

1.

solution: (1, 1)

$$\begin{array}{r} 7x + 5y = 12 \\ + \quad x - 5y = -4 \\ \hline 8x = 8 \\ x = 1 \end{array}$$

$$\begin{array}{r} (1) - 5y = -4 \\ -5y = -5 \\ y = 1 \end{array}$$

2.

solution: (96, 53)

$$y = \frac{2}{3}x - 11$$

$$\begin{array}{r} y = \frac{1}{2}x + 5 \\ \frac{2}{3}x - 11 = \frac{1}{2}x + 5 \\ 6\left(\frac{2}{3}x - 11 = \frac{1}{2}x + 5\right) \\ 4x - 66 = 3x + 30 \\ x = 96 \end{array}$$

$$\begin{array}{r} y = \frac{1}{2}(96) + 5 \\ y = 48 + 5 \\ y = 53 \end{array}$$

3.

solution: infinite solutions (on the line)

$$\begin{array}{r} a + b = 3 \\ + \quad -a - b = -3 \\ \hline 0 = 0 \end{array}$$

This is the same equation, so these are coincident lines.

4.

solution: $\left(-\frac{10}{3}, -\frac{4}{3}\right)$

$$x = 4y + 2$$

$$\begin{array}{r} -3x + 9y = -2 \\ -3(4y + 2) + 9y = -2 \\ -12y - 6 + 9y = -2 \\ -3y = 4 \\ y = -\frac{4}{3} \end{array}$$

$$\begin{array}{r} x = 4\left(-\frac{4}{3}\right) + 2 \\ x = -\frac{16}{3} + \frac{6}{3} \\ x = -\frac{10}{3} \end{array}$$

5.

solution: $\left(\frac{3}{4}, -2\right)$

$$\begin{array}{r} 8p - 3q = 12 \\ (-1)(8p + 7q = -8) = -8p - 7q = 8 \end{array}$$

$$\begin{array}{r} 8p - 3q = 12 \\ + \quad -8p - 7q = 8 \\ \hline -10q = 20 \\ q = -2 \end{array}$$

$$\begin{array}{r} 8p - 3(-2) = 12 \\ 8p + 6 = 12 \\ 8p = 6 \\ p = \frac{6}{8} = \frac{3}{4} \end{array}$$

6.

solution: (5, 2)

$$3c + 4d = 23$$

$$c = 15 - 5d$$

$$3(15 - 5d) + 4d = 23$$

$$45 - 15d + 4d = 23$$

$$-11d = -22$$

$$d = 2$$

$$c = 15 - 5(2)$$

$$c = 5$$

7.

solution: $(\frac{3}{2}, 3)$

$$4x + \frac{1}{2}y = \frac{15}{2}$$

$$(-2)(2x + 2y = 9) = -4x - 4y = -18$$

$$4x + \frac{1}{2}y = \frac{15}{2}$$

$$+ -4x - 4y = -18$$

$$-3\frac{1}{2}y = -\frac{36}{2} + \frac{15}{2}$$

$$-\frac{7}{2}y = -\frac{21}{2}$$

$$y = 3$$

$$2x + 2(3) = 9$$

$$2x = 9 - 6$$

$$2x = 3$$

$$x = \frac{3}{2}$$

8.

solution: (2, 1)

$$5x - 3y = 7$$

$$y = \frac{3}{4}x - \frac{1}{2}$$

$$5x - 3(\frac{3}{4}x - \frac{1}{2}) = 7$$

$$5x - \frac{9}{4}x + \frac{3}{2} = 7$$

$$4(5x - \frac{9}{4}x + \frac{3}{2} = 7)$$

$$20x - 9x + 6 = 28$$

$$11x = 22$$

$$x = 2$$

$$y = \frac{3}{4}(2) - \frac{1}{2}$$

$$y = \frac{6}{4} - \frac{2}{4} = \frac{4}{4}$$

$$y = 1$$

9.

no solution; parallel lines

$$(-2)(6x - 3y = 5) = -12x + 6y = -10$$

$$12x - 6y = 7$$

$$+ -12x + 6y = -10$$

$$0 = -3$$

10. sometimes

11. sometimes

12. always