# Graph A Line That Contains The Point (-2,7) And Has A Slope Of 4.Plz Help Plzzz

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Understanding how to graph a line given a specific point and slope is a fundamental skill in algebra and coordinate geometry. In this article, we will explore the step-by-step process to graph such a line, examine the mathematical principles involved, and provide practical examples to solidify your understanding. Whether you're a student learning to plot lines or someone seeking to enhance your algebraic skills, this comprehensive guide will help you grasp the concepts thoroughly.

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## Understanding the Basic Concepts

### What Is a Slope?

The slope of a line indicates its steepness and direction. It is usually represented by the letter 'm' and is calculated as the ratio of the change in y-values to the change in x-values between two points on the line:

$$
m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}
$$

A positive slope means the line rises as it moves from left to right, while a negative slope indicates it falls. A slope of 4 signifies a steep incline where, for every 1 unit increase in x, y increases by 4 units.

### Point-Slope Form of a Line

The point-slope form is an algebraic way to express the equation of a line when you know a point on the line and its slope:

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

Here, $(x_1, y_1)$ is a point on the line, and $m$ is the slope. This form is particularly useful for graphing because it directly incorporates the known point and slope.

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# Applying the Concepts to the Given Data

## Given Point and Slope

- Point: $(-2, 7)$
- Slope: $4$

Using these, we can write the equation of the line in point-slope form:

$$
y - 7 = 4(x + 2)
$$

Note: Since the point is $(-2, 7)$, we substitute $x_1 = -2$ and $y_1 = 7$.

## Converting to Slope-Intercept Form

To make graphing easier, it's often helpful to convert the equation into the slope-intercept form $y = mx + b$:

$$
y - 7 = 4(x + 2)
$$
$$
y - 7 = 4x + 8
$$
$$
y = 4x + 8 + 7
$$
$$
y = 4x + 15
$$

This equation indicates that the line has a y-intercept at $(0, 15)$ and maintains a slope of 4.

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# Step-by-Step Guide to Graph the Line

## Step 1: Plot the Known Point

Begin by plotting the point $(-2, 7)$ on the coordinate plane:
- Move 2 units left from the origin along the x-axis.
- Move 7 units up along the y-axis.
- Mark this point with a dot.

## Step 2: Use the Slope to Find a Second Point

Since the slope $m = 4$, it indicates that for each 1 unit increase in x, y

increases by 4 units.

- From the point $(-2, 7)$, move:
- 1 unit to the right: x changes from −2 to −1.
- 4 units up: y changes from 7 to 11.
- Plot the second point at $(-1, 11)$.

Alternatively, you can move left and down using negative slope or other combinations, as long as the ratio remains consistent.

### Step 3: Draw the Line

Using a ruler, draw a straight line passing through the two points:
- Confirm the line extends beyond the points.
- Ensure the line is straight and smooth.

### Step 4: Verify with the Equation

Pick another point on the line (for example, the y-intercept at $(0, 15)$):
- When $x = 0$,
- $y = 4(0) + 15 = 15$,
which confirms the point $(0, 15)$ lies on the line.

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## Additional Tips for Graphing

### Creating a Table of Values

Constructing a table helps visualize the line:

| $x$ | $y = 4x + 15$ | Points |
|---|---|---|
| −3 | 4(−3) + 15 = 3 | $(-3, 3)$ |
| −2 | 4(−2) + 15 = 7 | $(-2, 7)$ (known point) |
| −1 | 4(−1) + 15 = 11 | $(-1, 11)$ |
| 0 | 4(0) + 15 = 15 | $(0, 15)$ |
| 1 | 4(1) + 15 = 19 | $(1, 19)$ |

Plot these points on the coordinate plane and draw the line through them.

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## Understanding the Equation of the Line

### Interpretation of the Slope and Intercept

- Slope (4): For every increase of 1 in $x$, $y$ increases by 4.
- Y-intercept (15): The point where the line crosses the y-axis at $(0, 15)$.

