \therefore \left(\frac{55}{7}, \frac{58}{7}\right)$$

b) $\frac{4x}{3} - \frac{y}{4} = 6$ ①

$$\begin{array}{r} 5x + y = 13 \quad \text{②} \\ \hline 16x - 3y = 72 \quad \text{①} \times 12 \\ 5x + 6y = 78 \quad \text{②} \times 6 \\ \hline 32x - 6y = 144 \quad \text{①} \times 2 \\ 5x + 6y = 78 \quad \text{②} \\ \hline 37x = 222 \quad \text{①} + \text{②} \\ x = \frac{222}{37} \end{array}$$

sub $x = 6$ into ①

$$\frac{5(6)}{6} + y = 13$$

$$y = 13 - 5$$

$$y = 8$$

∴ $(6, 8)$ is the solⁿ

$$10c) \frac{x-5}{3} + \frac{y+2}{2} = 1 \quad (1)$$

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

$$2(x-5) + 3(y+2) = 6 \quad (1) \times 6$$

$$3(x-1) + 5(y+2) = 30 \quad (2) \times 15$$

$$2x - 10 + 3y + 6 = 6 \quad (1)$$

$$3x - 3 + 5y + 10 = 30 \quad (2)$$

$$2x + 3y = 10 \quad (1)$$

$$3x + 5y = 23 \quad (2)$$

$$6x + 9y = 30 \quad (1) \times 3$$

$$6x + 10y = 46 \quad (2) \times 2$$

$$-y = -16 \quad (1) - (2)$$

$$y = 16$$

sub $y=16$ into (1)

$$2x + 3(16) = 10$$

$$2x = -38$$

$$x = -19$$

∴ $(-19, 16)$ is the solⁿ