

Abe Mirza**Solving Equations****Algebra**

1. Solve the equation $14y + 26y + 5 = 39y$

2. Solve the equation $x - 0.9x + 0.1 = 0.3(x+1)$

3. Solve the equation $3n + 14 - 22 - 12 = 6n$

4. Solve the equation $2(y+5) - 4 = 6(y+2) + 2$

5. Solve the equation $\frac{2}{4}x + 1 = \frac{1}{4}x + 6$

6. Solve the equation $\frac{2x}{3} + \frac{x}{2} = -\frac{3}{2} + \frac{x}{3}$

7. Solve the equation $6(4x+1) = 2(2x+3)$

8. Solve the equation $\frac{1}{6}(y+18) + \frac{1}{3}(2y+3) = y+3$

9. Solve the equation $-(6k-5) + (-5k+8) = -3$

10. Solve the equation $0.30(x+15) - 0.40(x+25) = 25$

11. Solve the inequality $2x - 5 > -2x + 6$

12. Solve the inequality $1 < 2x - 7 < 9$

13. Solve the inequality $8(t-3) < -4(t-3)$

Answers

1. $y = -5$ 2. $x = -1$ 3. $n = -20/3$ 4. $y = -2$ 5. $x = 20$ 6. $x = -9/5$ 7. $x = 0$

8. $y = 6$ 9. $k = 16/11$ 10. $x = -305$ 11. $x > 11/4$ 12. $4 < x < 8$ 13. $t < 3$

Abe Mirza**Slope and Equation of a Line****Algebra**

Given two points $(x_1, y_1), (x_2, y_2)$, The **slope** of the line that goes through these two points will be

$$\text{Slope} = m = \frac{\text{Change in } y}{\text{Change in } x} = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

If $m > 0$ line always goes from **South West** to **North East**

If $m < 0$ line always goes from **North West** to **South East**

If $m = 0$ line is always (**Horizontal Line**) _____

If $m = \text{undefined}$ line is always (**Vertical Line**) |

Example: Find the slope of the lines that through points $(-7, 6)$ and $(4, 5)$ $m = \frac{5-6}{4-(-7)} = \frac{-1}{11}$

Practice: Find the slope of the lines through points $(-8, -6)$ and $(-4, 15)$ $m =$

Slope-Intercept Form: $y = mx + b$ $m =$ Slope, $b =$ y-intercept

Note: If two lines have the **same slope** they will be **parallel**. $y = -8x + 12$ $y = -8x - 5$

Vertical Lines: $x = a$, $x = 3$, $x = -4$ **Horizontal Lines:** $y = b$, $y = 7$, $y = -2$

Finding x and y intercepts in an equation of line:

Finding **x-intercept**, let $y = 0$, solve for x \Leftrightarrow Finding **y-intercept**, let $x = 0$, solve for y

Example: Find x and y intercepts in equation $2x - 3y = 12$

Finding **x-intercept**, let $y = 0 \Rightarrow 2x - 3y = 12 \quad 2x - 0 = 12, \quad 2x = 12, \quad x = 6$

Finding **y-intercept**, let $x = 0 \Rightarrow 2x - 3y = 12 \quad 0 - 3y = 12, \quad -3y = 12, \quad y = -4$

Example: Find x and y intercepts in equation $y = -\frac{1}{2}x + 5$ Ans: $x = 10, \quad y = 5$

Perpendicular lines: their slopes are negative reciprocal of each other $m_1 = \frac{-1}{m_2}, \quad y = 2x + 3, \quad y = \frac{-1}{2}x + 3$

How to find the Equation of a line $y = mx + b$			
Case	Given	How	Example
1	$m =$ Slope, $b =$ y-intercept	Substitute them into equation	$m = -2, b =$ y-intercept $= 3$ Substitute them into equation $y = -2x + 3$
2	$m =$ Slope, and a point $= (x, y)$	Substitute them into equation $y = mx + b$ and then solve for b	Find the equation of the line that passes through point $(-8, 6)$ and its slope $= m = -2$ $6 = -2(-8) + b, \quad 6 = 16 + b, \quad b = -10$ Substitute them into equation $y = -2x - 10$
3	Passes through two points $(x_1, y_1), (x_2, y_2)$	First find slope and then use (x_1, y_1) like case 2	Find the equation of the line that passes through points $(-5, 8)$ and $(5, 18)$ $m = \frac{18 - 8}{5 - (-5)} = \frac{10}{10} = 1, \quad y = mx + b$ $8 = 1(-5) + b, \Rightarrow 13 = b \quad y = x + 13$
4	$m = 0$ and passes through point (x_1, y_1)	Always a Horizontal Line: $y = 0 + b = y_1$	Find the equation of the line that passes through point $(-4, -6)$ and its slope $= m = 0$ $y = 0 + b = y_1 = -6 \quad y = -6$
5	$m = \text{undefined} = \frac{\text{Number}}{0}$ and passes through point (x_1, y_1)	Always a Vertical Line: $x = x_1,$	Find the equation of the line that passes through point $(3, 7)$ and its slope $= m = \text{undefined}$ A vertical line, so its equation is $x = 3$
6	Passes through point (x_1, y_1) and is parallel to a given line	The new slope $= m$ of the parallel line and then do like case 2	Find the equation of the line that passes through point $(-4, 7)$ and is parallel to its line $y = -2x - 10$ The line has slope of $= m = -2$ $7 = -2(-4) + b, \quad 1 = 8 + b, \quad b = 1$ $y = -2x + 1$
7	Passes through point (x_1, y_1) and is perpendicular to a given line	The new slope will be the $m_2 = -1/m_1$ of the given equation, Having slope m_2 and (x_1, y_1) then do like case 2	Find the equation of the line that passes through point $(-4, 7)$ and is perpendicular to its line $y = -2x - 10$ The line has slope of $= m = -1/-2 = 1/2 = .5$ $7 = .5(-4) + b, \quad 7 = -2 + b, \quad b = 9 \quad y = .5x + 9$

- Find the equation of a line that

P.1) passes through point $(0, 1)$ and its slope $= m = -1$

Ans: $y = -x + 1$

P.2) passes through point $(-9, 4)$ and its slope $= m = \frac{2}{3}$

Ans: $y = \frac{2}{3}x + 10$

P.3) passes through points $(3, 5)$ and $(8, 15)$

Ans: $y = 2x - 1$

P.4) passes through points $(-1, -3)$ and $(2, -1)$

Ans: $y = \frac{2}{3}x - \frac{7}{3}$