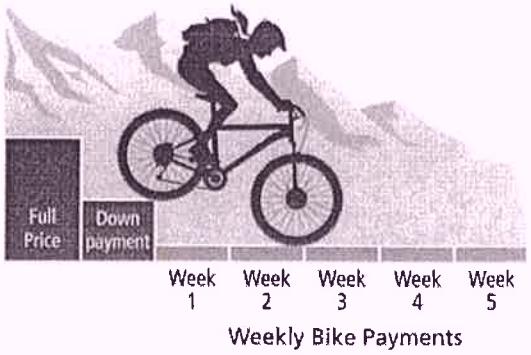
Name: 3rd

Lesson 2.1 – Slope Intercept Form

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.

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



Weekly Bike Payments

B) 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.

Slope rise/fall ↕ / run →

Slope-intercept form

$y = mx + b$

y-intercept $(0, b)$

EXAMPLE 1

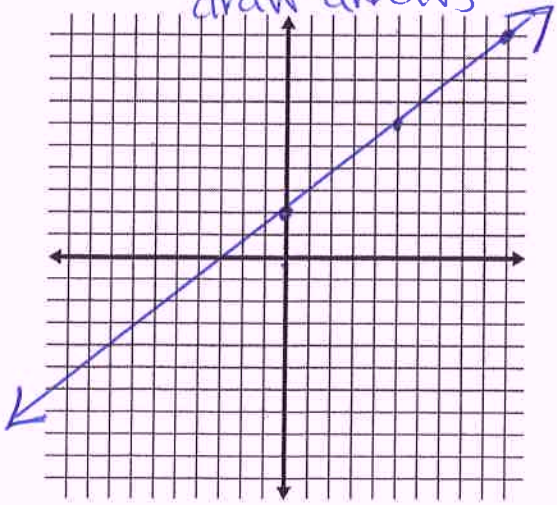
What is the graph of $y = \frac{4}{5}x + 2$?

STEP 1 Identify y-intercept (0,2) plot the point

Step 2 Use the slope to plot 2 more points

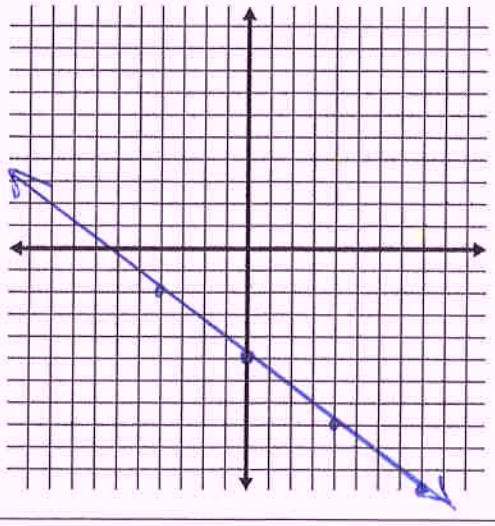
$\frac{4}{5}$ rise 4 run (→) 5

Step 3 Draw a line through points & draw arrows



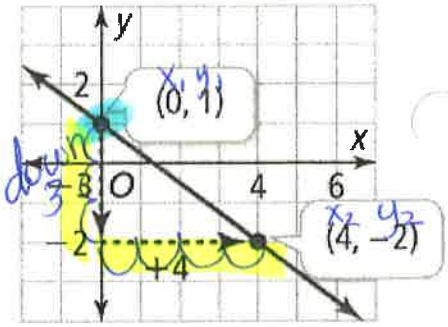
Try it... Graph $y = -\frac{3}{4}x - 5$

down 3 right 4 (0,-5)



EXAMPLE 2

What is the equation of the line in slope-intercept form?



Step 1 Find slope from two points

a) $\frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 1}{4 - 0} = \frac{-3}{4}$ OR b) look at graph $-\frac{3}{4}$

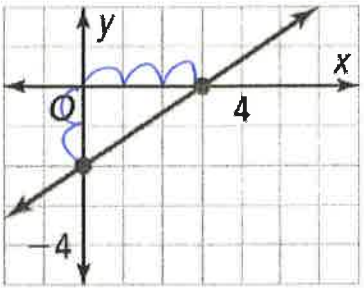
down 3, right 4

Step 2 Find y-intercept (0,1) b=1

Step 3 Write equation

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

Try it... Write the equation in slope-intercept form.



Slope $\frac{2}{3}$

y-int: (0, -2)

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

Example 3

How can you find an equation of a line that passes through two points if neither of them is the y-intercept? Consider the line that passes through the points (-1, -2) and (3, 4).

$x_1\ y_1\ \ x_2\ y_2$

Step 1 Find slope

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

Step 2 Use slope and one of the points to find y-int

(3,4) 3/2

$y = mx + b$

$4 = \frac{3}{2}(3) + b$

$4 = \frac{9}{2} + b$

$4 = 4.5 + b$

$-4.5 \quad -4.5$

$-0.5 = b$

Step 3 Write equation

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

Try it....Write an equation in slope-intercept form for a line that passes through $(5, 4)$ and $(-1, 6)$.

① Slope $\frac{6-4}{-1-5} = \frac{2}{-6} = -\frac{1}{3}$

② y-int $4 = -\frac{1}{3}(5) + b$ or $6 = -\frac{1}{3}(-1) + b$

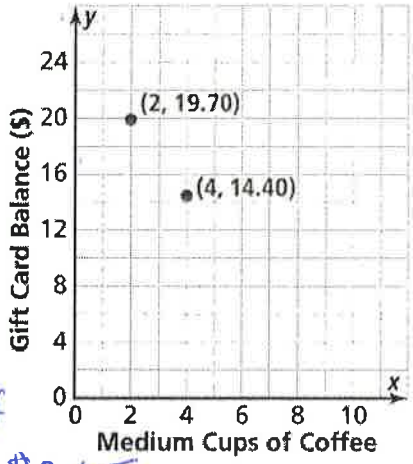
$4 = -\frac{5}{3} + b$ or $6 = \frac{1}{3} + b$

$5.\overline{6} = b$ $5.\overline{6} = b$

③ $y = -\frac{1}{3}x + 5.\overline{6}$

EXAMPLE 4

Allie received a gift card for her local coffee shop. Every time she goes to the shop, she gets a medium coffee. The graph shows the gift card balance at two points. What was the starting balance for the gift card?



Step 1 Interpret the two points

(2, 19.70) → After 2 cups the balance is $19.70

(4, 14.40) → After 4 cups the balance is $14.40

Step 2 Find slope and interpret the meaning

$\frac{19.70 - 14.40}{2 - 4} = \frac{5.3}{-2} = -2.65$ Each cup of coffee cost $2.65

Step 3 What was the starting balance?

$19.70 = -2.65(2) + b$

$19.70 = -5.3 + b$

$+5.3 \quad +5.3$

$b = 25$

Starting balance is $25

Try it... How can Allie determine the number of medium coffees she can buy with the gift card if she does not know the original value of the card?

$\frac{25}{2.65} = 9.4$

9 cups