

Determining the Equation of a Line in the form $y = mx + b$

Pages 130-138 Given the slope and y-intercept

Example 1
Write the equation of a line with a slope of -3 and a y-intercept of 5.

Solution $y = mx + b$
 $y = -3x + 5$

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Given the slope and y-intercept

Example 2:
The slope of a line is 2 and the y-intercept is -3.
State the equation of the line.

Example 1:
$m = 2$
$b = -3$
$y = mx + b$
$= (2)x + (-3)$
$= 2x - 3$
Therefore, the equation of the line
is $y = 2x - 3$.

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Jul 5-9:36 AM

Determining the Equation of a Line in the form $y = mx + b$

Example 2:
Given that $m = -\frac{1}{4}$ and $b = 5$.
State the equation of the line.

Example 2:
$m = -\frac{1}{4}$
$b = 5$
Click to reveal step
Click to reveal step
Click to reveal step
Click to reveal step

Example 3:
Given that $m = \frac{2}{3}$ and $b = -2$.
State the equation of the line.

Work your way down the left hand side, and click on the right hand side to see if you have the correct step.

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Given the slope and a point.

Example 1 -
Determine the equation of a line with a slope of 3 and passing through the point (-1, 5).

$m = 3$

Solutions

$y = mx + b$

$y = 3x + b$

$5 = 3(-1) + b$

$5 = -3 + b$

$5 + 3 = -3 + b$

$8 = b$

or $y_2 - y_1 = m(x_2 - x_1)$

$5 - 5 = 3(x + 1)$

$y - 5 = 3x + 3$

$y = 3x + 3 + 5$

$y = 3x + 8$

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Determining the Equation of a Line in the form $y = mx + b$

Given the slope and a point.

Example 1:
A line has a slope of -1 and passes through (3, 5).
Determine the equation of the line.

or

$y_2 - y_1 = m(x_2 - x_1)$

Example 1:
$m = -1$
$x = 3$
$y = 5$
$y = mx + b$
$5 = (-1)(3) + b$
$5 = -3 + b$
$5 + 3 = b$
$8 = b$
$y = (-1)x + 8$
$y = -x + 8$
Therefore, the equation of the line is $y = -x + 8$.

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Example 2:
A line has a slope of $\frac{1}{4}$ and passes through (-4, 2).
Determine the equation of the line.

Example 2:
$m = \frac{1}{4}$
$x = -4$
$y = 2$
$y = mx + b$
Click to reveal step
Click to reveal step
Click to reveal step
Click to reveal step
Click to reveal step

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Example 3:
 A line has a slope of $-\frac{2}{3}$ and passes through $(-2, -7)$.
 Determine the equation of the line.
 $y = mx + b$ or $y_2 - y_1 = m(x_2 - x_1)$

Handwritten:
 $y = -\frac{2}{3}x + b$
 $-7 = -\frac{2}{3}(-2) + b$

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Part III: Given two points on the line.

Example 1:
 A line passes through $(2, -1)$ and $(-4, 2)$.
 Determine the equation of the line.

Handwritten:
 $y = mx + b$
 $-1 = (-\frac{1}{3})(2) + b$
 $-1 = -\frac{2}{3} + b$
 $-1 + \frac{2}{3} = b$
 $-\frac{1}{3} = b$
 $\therefore y = -\frac{1}{3}x - \frac{1}{3}$ is the equation of the line.

Handwritten:
Example 1:
 $x_1 = 2$
 $y_1 = -1$
 $x_2 = -4$
 $y_2 = 2$
 $m = \frac{y_2 - y_1}{x_2 - x_1}$
 $= \frac{2 - (-1)}{-4 - 2}$
 $= \frac{3}{-6}$
 $= -\frac{1}{2}$

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Determining the Equation of a Line in the form $y = mx + b$

Example 2:
 A line passes through $(-8, 3)$ and $(-5, 5)$.
 Determine the equation of the line.

Handwritten:
 $y = mx + b$
 Click to reveal step
 Click to reveal step
 Click to reveal step
 Click to reveal step
 Click to reveal step
 Click to reveal step
 Click to reveal step

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Determining the Equation of a Line in the form $y = mx + b$

Special Case:
Example 3:
 A line passes through $(0, 4)$ and $(2, -4)$.
 Determine the equation of the line.

Handwritten:
Example 3:
 $x_1 = 0$ } $b = 4$
 $y_1 = 4$
 $x_2 = 2$
 $y_2 = -4$
 $m = \frac{y_2 - y_1}{x_2 - x_1}$
 $= \frac{-4 - 4}{2 - 0}$
 $= \frac{-8}{2}$
 $= -4$ or -4

Handwritten:
 $m = -4$
 $b = 4$
 $y = mx + b$
 $y = -4x + 4$
 $\therefore y = -4x + 4$ is the equation of the line.

Annotations:
 This is not just any point on the line... it's the y-INTERCEPT!
 Now we have values for m and b. We can determine $y = mx + b$!
 We still need slope! Use what is given to find m!

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Example 3 - Determine the equation of a line that passes through the points $(1,3)$ and $(4,9)$

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Textbook Assignment

Page 134 # 5 a,c,e, 6 a,c
 Page 135 # 7a,d, 9
 Page 136 # 11 and try 12

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1) Determine the equation of a line with a slope of -2 and passes through the point (4, 3)

$y = mx + b$
 $3 = -2(4) + b$
 $3 + 8 = -8 + 8 + b$
 $11 = b$

$\therefore y = -2x + 11$

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Finding Slope

A) (x_1, y_1)
 B) (x_2, y_2)

$(1, 2)$
 $(4, 8)$

$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} =$

$\frac{8 - 2}{4 - 1} = \frac{6}{3} = 2$

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$y = mx + b$

$y = 2x + b$

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

$\therefore y = 2x + 0$

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$y = mx + b$ $m = 2$

$y = 2x + b$ $(4, 4)$

$4 = 2(4) + b$ $x \ y$

$4 = 8 + b$ $\therefore y = 2x - 4$

$4 - 8 = 8 - 8 + b$

$-4 = b$

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