

PLEASE NOTE: Some of these questions have multiple solutions, in which case I provided one possible solution. See me with any questions.

1. Consider the line given by $y = 2x + 3$.

(a) Find five points on the line and arrange them in a table.

Solution: These are five possible points, and they should be in a table. $(-3,-3)$, $(-1,1)$, $(0,3)$, $(1,5)$, $(3,9)$

(b) Graph the line.

(c) Find the x -intercept and the y -intercept.

Solution: x -intercept: $x = \frac{-3}{2}$ or $(\frac{-3}{2}, 0)$
 y -intercept: $y = 3$ or $(0,3)$

2. Find the slope-intercept form of the equation of the line through the points $(-1, 4)$ and $(2, 7)$.

Solution: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 4}{2 - (-1)} = \frac{3}{3} = 1$

To determine the value of b , we can substitute either of these points into the general slope-intercept equation and solve for b . This is one of many possible ways to determine the value of b .

$$\begin{aligned} y &= mx + b \\ 4 &= 1 * (-1) + b \\ 4 &= -1 + b \\ 5 &= b \\ y &= x + 5 \end{aligned}$$

3. Consider the line passing through the point $(3, 4)$ with slope -1 .

(a) Write down the equation of the line in point-slope form.

Solution: $-(x - 3) = y - 4$

(b) Write down the equation of the line in slope-intercept form.

Solution: $y = -x - 7$

(c) Find all intercepts.

Solution: y -intercept: $(0, 7)$. x -intercept: $(7, 0)$

4. Consider the line $y = 3x - 1$.

(a) Find the equation of a parallel line through $(-2, 5)$.

Solution: $y = 3x + 11$ or $3(x + 2) = y - 5$

(b) Find the equation of a perpendicular line through $(2, 4)$.

Solution: $y = \frac{-1}{3}x + \frac{14}{3}$ or $\frac{-1}{3}(x - 2) = y - 4$

5. Consider the line $3x - 2y = 6$.

(a) Find the slope and intercepts of the line.

Solution: Slope = $m = \frac{3}{2}$, y -int: $(0, -3)$, x -int = $(2, 0)$.

(b) Find a point on the line and a point not on the line. **Solution:** On the line: (0,-3).
Not on the line: (0,0)

(c) Write the equation of the line in slope-intercept form.

Solution: $y = \frac{3}{2}x - 3$

6. Find the point of intersection of the graphs of $-x + 3y = -24$ and $x + y = -8$.

Solution: (0,-8)

7. Solve:

$$\begin{cases} y & = 3x + 2 \\ 3x + 6y & = 12 \end{cases}$$

Solution: (0,2)

8. Write down a system of two linear equations that has

(a) Exactly one solution

Solution: Any two linear equations that are not parallel

(b) No solution

Solution: Any two parallel linear equations

(c) Infinitely many solutions

Example Solution:

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

9. Derive the point-slope form of the equation for a line by following these steps.

Step 1: Let L be the line passing through the fixed point (x_1, y_1) and an arbitrary point (x, y) .

Step 2: Manipulate the general formula for the slope of L .