Writing Linear Equations from a Context

Word problems in Slope-intercept form

When a word problem involves a constant rate or speed and a beginning amount, it can be written in slope-intercept form: $y = mx + b$. To do this, recognize which number will represent m, the rate, and which number will represent b, the y-intercept.

1. An airplane 30,000 feet above the ground begins descending at the rate of 2000 feet per minute. Assume the plane continues at the same rate of descent. The plane's height and minutes above the ground are related to each other.

Identify the variables in this situation: x= time (min) y= height (ft)

What is the given information in this problem (find all that apply)?

y-intercept 30,000. slope −2000 ft/min.

a. Write an equation to model the situation.

$y = -2000x + 30000$

b. Use your equation to find the altitude of the plane after 5 minutes.

$y = ?$ $x = 5$

$y = -2000(5) + 30000$

$= -10{,}000 + 30{,}000 = 20{,}000$ ft.

2. Suppose you receive $100 for a graduation present, and you deposit it in a savings account. Then each week thereafter, you add $5 to the account but no interest is earned. The amount in the account is related to the number of weeks that have passed.

Identify the variables in this situation: x= # of weeks y= Amount ($) bank

What is the given information in this problem (find all that apply)?

y-intercept $100 slope $5/week

a. Find an equation for the amount y you have after x weeks.

$y = 5x + 100$

b. Use your equation to find when you will have $310 in the account.

$x = ?$ $y = 310$

$310 = 5x + 100$

$310 - 100 = 5x$

$210 = 5x$

$\frac{210}{5} = \frac{5x}{5}$

$x = 42$

∴ I will have $310 in 42 weeks.

MORE WORD PROBLEM PRACTICE:

1. Nick is given $50 to spend on a vacation . He decides to spend $5 a day. The amount Nick has left and the number of days are related.

Identify the variables in this situation: x= #days y= Amount ($) left

What is the given information in this problem (find all that apply)?
y-intercept $50 slope −$5/day

a. Write an equation relating *x* and *y*.

$y = -5x + 50$

b. Use your equation to find out when Nick will have $15 left.

$x = ?$ $y = \$15$

$15 = -5x + 50$
$15 - 50 = -5x$
$-35 = -5x$
$7 = x$

∴ Nick will have $15 left after 7 days.

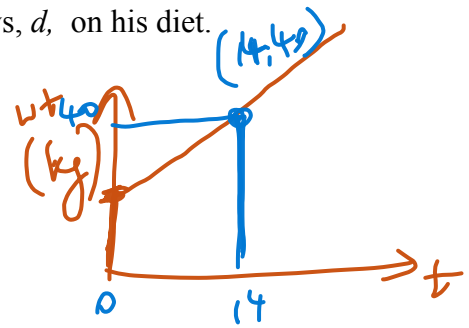
2. Julio plans a diet to gain 0.2 kg a day. After 14 days he weighs 40 kg. The number of days he diets and his weight are related.

Identify the variables in this situation: x= # of days y= weight (kg)

What is the given information in this problem (find all that apply)?
y-intercept 37.2 slope 0.2kg/day

a. Write an equation relating Julio's weight , *w*, to the number of days, *d*, on his diet.

$y = 0.2x + 37.2$



b. Howlong will it take Julio to reach his goal weight of 50 kg?

$x = ?$ $y = 50$

$50 = 0.2x + 37.2$
$50 - 37.2 = 0.2x$
$12.8 = 0.2x$
$0.2 \quad 0.2$
$64 = x$

∴ Julio gains 50kg in 64 days.

$y = mx + b$
$40 = 0.2(14) + b$
$40 = 2.8 + b$
$40 - 2.8 = b$
$37.2\text{kg} = b$