

1.) What is the relationship between the slopes of two parallel lines?

the slopes are the same

2.) What is the relationship between the slopes of two perpendicular lines?

the slopes are opposite reciprocals

3.) Give an example of parallel lines.

$$y = 2x + 5$$

$$y = 2x - 7$$

4.) Give an example of perpendicular lines.

$$y = 3x - 2$$

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

Write the equation of the that is **parallel** to the given equation and contains the given point.

5.) $y = \frac{3}{2}x - 4$; $(-4, 5)$

$$m_{\parallel} = \frac{3}{2}$$

$$5 = \frac{3}{2}(-4) + b$$

$$5 = -6 + b$$

$$+6 \quad +6$$

$$11 = b$$

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

6.) $y + 2x = 3$; $(3, 1)$

$$-2x \quad -2x$$

$$y = -2x + 3$$

$$m_{\parallel} = -2 \quad (3, 1)$$

$$x \quad y$$

$$1 = -2(3) + b$$

$$1 = -6 + b$$

$$+6 \quad +6$$

$$7 = b$$

$$y = -2x + 7$$

Write the equation of the that is **perpendicular** to the given equation and contains the given point.

7.) $y = \frac{1}{4}x - 3$; $(2, 10)$

$$x \quad y$$

$$m_{\perp} = -4$$

$$10 = -4(2) + b$$

$$10 = -8 + b$$

$$+8 \quad +8$$

$$18 = b$$

$$y = -4x + 18$$

8.) $y + 3x = 5$; $(9, 2)$

$$-3x \quad -3x$$

$$y = -3x + 5$$

$$m_{\perp} = \frac{1}{3} \quad (9, 2)$$

$$x \quad y$$

$$2 = \frac{1}{3}(9) + b$$

$$2 = 3 + b$$

$$-3 \quad -3$$

$$-1 = b$$

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

Solve the system of equations using elimination.

$$13.) \begin{cases} -3x + 5y = 45 \\ 3x + 13y = 9 \end{cases}$$

$$\begin{array}{r} 18y = 54 \\ \hline 18 \quad 18 \\ y = 3 \end{array}$$

$$\begin{array}{r} 3x + 13(3) = 9 \\ 3x + 39 = 9 \\ \hline -89 \quad -39 \end{array}$$

$$\boxed{(-10, 3)}$$

$$\frac{3x}{3} = \frac{-30}{3} \quad x = -10$$

$$15.) \begin{cases} 4x - 3y = 8 \\ 3(2x + y = 14) \end{cases}$$

$$\begin{array}{r} 4x - 3y = 8 \\ 6x + 3y = 42 \\ \hline 10x = 50 \\ 10 \quad 10 \\ x = 5 \end{array}$$

$$\begin{array}{r} 2(5) + y = 14 \\ 10 + y = 14 \\ \hline -10 \quad -10 \\ y = 4 \end{array}$$

$$\boxed{(5, 4)}$$

$$14.) \begin{cases} 4x - 7y = 13 \\ -1(2x - 7y = 3) \end{cases}$$

$$\begin{array}{r} 2(5) - 7y = 3 \\ 10 - 7y = 3 \\ \hline -10 \quad -10 \\ -7y = -7 \\ \hline -7 \quad -7 \\ y = 1 \end{array}$$

$$\begin{array}{r} 4x - 7y = 13 \\ -2x + 7y = -3 \\ \hline 2x = 10 \\ \hline 2 \quad 2 \\ x = 5 \end{array}$$

$$\boxed{(5, 1)}$$

$$16.) \begin{cases} 4x + 5y = 22 \\ 5(5x - y = 13) \end{cases}$$

$$\begin{array}{r} 5(3) - y = 13 \\ 15 - y = 13 \\ \hline -15 \quad -15 \\ -y = -2 \\ \hline -1 \quad -1 \\ y = 2 \end{array}$$

$$\begin{array}{r} 4x + 5y = 22 \\ 25x - 5y = 65 \\ \hline 29x = 87 \\ \hline 29 \quad 29 \\ x = 3 \end{array}$$

$$\boxed{(3, 2)}$$

Solve the system of equations using any method.

$$17.) \begin{cases} y = 3x - 6 \\ -3x + y = 6 \end{cases}$$

$$\begin{array}{r} -3x + 3x - 6 = 6 \\ \hline -6 \neq 6 \end{array}$$

false

parallel lines
no solution

$$18.) \begin{cases} 6x - 3y = 15 \\ y = 2x - 5 \end{cases}$$

$$3(-2x + y = -5)$$

$$\begin{array}{r} 6x - 3y = 15 \\ -6x + 3y = -15 \\ \hline 0 = 0 \end{array}$$

infinitely many solutions
same line

19.) When solving a system of equations and both variables are eliminated, what possible situations describe the lines?

- a true statement, $0 = 0$ means the lines are ^{the} same line or infinitely many solutions
- a false statement like $2 \neq 5$ means the lines are parallel or no solution

Answers:

1. Parallel lines have the same slope.
2. Perpendicular lines have opposite reciprocal slopes. (ex: 2 & $-1/2$)
3. $y = 2x + 1$ & $y = 2x - 4$
4. $y = -2x + 5$ & $y = 1/2x + 7$
5. $y = 3/2x + 11$
6. $y = -2x + 7$
7. $y = -4x + 18$
8. $y = 1/3x - 1$
9. (4, 5)
10. (2, 3)
11. (10, 20)
12. (-10, 20)
13. (-10, 3)
14. (5, 1)
15. (5, 4)
16. (3, 2)
17. No solution
18. Infinite Solution
19. The lines are either parallel(no solution) or they are the same line (infinite solutions).