Bell Work

1. What is the slope of the line that goes through (9, 5) and (-3, -3)?

2. What is the function equation of the linear parent function?

3. What is the equation in slope-intercept form of the line that goes through (6, -9) and has a slope of $-4/3$?

4. Solve $6x - 18 = -4(x - 4)$ and show all work.

Today you will solve systems of equations algebraically.

$$y = \frac{3}{4}x - 5 \quad \& \quad y = \frac{1}{6}x + 2$$

$$2x + 5y = 18 \quad \& \quad y = 2x + 6$$

$$4x - 3y = 4$$
$$3x + y = -23$$

$$2x + 5y = 19$$
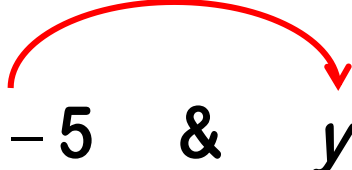$$2x = 4y - 26$$

$$4a - 5b = 13$$
$$2a - 7b = 11$$

Find the intersection.
Substitution

Use substitution when one is slope-intercept.

1. **Substitute one equation into the other.**
2. **Solve for the variable.**
3. **Find the other variable.**

$$(12, 4)$$

$$y = \frac{3}{4}x - 5 \quad \& \quad y = \frac{1}{6}x + 2$$

$$(12)\,\frac{3}{4}x - 5^{(12)} = \frac{1}{6}x + 2^{(12)}$$

$$9x - 60 = 2x + 24$$

$$7x = 84$$

$$x = 12$$

$$y = \frac{3}{4}(12) - 5 = 4$$

Find the intersection.

Substitution

Use substitution when one is slope-intercept.

1. **Substitute one equation into the other.**
2. **Solve for the variable.**
3. **Find the other variable.**

(-1, 4)

$$2x + 5y = 18 \quad \& \quad y = 2x + 6$$

$$2x + 5(2x + 6) = 18$$

$$2x + 10x + 30 = 18$$

$$12x = -12$$

$$x = -1$$

$$y = 2(-1) + 6 \quad = 4$$

Find the intersection.

Substitution

Use substitution when one is slope-intercept.

1. **Substitute one equation into the other.**

2. **Solve for the variable.**

3. **Find the other variable.**

(3, -2)

$$3x - 4y = 17 \quad \& \quad y = \frac{2}{3}x - 4$$

$$3x - 4(\frac{2}{3}x - 4) = 17$$

$$3x - \frac{8}{3}x + 16 = 17$$

$$\frac{1}{3}x = 1$$

$$x = 3$$

$$y = \frac{2}{3}(3) - 4 = -2$$

Find the intersection.

Substitution

Use substitution when one is slope-intercept.

1. **Substitute one equation into the other.**

2. **Solve for the variable.**

3. **Find the other variable.**

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

$$2x + 3\left(-\frac{2}{3}x - 1\right) = 5$$

$$2x - 2x - 3 = 5$$

$$-3 = 5$$

No Solution

Find the intersection.

Substitution

Use substitution when one is slope-intercept.

1. **Substitute one equation into the other.**

2. **Solve for the variable.**

3. **Find the other variable.**

$$y = \frac{1}{4}x - 3 \quad \& \quad x - 4y = 12$$

$$x - 4(\frac{1}{4}x - 3) = 12$$

$$x - x + 12 = 12$$

$$12 = 12$$

Infinitely Many Solutions

Find the intersection.

Elimination

Both are standard form.

1. **Eliminate one of the variables.**
2. **Solve for the variable.**
3. **Substitute to find the other variable.**

(-3, 5)

$$2x + 5y = 19$$

$$2x = 4y - 26$$

$$2x + 5y = 19$$

$$2x - 4y = -26$$

$$2x + 5y = 19$$

$$\underline{-2x + 4y = 26}$$

$$9y = 45$$

$$y = 5$$

$$2x + 5(5) = 19$$

$$2x + 25 = 19$$

$$2x = -6 \qquad x = -3$$

Find the intersection.

Elimination

Both are standard form.

1. **Eliminate one of the variables.**
2. **Solve for the variable.**
3. **Substitute to find the other variable.**

(-5, -8)

$$4x - 3y = 4$$

$$(3) \quad 3x + y = -23$$

$$4x - 3y = 4$$

$$\underline{9x + 3y = -69}$$

$$13x \qquad = -65$$

$$x = -5$$

$$3(-5) + y = -23$$

$$-15 + y = -23$$

$$y = -8$$

Find the intersection.

Elimination

Both are standard form.

1. **Eliminate one of the variables.**

2. **Solve for the variable.**

3. **Substitute to find the other variable.**

(6, 7)

$$2y = -5x + 44$$

$$4x + 5y = 59$$

$$(5) \quad 5x + 2y = 44$$

$$(-2) \quad 4x + 5y = 59$$

$$25x + 10y = 220$$

$$-8x - 10y = -118$$

$$\overline{}$$

$$17x \qquad = 102$$

$$x = 6$$

$$5(6) + 2y = 44$$

$$30 + 2y = 44$$

$$2y = 14 \qquad y = 7$$

Find the intersection.

$$2y = -5x + 44$$

$$4x + 5y = 59$$

Substitution

1. **Substitute one into the other.**

$$y = -\frac{5}{2}x + 22$$

2. **Solve for the variable.**

3. **Substitute to find the other variable.**

$$4x + 5\left(-\frac{5}{2}x + 22\right) = 59$$

(6, 7)

$$4x - \frac{25}{2}x + 110 = 59$$

$$-\frac{17}{2}x = -51$$

$$y = -\frac{5}{2}(6) + 22 = 7$$

$$x = 6$$

Which one do you use?

Either one would be OK to use.

$$4a = 5b + 13$$

$$2a - 7b = 11$$

Elimination

$$4a - 5b = 13$$

$$2a - 7b = 11$$

Substitution

$$a = \frac{5}{4}b + \frac{13}{4}$$

$$2a - 7b = 11$$

Substitution

Use it when one of the variables is by itself.

1. Substitute one equation into the other.

2. Solve for the variable.

3. Find the other variable.

Elimination

Use it when the variables are on the same side.

1. Eliminate one of the variables.

2. Solve for the variable.

3. Substitute to find the other variable.

Assignment:
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Use substitution to solve each system of equations.

15. $\begin{cases} -4y = x \\ 2x + 6y = -3 \end{cases}$

16. $\begin{cases} 12x + y = 21 \\ 18x - 3y = -36 \end{cases}$

17. $\begin{cases} y = 4x \\ 32x + 21y = 29 \end{cases}$

18. $\begin{cases} y + 1 = x \\ -2x + 3y = 2 \end{cases}$

Use elimination to solve each system of equations.

19. $\begin{cases} 4x - 9y = 26 \\ 4x - 5y = 2 \end{cases}$

20. $\begin{cases} 6x - 3y = -6 \\ -5x + 7y = 41 \end{cases}$

21. $\begin{cases} 12x - 3y = -15 \\ 8x + 8y = -58 \end{cases}$

22. $\begin{cases} 3x + y = 7 \\ -3x + 2y = 11 \end{cases}$