MPM 1D1

The Equation of a Line Given the Slope and a Point

Write the equation of the line that passes through the given point with the given slope.

a) $m = 4$ $P(-6, -2)$

b) $m = \frac{1}{4}$ $P(5, 2)$

c) $m = \frac{-3}{2}$ $P(-4, 5)$

d) $m = 3$ $P(3, -1)$

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Standard Form $Ax + By + C = 0$

$y = mx + b$ slope y-int form

$y - y_1 = m(x - x_1)$ is the equation in **point-slope form**

2 Determine the equation of the line: All 3 forms

a) with a slope of –4, and that passes through the point (–3, 5)

b) with a slope of $\frac{2}{3}$, and that passes through the point (4, –2)

3 Determine the equation of the line with the same slope as $y = 6x - 5$ and that has the same x-intercept as the line defined by the equation $2x - 4y + 8 = 0$.

Write the equation of the line with each slope and passing through the indicated point.

a) $m = 4$ $P(-6, -2)$ (x y)

① $y = 4x + b$

② $(-2) = 4(-6) + b$

③ $-2 = -24 + b$

$-2 + 24 = b$

$22 = b$

④ $\therefore y = 4x + 22$

b) $m = \frac{1}{4}$ $P(5, 2)$ (x y)

① $y = \frac{1}{4}x + b$

② $(2) = \frac{1}{4}\left(\frac{5}{1}\right) + b$

③ $2 = \frac{5}{4} + b$

$\frac{2}{1} - \frac{5}{4} = b$

$\frac{8}{4} - \frac{5}{4} = b$

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

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

c) $m = \frac{-3}{2}$ P(–4, 5)

x y

① $y = \frac{-3}{2}x + b$

② $(5) = \frac{-3}{2}\left(\frac{-4}{1}\right) + b$

③ $5 = \frac{12}{2} + b$

$5 = 6 + b$

$5 - 6 = b$

$-1 = b$

④ $y = \frac{-3}{2}x - 1$

d) $m = 3$ P(3, –1)

① $y = 3x + b$

② $(-1) = 3(3) + b$

③ $-1 = 9 + b$

$-10 = b$

④ $\therefore y = 3x - 10$

Standard Form $Ax + By + C = 0$

$y = mx + b$ slope y-int form

$y - y_1 = m(x - x_1)$ is the equation in **point-slope form**

2 Determine the equation of the line: All 3 forms

a) with a slope of –4, and that passes through the point (–3, 5)

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

$y - 5 = -4(x - -3)$

$y - 5 = -4(x + 3)$ pt-slope form

$y - 5 = -4x - 12$

$y = -4x - 7$ slope-y int form

$4x + y + 7 = 0$ standard form

b) with a slope of $\frac{2}{3}$, and that passes through the point (4, –2)

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

$y - -2 = \frac{2}{3}(x - 4)$

$y + 2 = \frac{2}{3}(x - 4)$ pt-slope form

$y + 2 = \frac{2}{3}x - \frac{8}{3}$

$y = \frac{2}{3}x - \frac{14}{3}$ slope-y int form

$3y = 2x - 14$

$0 = 2x - 3y - 14$ standard

Determine the equation of a line whose slope is the same as the line $y = 6x - 5$ and has the same x-intercept as the line $2x - 4y + 8 = 0$.

(point)

$m = 6$

$2x - 4y + 8 = 0$

let $y = 0$:

$2x - 4(0) + 8 = 0$

$2x + 8 = 0$

$2x = -8$

$x = -4$

$(-4, 0)$

Eq'n of line with $m = 6$ thru $(-4, 0)$

① $y = 6x + b$

② $(0) = 6(-4) + b$

③ $0 = -24 + b$

$24 = b$

$\therefore y = 6x + 24$