

Example 1

Word Problems

Water pressure can be measured in atmospheres (atm). Write an equation that models the pressure Y at a depth of x meters. What graph models the pressure?

At 0 meters, the pressure is 1 atm.

The pressure increases by 0.1 atm/m.

Step 1: Identify the slope and y intercept

Slope = rate of change = 0.1 atm/m

y-intercept = beginning value = 1 atm

Step 2: Substitute m and y-intercept into $y = mx + b$

$$y = 0.1x + 1$$

Step 3: Graph the equation

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$$y = 0.1x + 1$$

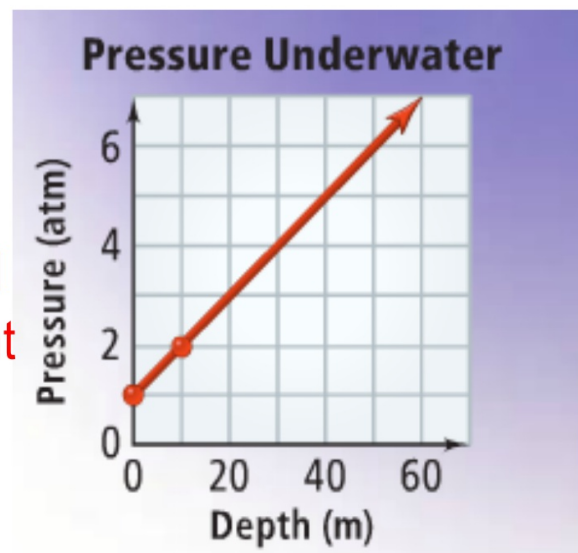
Step 3: Graph the equation

y-intercept = 1 \therefore plot (0,1)

Slope is $0.1 = \frac{1}{10}$

Plot a second point 1 unit up and 10 units to the right

Draw a line



The table shows the altitude of a hot-air balloon during its linear descent. What equation in slope-intercept form gives the balloon's altitude at any time. What do the slope and y-intercept represent?

Example 2:

Hot-Air Balloon Descent

Time, x (s)	Altitude, y (m)
10	640
30	590
70	490
90	440

Step 1: Find the slope. Pick two points

$$m = \frac{590 - 640}{30 - 10} = -2.5$$

Step 2: Substitute into point - slope form

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

$$y - 640 = -2.5(x - 10)$$

Step 3: Rewrite in slope-intercept form

$$y = -2.5x + 665$$

Slope -2.5 = rate of descent of the balloon in meters/second
y-intercept 665 is the initial altitude of the balloon in meters

Example 3

Online Shopping A media download store sells songs for \$1 each and movies for \$12 each. You have \$60 to spend. Write and graph an equation that describes the items you can purchase. What are three combinations of numbers of songs and movies you can purchase?

Define Let x = the number of songs purchased.

Let y = the number of movies purchased.

Relate cost of a song times number of songs plus cost of a movie times number of movies equals \$60

Write $1 \cdot x + 12 \cdot y = 60$

$$x + 12y = 60.$$

Find the intercepts.

$$x + 12y = 60$$

$$x + 12(0) = 60$$

$$x = 60$$

$$x + 12y = 60$$

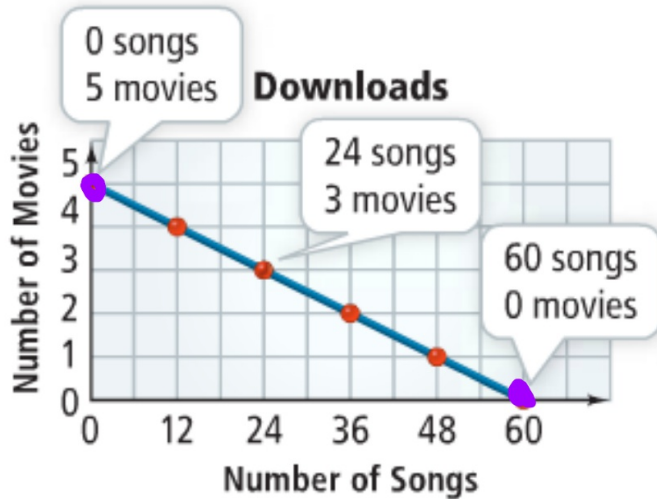
$$0 + 12y = 60$$

$$y = 5$$

$$x + 12y = 60.$$

Find the intercepts.

$$\begin{array}{l} x + 12y = 60 \\ x + 12(0) = 60 \\ x = 60 \end{array} \qquad \begin{array}{l} x + 12y = 60 \\ 0 + 12y = 60 \\ y = 5 \end{array}$$



The intercepts give you two combinations of songs and movies. Use the graph to identify a third combination. Each of the red points is a possible solution.

Use the intercepts to draw the graph. Only points in the first quadrant make sense.

Your turn:

1. A plumber charges a \$65 fee for a repair plus \$35 per hour. Write an equation to model the total cost y of repair that takes x hours. What graph models the total cost?

2. a. The table shows the number of gallons of water y in a tank after x hours. The relationship is linear. What is an equation in point-slope form that models the data? What does the slope represent?
- b. **Reasoning** Write the equation from part (a) in slope-intercept form. What does the y -intercept represent?

Volume of Water in Tank

Time, x (h)	Water, y (gal)
2	3320
3	4570
5	7070
8	10,820

3. A store sells gift cards in present amounts. You can purchase gift cards for \$10 or \$25. You have spent \$285 on gift cards. Write an equation in standard form to represent this situation. What are three combinations of gift cards you could have purchased?