

Find The X- And Y-intercepts Of The Graph Of $4x + 7y = 36$. State Each answer As An Integer Or An Improper

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Understanding how to find the x- and y-intercepts of a linear equation is fundamental in graphing and analyzing algebraic functions. The intercepts represent the points where the graph crosses the axes, providing insight into the behavior and position of the line or curve. In this article, we will explore the process of determining the intercepts for the equation $4x + 7y = 36$, illustrating each step clearly and thoroughly.

What Are X- and Y-intercepts?

Before diving into calculations, it's essential to grasp what intercepts are:

X-intercept

The x-intercept is the point where the graph crosses the x-axis. At this point, the value of y is zero because the point lies directly on the x-axis.

Y-intercept

Conversely, the y-intercept is where the graph crosses the y-axis, with the x-coordinate equal to zero.

Knowing these intercepts allows us to sketch the graph accurately and understand the linear equation's behavior in the coordinate plane.

Equation Under Consideration: $4x + 7y = 36$

Our goal is to find the x- and y-intercepts for the equation:

$$4x + 7y = 36$$

We will approach this systematically, applying the standard methods for calculating intercepts.

Finding the X-Intercept

To find the x-intercept, follow these steps:

Step 1: Set y to zero

Since the x-intercept occurs where $y = 0$, substitute $y = 0$ into the equation:

$$4x + 7(0) = 36$$

This simplifies to:

$$4x + 0 = 36$$

Step 2: Solve for x

Divide both sides of the equation by 4:

$$4x / 4 = 36 / 4$$

$$x = 9$$

Result: X-intercept is at (9, 0)

Therefore, the x-intercept is at the point:

$$(9, 0)$$

This is an integer coordinate point where the graph crosses the x-axis.

Finding the Y-Intercept

Similarly, to find the y-intercept:

Step 1: Set x to zero

Since the y-intercept occurs where $x = 0$, substitute $x = 0$ into the equation:

$$4(0) + 7y = 36$$

Simplifies to:

$$0 + 7y = 36$$

Step 2: Solve for y

Divide both sides by 7:

$$7y / 7 = 36 / 7$$

$$y = 36/7$$

Result: Y-intercept is at (0, 36/7)

Expressed as an improper fraction, the y-intercept is at:

$$(0, 36/7)$$

Since the problem asks for each answer as an integer or an improper fraction, $36/7$ qualifies as an improper fraction.

Summary of Intercepts

Intercept Type	Coordinates	Explanation
X-intercept	(9, 0)	Found by setting $y = 0$ and solving for x
Y-intercept	(0, $36/7$)	Found by setting $x = 0$ and solving for y

Graphing the Equation Using the Intercepts

Having identified the intercepts, plotting the graph becomes straightforward:

- Plot the x-intercept at (9, 0)
- Plot the y-intercept at (0, $36/7$)

Since the equation is linear, connecting these two points will produce the line representing the equation $4x + 7y = 36$.

Additional Insights and Tips for Finding Intercepts

Understanding the process of finding intercepts is vital in various contexts, such as:

- Sketching linear graphs quickly
- Interpreting real-world data modeled by linear equations
- Solving systems of equations visually

Here are some tips to remember:

- Always set the other variable to zero when finding an intercept.
- For the x-intercept, set $y = 0$; for the y-intercept, set $x = 0$.
- Handle fractions carefully to ensure accuracy, especially in the y-intercept calculation.
- If the resulting value is a fraction, express it as an improper fraction unless simplified further.

Practice Problems

To reinforce your understanding, try solving similar problems:

1. Find the x- and y-intercepts of $3x - 4y = 12$.
2. Determine the intercepts for the equation $y = (2/3)x + 5$.
3. For the equation $5x + 2y = 10$, find the intercepts and graph the line.

Conclusion

In summary, the intercepts of the equation $4x + 7y = 36$ are:

- X-intercept at $(9, 0)$
- Y-intercept at $(0, 36/7)$

Knowing how to find these points allows for quick graphing, analysis, and interpretation of linear equations. Remember to set the appropriate variable to zero, solve for the other, and express your answers as integers or improper fractions as required. Mastery of this fundamental skill enhances your overall understanding of linear functions and prepares you for more advanced topics in algebra and calculus.

By practicing these steps regularly, you'll develop confidence in solving intercept problems efficiently and accurately, which is essential for both academic success and practical applications in fields like engineering, economics, and data analysis.

Frequently Asked Questions

What are the x-intercepts of the graph of $4x + 7y = 36$?

$x = 9$ when $y = 0$, so the x-intercept is $(9, 0)$.

How do you find the y-intercept of the equation $4x + 7y = 36$?

Set $x = 0$ and solve for y : $7y = 36$, so $y = 36/7$.

Are the intercepts of the equation $4x + 7y = 36$ rational or integers?

The x-intercept is an integer (9), but the y-intercept is an improper fraction ($36/7$).

What is the x-intercept of the graph of $4x + 7y = 36$?

The x-intercept is (9, 0).

What is the y-intercept for the equation $4x + 7y = 36$?

The y-intercept is (0, $36/7$).

Can the x-intercept of $4x + 7y = 36$ be expressed as an improper fraction?

