

Foundations of Algebra Unit 5: Linear Functions Notes

Day 10 - Writing Equations of Lines

Explain: For each of the following problems, write the equation of the line using the given parameters (two points on the line).

a. (4, -2) and (0, -4)

$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$
 $m = \frac{-2 - (-4)}{4 - 0} = \frac{2}{4} = \frac{1}{2}$
 $b = -4$
 Equation of the Line: $y = \frac{1}{2}x - 4$

b. (2, 7) and (3, 4)

$m = \frac{4 - 7}{3 - 2} = \frac{-3}{1} = -3$
 $b = 13$
 Equation of the Line: $y = -3x + 13$

c. (5, 1) and (-5, -9)

$m = \frac{-9 - 1}{-5 - 5} = \frac{-10}{-10} = 1$
 $b = -6$
 Equation of the Line: $y = x - 6$

d. (-1, 4) and (1, 0)

$m = \frac{0 - 4}{1 - (-1)} = \frac{-4}{2} = -2$
 $b = 2$
 Equation of the Line: $y = -2x + 2$

Writing Equations Using Slope Intercept Form

$y = mx + b$

- Calculate the slope using the slope formula.
 $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{15 - 13}{5 - 27} = \frac{2}{-24} = -\frac{1}{12}$
- Write the formula $y = mx + b$.
- Substitute the value of the slope in for m and the value of the point in for x and y .
 $15 = -\frac{1}{12}(5) + b$
 $15 = -\frac{5}{12} + b$
 $15 + \frac{5}{12} = b$
 $17\frac{5}{12} = b$
- Solve the equation for b .
 $b = 17\frac{5}{12}$
- Substitute the value of m and the newly found b into $y = mx + b$.
 $y = -\frac{1}{12}x + 17\frac{5}{12}$

Writing Equations Using Point Slope Form

$y - y_1 = m(x - x_1)$

- Calculate the slope using the slope formula.
 $m = -4$
- Write the formula $y - y_1 = m(x - x_1)$.
- Substitute the value of the slope in for m and the value of the point in for x and y .
 $y - 13 = -4(x - 15)$
 $y - 13 = -4x + 60$
 $y = -4x + 73$
- Solve the equation for y .
 $y = -4x + 73$

Ex 1: Write the equation of a line given points (15, -13) and (5, 27).

$m = \frac{27 - (-13)}{5 - 15} = \frac{40}{-10} = -4$
 $b = 73$
 Equation: $y = -4x + 73$

Ex 2: Write the equation of a line given points (6, 19) and (0, -35).

1) Find slope: $m = \frac{19 - (-35)}{6 - 0} = \frac{54}{6} = 9$

2) $y = mx + b$
 $19 = 9(6) + b$
 $19 = 54 + b$
 $b = -35$
 $m = 9$, $b = -35$
 Equation: $y = 9x - 35$

Ex 3: Write the equation of a line given points (1, -4) and (3, 2).

1) Slope: $m = \frac{2 - (-4)}{3 - 1} = \frac{6}{2} = 3$

2) $y - y_1 = m(x - x_1)$
 $y - (-4) = 3(x - 1)$
 $y + 4 = 3x - 3$
 $y = 3x - 7$
 $m = 3$, $b = -7$
 Equation: $y = 3x - 7$