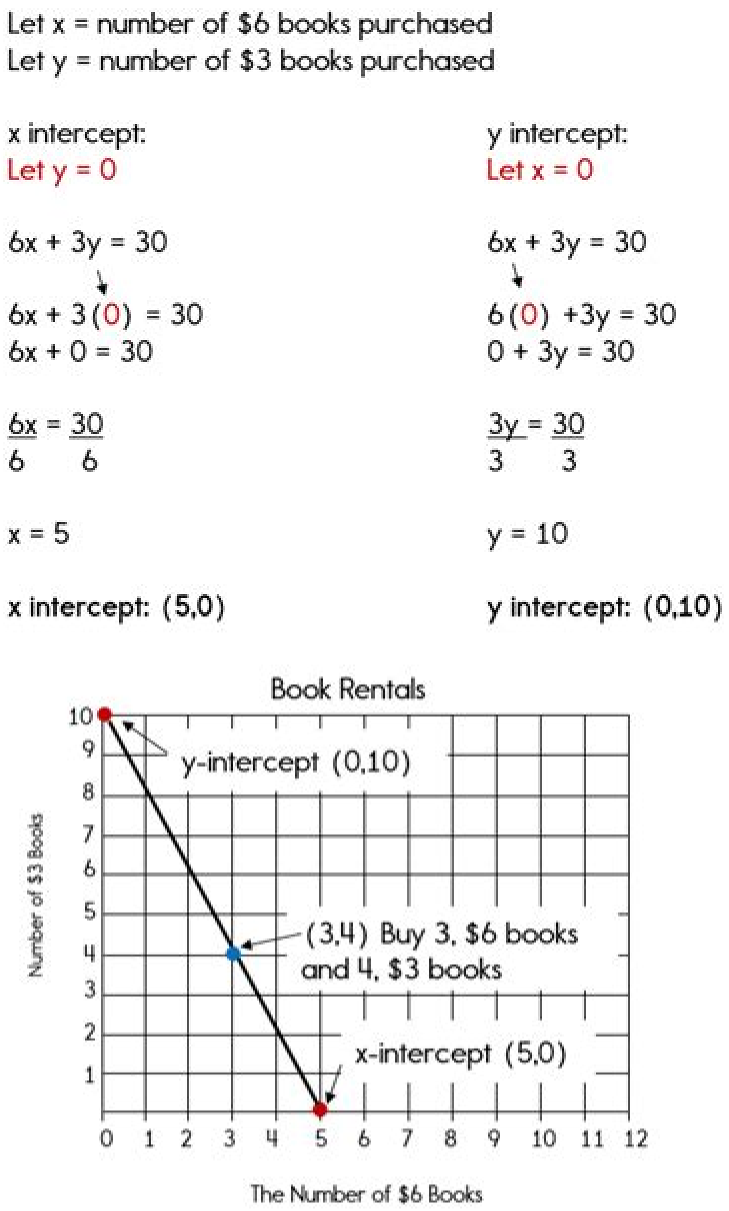
Y Intercept Practice Problems



Let x = number of \$6 books purchased
Let y = number of \$3 books purchased

x intercept:
Let $y = 0$

$6x + 3y = 30$

$6x + 3(0) = 30$
$6x + 0 = 30$

$\frac{6x}{6} = \frac{30}{6}$

$x = 5$

x intercept: (5,0)

y intercept:
Let $x = 0$

$6x + 3y = 30$

$6(0) + 3y = 30$
$0 + 3y = 30$

$\frac{3y}{3} = \frac{30}{3}$

$y = 10$

y intercept: (0,10)

Y intercept practice problems are an essential part of understanding linear equations and graphing functions. The y-intercept is the point where a line crosses the y-axis, and it plays a critical role in the analysis of linear relationships. This article will delve into the concept of y-intercepts, outline methods for finding them, and provide a variety of practice problems to reinforce your understanding.

Understanding the Y-Intercept

The y-intercept is the value of y when x equals zero in a linear equation. In the standard form of a linear equation, which is often written as \(y = mx + b\), the term \(b\) represents the y-intercept. Here, \(m\) is the slope of the line, and it indicates how steep the line is.

Identifying the Y-Intercept

To identify the y-intercept from a linear equation, follow these steps:

1. Set x to zero: Since the y-intercept occurs where the line crosses the y-axis, substitute \(x = 0\) into the equation.
2. Solve for y: After substituting, solve the equation to find the value of \(y\).
3. Interpret the result: The resulting value of \(y\) is your y-intercept, which can be expressed as the coordinate \((0, b)\).