No, the x-intercept is an integer (9), which is also an improper fraction, but typically expressed as $9/1$.

What steps are involved in finding the y-intercept of $4x + 7y = 36$?

Set $x = 0$, then solve $7y = 36$ to find $y = 36/7$.

Is the y-intercept of the graph of $4x + 7y = 36$ a rational number?

Yes, the y-intercept is $36/7$, which is a rational number.

Additional Resources

Find The X- And Y-intercepts Of The Graph Of $4x - 7y = 36$ is a fundamental skill in algebra that helps us understand the graph of a linear equation. Identifying the intercepts allows us to quickly sketch the graph and analyze the behavior of the line. In this guide, we will explore step-by-step how to find both the x-intercept and y-intercept for the given equation, ensuring clarity and precision in each step. Whether you're a student preparing for exams or someone brushing up on algebra skills, mastering this process will provide a solid foundation for graphing linear equations.

Understanding Intercepts in a Linear Equation

Before diving into the calculations, let's clarify what x-intercept and y-intercept mean:

- X-intercept: The point(s) where the graph crosses the x-axis. At this point, the y-value is zero.
- Y-intercept: The point(s) where the graph crosses the y-axis. At this point, the x-value is zero.

Knowing these intercepts allows you to quickly sketch the line without plotting every point.

The Given Equation: $4x - 7y = 36$

Our goal is to find the x- and y-intercepts of the graph represented by the equation:

$$4x - 7y = 36$$

This is a linear equation in standard form, which makes it straightforward to find the intercepts by applying simple substitutions.

Step-by-Step Guide to Find the Intercepts

1. Finding the X-Intercept

Definition: To find the x-intercept, set $y = 0$ in the equation and solve for x.

Step 1: Substitute $y = 0$ into the equation:

$$4x - 7(0) = 36$$

Step 2: Simplify:

$$4x - 0 = 36$$

$$4x = 36$$

Step 3: Solve for x:

$$x = 36 / 4$$

$$x = 9$$

Result: The x-intercept is at (9, 0).

2. Finding the Y-Intercept

Definition: To find the y-intercept, set $x = 0$ in the equation and solve for y.

Step 1: Substitute $x = 0$ into the equation:

$$4(0) - 7y = 36$$

Step 2: Simplify:

$$0 - 7y = 36$$

$$-7y = 36$$

Step 3: Solve for y:

$$y = 36 / -7$$

$$y = -36/7$$

Since the problem asks for answers as an integer or an improper fraction, our result $-36/7$ is acceptable.

Result: The y-intercept is at $(0, -36/7)$.

Summary of Intercepts

- X-intercept: $(9, 0)$
- Y-intercept: $(0, -36/7)$

These points are critical for graphing the line, as they mark where the line crosses the axes.

Visualizing the Graph

Using the intercepts, you can sketch the graph:

- Plot the point $(9, 0)$ on the x-axis.
- Plot the point $(0, -36/7)$ on the y-axis.
- Draw a straight line passing through these points.

This line represents the equation $4x - 7y = 36$.

Additional Tips and Considerations

Handling Improper Fractions

- When the y-intercept yields an improper fraction, as in $-36/7$, it's often helpful to convert it to a mixed number for better visualization:

$$-36/7 = -5 \frac{1}{7}$$

- However, for graphing and calculations, keeping the improper fraction maintains precision.

Verifying the Intercepts

- To verify the points, substitute x and y back into the original equation:

- For $x = 9, y = 0$:

$$4(9) - 7(0) = 36 \rightarrow 36 = 36 \checkmark$$

- For $x = 0, y = -36/7$:

$$4(0) - 7(-36/7) = 36 \rightarrow 0 + 36 = 36 \checkmark$$

Extending the Practice

- Try finding intercepts for other linear equations to strengthen your understanding.
- Practice with different forms: slope-intercept form ($y = mx + b$) and standard form ($Ax + By = C$).

Frequently Asked Questions

Q1: What if the x-intercept or y-intercept is not an integer?

A1: It's common for intercepts to be fractions, especially in equations with coefficients that do not divide evenly. Always express your answer as an improper fraction or mixed number, as required.

Q2: Can an equation have no intercepts?

A2: Yes, if the line is parallel to an axis or does not cross the axes (e.g., a vertical line with no y-intercept), then intercepts may not exist or may be undefined.

Q3: Why is finding intercepts useful?

A3: Intercepts provide quick points to sketch the graph and understand the behavior of the line without plotting numerous points.

Final Thoughts

Finding the x- and y-intercepts of the graph of an equation like $4x - 7y = 36$ is a fundamental skill that enhances your understanding of linear functions and their graphs. By substituting 0 into the equation for each variable, you can quickly determine the intercepts, which serve as valuable reference points in graphing. Remember to express your answers as integers or improper fractions, and verify your solutions for accuracy. Mastering this process will make you more confident in analyzing linear equations and interpreting their graphs.

Practice Exercise:

Find the x- and y-intercepts of the equation $3x + 2y = 12$.

Solution:

- X-intercept: set $y=0 \rightarrow 3x=12 \rightarrow x=4$, so $(4,0)$.
- Y-intercept: set $x=0 \rightarrow 2y=12 \rightarrow y=6$, so $(0,6)$.

Keep practicing to improve your skills!

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