

# Bellwork #4, 8

(1-14)

F. Math 3

Solving Systems of Equations by Substitution

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

Solve each of the following systems of equations by using the substitution method.

1. 
$$\begin{cases} y = 3 \\ 2x + y = 9 \end{cases}$$

$$2x + 3 = 9$$

$$2x = 6$$

$$x = 3$$

$$\boxed{(3, 3)}$$

2. 
$$\begin{cases} x = -2 \\ y - 4x = -13 \end{cases}$$

$$y - 4(-2) = -13$$

$$y + 8 = -13$$

$$y = -21$$

$$\boxed{(-2, -21)}$$

3. 
$$\begin{cases} y = 6x \\ x + y = 28 \end{cases}$$

$$x + 6x = 28$$

$$7x = 28$$

$$x = 4$$

$$y = 6(4) = 24$$

$$\boxed{(4, 24)}$$

4. 
$$\begin{cases} 2x + 10y = 20 \\ x = 10 - 5y \end{cases}$$

$$2(10 - 5y) + 10y = 20$$

$$20 - 10y + 10y = 20$$

$$20 = 20$$

\* infinite solutions

Same line

5. 
$$\begin{cases} 3x - y = 6 \\ y = 3x + 4 \end{cases}$$

$$3x - (3x + 4) = 6$$

$$3x - 3x - 4 = 6$$

$$-4 = 6$$

no solution

6. 
$$\begin{cases} 2x + 3y = 19 \\ y = 2x + 1 \end{cases}$$

$$2x + 3(2x + 1) = 19$$

$$2x + 6x + 3 = 19$$

$$8x + 3 = 19$$

$$y = 2(2) + 1 = 5$$

$$\frac{8x}{8} = \frac{16}{8} \Rightarrow x = 2$$

$$\boxed{(2, 5)}$$

7. 
$$\begin{cases} 3y + 2x = 2 \\ x - 2y = 8 \end{cases}$$

$$x = 8 + 2y$$

$$3y + 2(8 + 2y) = 2$$

$$3y + 16 + 4y = 2$$

$$7y + 16 = 2$$

$$7y = -14$$

$$y = -2$$

$$x = 8 + 2(-2)$$

$$x = 8 - 4 = 4 \quad x = 4$$

$$\boxed{(4, -2)}$$

8. 
$$\begin{cases} y - 2x = 0 \\ 2x + 7y = 16 \end{cases}$$

$$y - 2x = 0$$

$$y = 2x$$

$$y = 2(1)$$

$$\boxed{y = 2}$$

$$2x + 7(2x) = 16$$

$$2x + 14x = 16$$

$$16x = 16$$

$$\boxed{x = 1}$$

$$\boxed{(1, 2)}$$

9. 
$$\begin{cases} x + y = 4 \Rightarrow x = 4 - y \\ 2x + 2y = 8 \end{cases}$$

$$2(4 - y) + 2y = 8$$

$$8 - 2y + 2y = 8$$

$$8 = 8$$

infinite solutions

10.  $\begin{cases} 2x + y = 5 \rightarrow y = 5 - 2x \\ 4x + 2y = 8 \end{cases}$

$$4x + 2(5 - 2x) = 8$$

$$4x + 10 - 4x = 8$$

$$10 = 8$$

no solution

11.  $\begin{cases} 2x + y = 8 \\ y = 2x - 30 \end{cases}$

$$2x - y = 8$$

$$4x - y = 48 \quad y = 2x - 30$$

$$4x - (2x - 30) = 48$$

$$4x - 2x + 30 = 48$$

$$2x = 18$$

$$x = 9$$

$(9, -12)$

$(-6, -3)$

12.  $\begin{cases} \frac{x}{6} + \frac{4y}{3} = -5 \\ \frac{3x}{2} - \frac{4y}{2} = -8 \end{cases}$

$$x + 8y = -30$$

$$9x - 2y = -48$$

$$x = -30 - 8y$$

$$x = -6$$

$$9(-30 - 8y) - 2y = -48$$

$$-270 - 72y - 2y = -48$$

$$-270 - 74y = -48$$

$$-270 + 270 - 74y = -48 + 270$$

$$-74y = 222$$

$$y = -3$$

For each of the following problems, write a system of equations and solve.

13. The perimeter of a rectangle is 56 cm. The length of the rectangle is 2 cm more than the width. Determine the dimensions of the rectangle.

$$P = 2l + 2w$$

$$56 = 2(w + 2) + 2w$$

$$56 = 2w + 4 + 2w$$

$$56 = 4w + 4$$

$$\frac{52}{4} = \frac{4w}{4} \quad w = 13$$

$$l = w + 2$$

$$l = 13 + 2$$

$$l = 15$$

15cm x 13cm

14. The perimeter of a rectangle is 74 cm. The length of the rectangle is 5 cm less than twice the width. Determine the dimensions of the rectangle.

23cm x 14cm

$$P = 2l + 2w$$

$$74 = 2l + 2w \quad l = 2w + 5$$

$$74 = 2(2w + 5) + 2w \quad l = 2(14) + 5$$

$$74 = 4w + 10 + 2w \quad l = 28 + 5$$

$$74 = 6w + 10 \quad l = 33$$

$$\frac{84}{6} = \frac{6w}{6}$$

$$14 = w$$

15. The sum of two numbers is 18 and their difference is 12. Determine each of the numbers.

$$\begin{array}{r} x + y = 18 \\ x - y = 12 \\ \hline \end{array}$$

$$x = 18 - y$$

$$18 - y - y = 12$$

$$18 - 2y = 12$$

$$-2y = -6$$

$$y = 3$$

$$x = 15$$