Feb 7 Warm-Up

Calculate the slope for each of the following:

1. Given the coordinates (3,1), (1,4).

x_1, y_1 x_2, y_2

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{4-1}{1-3}$

$= \frac{3}{-2} = -3/2$

2. Given the equation 3y= 6x + 15

$y = mx + b$

Homework Solutions

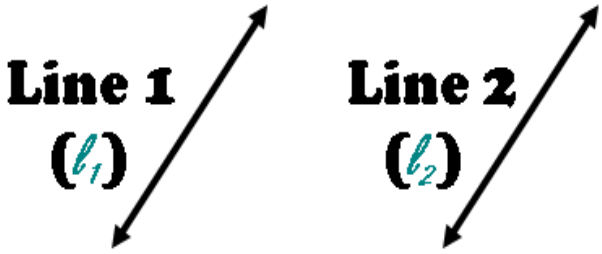
$\frac{3y}{3} = \frac{6x}{3} + \frac{15}{3}$

$y = 2x + 5$ $m = 2$

Parallel & Perpendicular Lines

Parallel Lines

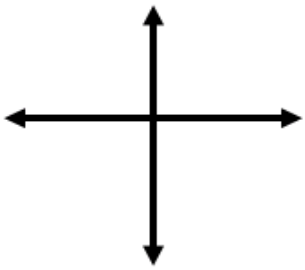
Two lines are parallel if they have the same slope.



$m_{\ell_1} = m_{\ell_2}$

Perpendicular Lines

Two lines are perpendicular if the product of their slopes is -1. In other words, the slopes of the lines are negative reciprocals of each other.



Line 1

Line 2

$m_1 \times m_2 = -1$

Notice the number flipped and changed sign

$m = 2$ is perpendicular to $m = \frac{-1}{2}$

Example 1

Show that the line through A(0, 3) and B(1, 5) is parallel to the line through C(1, 4) and D(2, 6).

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{5 - 3}{1 - 0}$

$= \frac{2}{1}$

$m = 2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{6 - 4}{2 - 1}$

$= \frac{2}{1}$

$m = 2$

same slope so parallel

Example 2

Show that the line through A(-1 , -2) and B(-3 , -5) is perpendicular to the line through C(1 , 0) and D(4 , -2).

$m = \frac{y_2 - y_1}{x_2 - x_1}$

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

$= \frac{-5+2}{-3+1}$

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

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

$m = \frac{y_2 - y_1}{x_2 - x_1}$

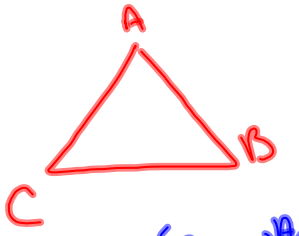
$= \frac{(-2)-(0)}{(4)-(1)}$

$m = \frac{-2}{3}$

opposite reciprocals perpendicular

Example 3

The vertices of △ABC are A(-3, 2), B(2, 3) and C(3, -2). Determine whether △ABC is a right triangle.



(-3, 2)(2, 3) (2, 3)(3, -2) C(3, -2) A(-3, 2)

$m_{AB} = \frac{3-2}{2-(-3)}$

$= \frac{1}{5}$

$m_{BC} = \frac{-2-3}{3-2}$

$= \frac{-5}{1}$

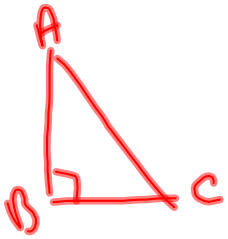
$m_{CA} = \frac{2-(-2)}{-3-3}$

$\frac{4}{-6}$

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

negative reciprocals

$AB \perp BC$



Worksheet → Parallel & Perpendicular

#1 a b c

#2 a d e

#3 a d c

#5 a b

#6 a

#8

2c) $m = -\frac{1}{2}$

$m_{par} = -\frac{1}{2}$

$m_{per} = \frac{2}{1}$

3b) $y = \frac{-2}{3}x + 5$

$m = -\frac{2}{3}$

$m_{per} = 3/2$

Attachments

Linear Equation Worksheet 1 Solutions.pdf