### Graphical Significance

The line's steepness reflects the slope, and the intercept indicates where the line meets the y-axis. This information helps in quickly sketching the graph without plotting numerous points.

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## Practical Applications and Related Concepts

### Real-World Examples

- Economics: The line could represent a cost function where the slope indicates variable cost per unit.
- Physics: The line might model velocity over time if the velocity increases linearly.

### Related Concepts

- Parallel lines: Lines with the same slope but different intercepts.
- Perpendicular lines: Lines with slopes that are negative reciprocals of each other (e.g., slope 4 and slope $-\frac{1}{4}$).

### Extensions and Challenges

- Graphing lines with negative slopes.
- Finding the equation of a line given two points.
- Understanding the significance of different forms of linear equations.

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## Conclusion

Graphing a line that passes through a specific point and has a known slope involves understanding the fundamental principles of linear equations. Starting with the point-slope form and converting to slope-intercept form simplifies the process. Plotting the initial point, using the slope to find additional points, and drawing a straight line through these points are core steps in the process. Mastery of these techniques enhances your ability to visualize and interpret linear relationships in various contexts.

By practicing these steps with different points and slopes, you'll develop greater confidence and precision in graphing lines, a vital skill in algebra, calculus, and numerous real-world applications.

## Frequently Asked Questions

## How do I find the equation of a line that passes through the point (-2, 7) with a slope of 4?

Use the point-slope form: $y - y_1 = m(x - x_1)$. Plugging in the point (-2, 7) and slope 4: $y - 7 = 4(x + 2)$. Simplify to get the slope-intercept form: $y = 4x + 15$.

## What is the slope-intercept form of the line passing through (-2, 7) with slope 4?

The line's equation in slope-intercept form is $y = 4x + 15$.

## How can I graph the line that passes through (-2, 7) and has a slope of 4?

Start by plotting the point (-2, 7). From there, use the slope 4 (rise over run) to find another point: go up 4 units and right 1 unit to ( -1, 11 ). Draw a line through these points.

## What is the significance of the point (-2, 7) in the line's equation?

The point (-2, 7) is a specific point that the line passes through, serving as a reference point to determine the line's equation.

## Can I verify the line's equation by plugging in the point (-2, 7)?

Yes. Substituting $x = -2$ into $y = 4x + 15$ gives $y = 4(-2) + 15 = -8 + 15 = 7$, which matches the point (-2, 7).

## What is the general form of the line passing through (-2, 7) with slope 4?

The general form can be written as $y - 7 = 4(x + 2)$, or expanded to $y = 4x + 15$.

## If I change the point to (0, y), how does the equation change?

Since the original point is (-2, 7), changing the point to (0, y) would change the line's position. To find the new equation, you'd need the new point. The original line's equation remains $y = 4x + 15$.

## What does the slope of 4 tell me about the line's steepness?

A slope of 4 indicates the line rises 4 units vertically for every 1 unit it moves horizontally, making it relatively steep.

## Is the line with slope 4 passing through (-2, 7) unique?

Yes. Given a point and a slope, there is exactly one line passing through that point with that slope.

## How can I check if a given point lies on this line?

Substitute the point's x-coordinate into the line's equation $y = 4x + 15$ and see if the resulting y matches the point's y-coordinate. For example, for $x = -2$: $y = 4(-2) + 15 = -8 + 15 = 7$, which matches, so the point $(-2, 7)$ lies on the line.

# Additional Resources

Graph A Line That Contains The Point (-2, 7) And Has A Slope Of 4 is a fundamental concept in algebra and coordinate geometry that offers insight into the behavior of linear functions. Understanding how to plot and analyze such a line is essential for students, educators, and anyone interested in mathematical visualization. This topic combines the basic principles of algebra with practical graphing techniques, making it both an educational cornerstone and a useful skill in various applications.

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# Understanding the Basics of Linear Equations

Linear equations are mathematical expressions that model straight lines on a coordinate plane. They are generally written in the form:

$$ y = mx + b $$

where:
- $m$ is the slope of the line,
- $b$ is the y-intercept (the point where the line crosses the y-axis).