Graphing with the Y-Intercept

When graphing a linear equation, the y-intercept is a crucial starting point. Here’s how to graph a line using the y-intercept:

1. Plot the y-intercept: Begin by plotting the point on the graph where the line crosses the y-axis.
2. Use the slope: From the y-intercept, use the slope \(m\) to determine another point on the line. If the slope is a fraction \(\frac{rise}{run} \), move up or down (rise) and then left or right (run) accordingly.
3. Draw the line: Connect the points to form the line.

Practice Problems

Now that you have a solid understanding of the y-intercept, it’s time to put your knowledge to the test. Below are various practice problems that will help you master finding and interpreting y-intercepts.

Finding the Y-Intercept from Equations

Problem 1: Find the y-intercept of the equation \(y = 3x + 6\).

- Solution:
1. Set \(x = 0\).
2. Substitute: \(y = 3(0) + 6\).
3. Solve: \(y = 6\).
4. The y-intercept is \((0, 6)\).

Problem 2: Determine the y-intercept of the equation \(2y - 4x = 8\).

- Solution:
1. Rearrange the equation to solve for \(y\):
\[
2y = 4x + 8 \implies y = 2x + 4
\]

2. Set \(x = 0\):
\[
y = 2(0) + 4 \implies y = 4
\]
3. The y-intercept is \((0, 4)\).

Problem 3: What is the y-intercept of the line described by the equation \(y = -\frac{1}{2}x - 3\)?

- Solution:
1. Set \(x = 0\).
2. Substitute: \(y = -\frac{1}{2}(0) - 3\).
3. Solve: \(y = -3\).
4. The y-intercept is \((0, -3)\).

Finding the Y-Intercept from Graphs

Problem 4: Given a graph of the line passing through points \((0, 2)\) and \((4, 0)\), identify the y-intercept.

- Solution:
- The point where the line crosses the y-axis is \((0, 2)\), so the y-intercept is \(2\).

Problem 5: A line crosses the y-axis at the point \((0, -5)\). What is the y-intercept?

- Solution:
- The y-intercept is already given as \(-5\).

Working with Real-World Problems

Problem 6: A company’s revenue \(R\) in thousands of dollars can be modeled by the equation \(R = 150x + 200\), where \(x\) is the number of years since the company was founded. Find the y-intercept and explain its significance.

- Solution:
1. Set \(x = 0\):
\[
R = 150(0) + 200 = 200
\]
2. The y-intercept is \((0, 200)\).
3. Significance: This means that when the company was founded (0 years), its initial revenue was $200,000.

Problem 7: A cyclist travels at a constant speed, and the distance \(d\) in miles covered after \(t\) hours can be represented by the equation \(d = 12t + 5\). What does the y-intercept represent in this context?

- Solution:

1. Set $t = 0$:

$$
d = 12(0) + 5 = 5
$$

2. The y-intercept is $(0, 5)$.
3. Significance: This indicates that the cyclist starts the trip with an initial distance of 5 miles already covered (perhaps from a previous trip or starting point).

Summary and Conclusion

In this article, we explored the concept of the y-intercept, discussed methods for determining it from equations and graphs, and provided practice problems to solidify your understanding. The y-intercept is not only a fundamental aspect of graphing linear equations but also has practical applications in various fields such as business, science, and everyday life.

Mastering the y-intercept will enhance your ability to analyze and interpret linear relationships, paving the way for more advanced topics in algebra and beyond. Keep practicing with various types of problems to build confidence and proficiency!

Frequently Asked Questions

What is the y-intercept in a linear equation?

The y-intercept is the point where a line crosses the y-axis, represented as (0, b) in the equation y = mx + b, where b is the y-intercept.

How can I find the y-intercept from a given linear equation in slope-intercept form?

In the slope-intercept form y = mx + b, the y-intercept is directly given as the value of b.

How do I determine the y-intercept from a table of values?

To find the y-intercept from a table, look for the row where the x-value is 0. The corresponding y-value will be the y-intercept.

Can I find the y-intercept from two points on a line?

Yes, you can find the y-intercept by first calculating the slope (m) using the two points, then using the slope-intercept form to solve for b.

What is the y-intercept of the equation 3x - 2y = 6?

To find the y-intercept, set x = 0. The equation becomes -2y = 6, so y = -3. Thus, the y-intercept is (0, -3).

In a word problem, how can I identify the y-intercept?

Look for the initial value or the starting point in the context of the problem; this value often represents the y-intercept.

What is the significance of the y-intercept in real-world scenarios?

The y-intercept often represents the initial condition or starting value before any changes occur, making it crucial for interpreting graphs in real-world context.

How do you graph the y-intercept on a coordinate plane?

To graph the y-intercept, locate the point (0, b) on the y-axis, where b is the y-intercept, and plot it on the graph.

Are there any special cases for the y-intercept in equations of vertical lines?

Vertical lines do not have a y-intercept because they do not cross the y-axis; they are represented by equations of the form x = k, where k is a constant.

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