Activity

2-1 Slope–Intercept Form

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MODEL & DISCUSS

Alani wants to buy a $360 bicycle. She is considering two payment options. The image shows Option A, which consists of making an initial down payment then smaller, equal-sized weekly payments. Option B consists of making 6 equal payments over 6 weeks.

Weekly Bike Payments

A. What factors should Alani take into consideration before deciding between Option A and Option B?

B. Communicate Precisely Suppose Alani could modify Option A and still pay off the bike in 5 weeks. Describe the relationship between the down payment and the weekly payments. MP.6

HABITS OF MIND

Look for Relationships What do you notice about the relationship among the amount of the payment, the number of payments, and the time it takes to pay off the loan? MP.7

Slope-Intercept Form

$y = mx + b$ ← y-intercept • crosses y-axis

slope : $\frac{\text{rise}}{\text{run}}$ ↕ y direction ↔ x direction

ex 1)

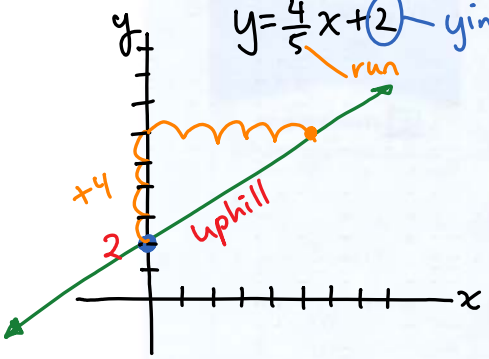
Notes

EXAMPLE 1 **Try It! Graph a Linear Equation**

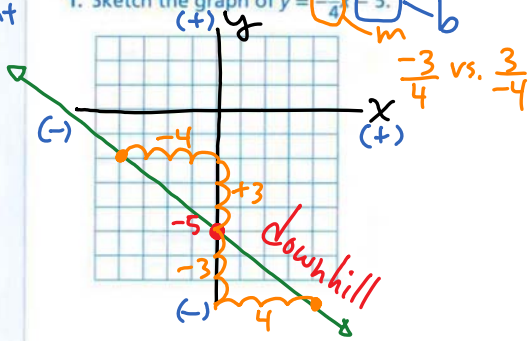
1. Sketch the graph of $y = -\frac{3}{4}x - 5$.

Slope: rise / run

$y = \frac{4}{5}x + 2$ — 2 = y-int; 4 = run; +4 = rise



$-\frac{3}{4}$ vs. $\frac{3}{-4}$

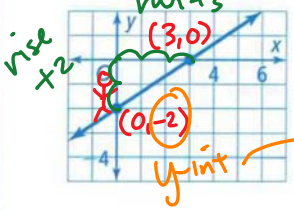


HABITS OF MIND

Reason What do the numbers represent in a linear equation in slope-intercept form? MP.2

EXAMPLE 2 **Try It! Write an Equation from a Graph**

2. Write the equation of the line in slope-intercept form.



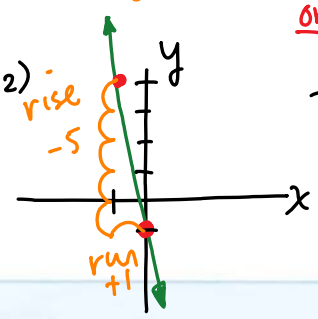
$y = mx + b$?

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

or $y = \frac{2}{3}x - 2$

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

ex2)



$y = mx + b$

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

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

slope

$y = mx + b$ ← y-int

Notes

Assess

EXAMPLE 3 **Try It! Understand Slope-Intercept Form**

3. Write the equation in slope-intercept form of the line that passes through the points (5, 4) and (−1, 6).

$y = mx + b$?

$x_1 y_1$ $x_2 y_2$

$m = \frac{6 - 4}{-1 - 5} \rightarrow \frac{2}{-6}$ or $\frac{1}{-3}$

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

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

$4 = -\frac{5}{3} + b$

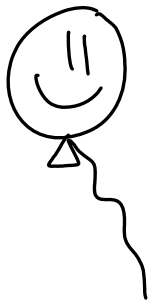
$+\frac{5}{3} \quad +\frac{5}{3}$

$\frac{17}{3} = b$

$\therefore y = -\frac{1}{3}x + \frac{17}{3}$

EXAMPLE 4 **Try It! Interpret Slope and *y*-Intercept**

4. Use information from Example 4 to write the equation in slope-intercept form. Find the *x*-intercept of the graph of the equation. What does the *x*-intercept mean in terms of the situation?



HABITS OF MIND

Construct Arguments How does the slope of a line given in slope-intercept form with a fractional coefficient of *x* compare to the slope of a line with a whole number coefficient of *x*? MP.3

Assess

Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** What information does the slope-intercept form of a linear equation reveal about a line?

slope, y-int

$y = mx + b$

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

2. **Communicate Precisely** How are the graphs of $y = 2x + 1$ and $y = -2x + 1$ similar? How are they different? MP.6

3. **Error Analysis** To graph $y = \frac{2}{3}x + 4$, Emaan plots one point at (0, 4) and a second point 2 units right and 3 units up at (2, 7). He then draws a line through (0, 4) and (2, 7). What error did Emaan make? MP.3

4. **Make Sense and Persevere** When writing the equation of a line in slope-intercept form, how can you determine the value of m in $y = mx + b$ if you know the coordinates of two points on the line? MP.1

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 1}{0 - 3} = \frac{-4}{-3} = \frac{4}{3}$

$m = \frac{4 - -5}{2 - -1} = \frac{4+5}{2+1} = \frac{9}{3} = 3$

Do You KNOW HOW?

Sketch the graph of each equation.

5. $y = 2x - 5$

y-int, slope, $\frac{2}{1}$, up 2, left 1, $+2$, -5

6. $y = -\frac{3}{4}x + 2$

y-int, slope, $\frac{-3}{4}$, down 3, right 4

Identify the slope and y-intercept of the line for each equation.

7. $y = -5x - \frac{3}{4}$ — m: -5, b: $-\frac{3}{4}$

8. $y = \frac{1}{4}x + 5$ — m: $\frac{1}{4}$, b: 5

$y = mx + b$

Write the equation of each line in slope-intercept form.

9. $y = \frac{-2}{1}x + 1$

10. $y = \frac{3}{2}x - 2$

11. A line that passes through (3, 1) and (0, −3)

$y = mx + b$

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

① x y ② x y

$-3 = \frac{4}{3}(0) + b$

$-3 = b$

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

12. A line that passes through (−1, −5) and (2, 4)

① x y ② x y

$y = mx + b$

$y = 3x + b$

$4 = 3(2) + b$

$4 = 6 + b$

$-6 \quad -6$

$-2 = b$

$\therefore y = 3x - 2$

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