

U6D6_T Equation Given Two Points

Thursday, April 26, 2018 9:09 AM



U6D6_T
Equation ...

U6D6 Warm Up:

Find the equation of a line that is perpendicular to $y = 3x$ and that passes through the point $(-2, 6)$.

$$\begin{aligned}
 mx + b &= y \\
 -\frac{1}{3}(-2) + b &= 6 \\
 \frac{2}{3} + b &= 6 \\
 b &= \frac{18}{3} - \frac{2}{3} \\
 b &= \frac{16}{3}
 \end{aligned}$$

$m = 3$
 $m_{\perp} = -\frac{1}{3}$

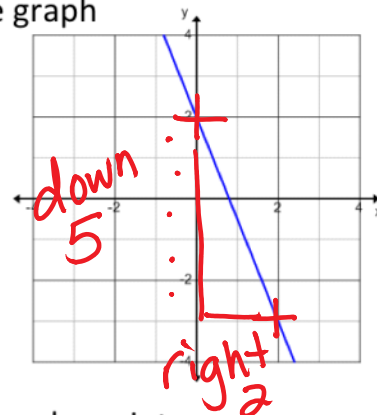
$$\begin{aligned}
 \frac{2}{3} + b - \frac{2}{3} &= 6 - \frac{2}{3} \\
 b &= \frac{18}{3} - \frac{2}{3} \\
 b &= \frac{16}{3}
 \end{aligned}$$

$\therefore y = -\frac{1}{3}x + \frac{16}{3}$

U6D6 Finding an Equation Given 2 Points

Case A: Finding equation of a line from the graph

$$\begin{aligned}
 m &= -\frac{5}{2} \quad b = 2 \\
 y &= mx + b \\
 \therefore y &= -\frac{5}{2}x + 2
 \end{aligned}$$



Case B: Find equation of a line given slope and a point

Example - find equation of a line with slope -3 and passing through the point $(-1, 2)$.

$$\begin{aligned}
 mx + b &= y \\
 -3(-1) + b &= 2 \\
 3 + b &= 2 \\
 3 + b - 3 &= 2 - 3 \\
 b &= -1
 \end{aligned}$$

$\therefore y = -3x - 1$

Case C : Find equation of a line given two points.

Example find the equation of the line that passes through the points (4,3) and (7,9).

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{9 - 3}{7 - 4} \\ &= \frac{6}{3} \\ &= 2 \end{aligned}$$

$$\begin{array}{c|c} \Delta x & \Delta y \\ \hline 4 & 3 \\ 7 & 9 \end{array} \begin{array}{l} \\ \\ \\ \end{array}$$
$$m = \frac{6}{3} = 2$$

$$\therefore m = 2$$

Use $m = 2$ with either point.

$$m = 2 \quad (4, 3)$$

$$\begin{aligned} mx + b &= y \\ 2(4) + b &= 3 \\ 8 + b &= 3 \end{aligned}$$

$$b = -5$$

$$m = 2 \quad (7, 9)$$

$$\begin{aligned} mx + b &= y \\ 2(7) + b &= 9 \\ 14 + b &= 9 \end{aligned}$$

$$b = -5$$

$$y = mx + b$$
$$\therefore y = 2x - 5$$

Example 1: Find an equation for the line passing through $(-3, 1)$ and $(-2, -5)$.

$$\begin{array}{c|c} x & y \\ \hline -3 & 1 \\ -2 & -5 \end{array} \rightarrow -6$$

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

$$\boxed{m = -6}$$

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

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

$$= \frac{-6}{-2 + 3}$$

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

$$\boxed{m = -6}$$

$$m = -6$$

$$(-3, 1)$$

$$mx + b = y$$

$$-6(-3) + b = 1$$

$$18 + b = 1$$

$$b = -17$$

$$\therefore \boxed{y = -6x - 17}$$

Example 2: Find an equation for the line passing through the point $(4, 5)$ and with an x intercept of 8. $(8, 0)$

$$\begin{array}{c|c} x & y \\ \hline 4 & 5 \\ 8 & 0 \end{array} \rightarrow -5$$

$$m = -\frac{5}{4}$$

$$mx + b = y$$

$$-\frac{5}{4}(4) + b = 5$$

$$-5 + b = 5$$

$$b = 5 + 5$$

$$b = 10$$

$$\therefore \boxed{y = -\frac{5}{4}x + 10}$$

Example 3: Find an equation for the line passing through the point (4,5) and with a y intercept of 3. (0,3)

$$4 \begin{array}{c|c} x & y \\ \hline 0 & 3 \\ 4 & 5 \end{array} 2$$

$$m = \frac{\Delta y}{\Delta x} \\ = \frac{2}{4}$$

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

$$b = 3$$

$$\therefore y = \frac{1}{2}x + 3$$

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