U6D4_T Parallel and Perpendicular Lines

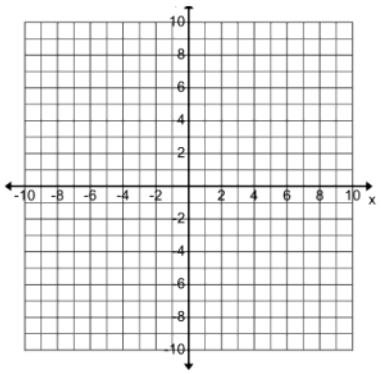
April 19, 2018 10:46 AM

U6D4_T Parallel a...

U6D4 Warm Up:

Graph the equation

$2x + 5y = -20$ using intercepts.

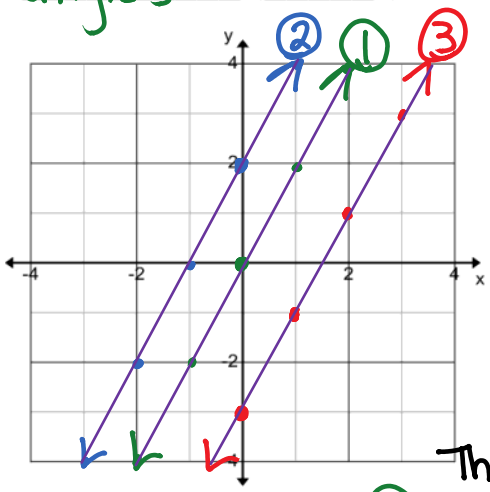


U6D4 ***Parallel and Perpendicular Lines (6.4)***

Definitions:

Parallel Lines : Lines which run in the same direction and never cross.

Perpendicular Lines : Lines which intersect at right angles (90°)



Graph $y = 2x$, $y = 2x + 2$ and $y = 2x - 3$ on the same grid.

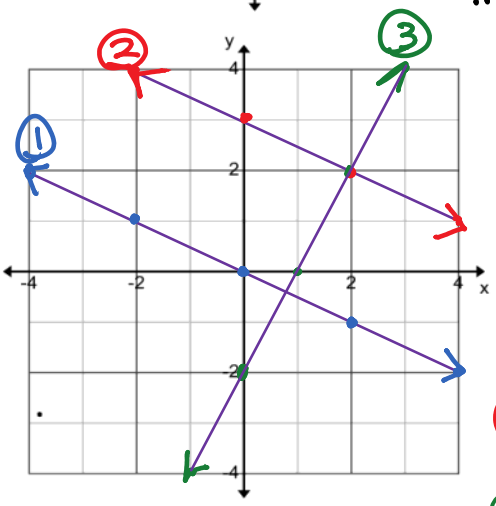
How are these lines related?

① $y = 2x$ $b = 0$, $m = \frac{2}{1}$ rise / run

② $y = 2x + 2$ $b = 2$ $m = \frac{2}{1}$ rise / run

③ $y = 2x - 3$ $b = -3$ $m = \frac{2}{1}$

They are parallel (and all have the same slope.)



Graph $y = -\frac{1}{2}x$, $y = -\frac{1}{2}x + 3$ and $y = 2x - 2$ on the same grid.

How are these lines related?

① $y = -\frac{1}{2}x$ $b = 0$ $m = \frac{-1}{2}$ rise / run

② $y = -\frac{1}{2}x + 3$ $b = 3$ $m = -\frac{1}{2}$

③ $y = 2x - 2$ $b = -2$ $m = \frac{2}{1}$

The third line is perpendicular to the other two.

Example 1: Are the following lines with given slopes, parallel, perpendicular or neither?

a. $m = 2, \quad m = -\frac{1}{2}$ ⊥

b. $m = -\frac{2}{3}, \quad m = -\frac{2}{3}$ //

c. $m = -2, \quad m = \frac{2}{4}$ ⊥

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

opposite signs and reciprocals.

d. $m = 0.75, \quad m = -\frac{3}{4}$

$m = 0.75, m = -0.75$

Neither

e. $m = 1, \quad m = -1$ ⊥

Perpendicular lines have slopes that are "negative reciprocals" Slopes of ⊥ lines multiply to −1.

Example 2: Give the slope of a line parallel to $y = \frac{2}{5}x - 3$.

$y = mx + b$

$m = \frac{2}{5}$

$m_{//} = \frac{2}{5}$

Example 3a: Give the slope of a line perpendicular to $y = \frac{1}{3}x + 2$.

$m = \frac{1}{3}$

$m_{\perp} = -3$

Example 3b: Give the slope of a line perpendicular to $y = 3$.

→ horizontal line $m = 0$

⊥ will be vertical $m_{\perp}$ is undefined

Example 4: Write an equation of a line parallel to $4x-3y+1=0$

$-3y=-4x-1$

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

$y=\frac{4}{3}x+\frac{1}{3}$

$m=\frac{4}{3}$

$m_{\parallel}=\frac{4}{3}$

use same slope

choose a different y-int.

$\therefore y=\frac{4}{3}x$ is a line parallel to $4x-3y+1=0$

Example 5: Write an equation of a line perpendicular to $5x+2y-3=0$

$2y=-5x+3$

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

$m=\frac{-5}{2}$

$m_{\perp}=\frac{2}{5}$

choose any y-int.

$y=\frac{2}{5}x$

is a line $\perp$ to $5x+2y-3=0$

Example 6: If (2,5) and (8,14) lie on line A and

(5,3) and (11,12) lie on line B,

determine if A and B are parallel, perpendicular or neither.