In the case of our specific line, the slope $m$ is given as 4, and the line must pass through the point $(-2, 7)$. Understanding how these components work together is key to graphing and analyzing the line effectively.

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# Deriving the Equation of the Line

## Using Point-Slope Form

The most straightforward method to find the equation of a line when given a point and a slope is the point-slope form:

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

where:
- $(x_1, y_1)$ is a point on the line,
- $m$ is the slope.

Given:
- Point $(-2, 7)$,
- Slope $m = 4$.

Substituting these into the point-slope form:

$$y - 7 = 4(x - (-2))$$
$$y - 7 = 4(x + 2)$$

Expanding the right side:

$$y - 7 = 4x + 8$$

Adding 7 to both sides:

$$y = 4x + 8 + 7$$
$$y = 4x + 15$$

Therefore, the equation of the line is:

$$y = 4x + 15$$

This is the explicit form of the line passing through $(-2, 7)$ with a slope of 4.

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# Graphing the Line

## Plotting Key Points

To graph the line accurately, start with the key components:

- Y-intercept: The point where the line crosses the y-axis, which occurs at $y = 15$ when $x = 0$. Plot this point at $(0, 15)$.
- Point $(-2, 7)$: Already given, and it should lie on the line. To verify, substitute $x = -2$:

$$y = 4(-2) + 15 = -8 + 15 = 7$$

which confirms the point.

- Additional points: To get a clearer graph, choose more $x$ values, such as $x = 1$:

$$y = 4(1) + 15 = 4 + 15 = 19$$

Plot at $(1, 19)$.

Similarly, for $x = -3$:

$$ y = 4(-3) + 15 = -12 + 15 = 3 $$

Plot at (−3, 3).

### Drawing the Line

After plotting these points:

- (0, 15),
- (−2, 7),
- (1, 19),
- (−3, 3),

connect them with a straight line. The line should extend infinitely in both directions, passing through all these points, with a consistent slope of 4.

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## Features and Characteristics of the Line

### Slope and Its Significance

The slope $m = 4$ indicates that for every increase of 1 in $x$, $y$ increases by 4. This steepness shows that the line rises rapidly as $x$ increases. The positive slope signifies an upward trend from left to right.

Features:
- Steepness: The line is relatively steep.
- Direction: Ascends from left to right.
- Rate of change: $\Delta y = 4 \times \Delta x$.

### Y-Intercept and Its Role

The y-intercept at $(0, 15)$ is where the line crosses the y-axis. It provides an initial point from which the line extends, and it helps in quick graphing.

Features:
- Acts as a reference point.
- Useful for quick sketching.
- Represents the value of $y$ when $x = 0$.

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## Applications and Real-World Relevance

Understanding how to graph and analyze lines like this one has numerous

practical applications:

- Physics: Linear relationships between variables, such as constant velocity over time.
- Economics: Cost functions with fixed starting costs plus variable costs.
- Engineering: Stress-strain graphs and other linear models.
- Statistics: Regression lines indicating relationships between variables.

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## Pros and Cons of Graphing a Line with a Known Point and Slope

Pros:

- Simplicity: Using point-slope form makes it straightforward to derive the equation.
- Visualization: Graphing helps in visual understanding of data relationships.
- Predictability: Knowing the slope and a point allows for easy plotting of additional points.
- Application: Fundamental for modeling real-world phenomena.

Cons:

- Limited to Linear Data: Not applicable for non-linear relationships.
- Errors in Plotting: Mistakes in plotting points can lead to incorrect graphs.
- Requires Accurate Calculation: Slight miscalculations can distort the line.

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## Common Challenges and Tips

- Ensuring Correct Plotting: Always verify points by plugging $x$ values into the equation.
- Choosing Appropriate Values: Select $x$ values that make calculations simple and accurate.
- Extending the Line: Remember that the line extends infinitely; use arrows when sketching.
- Understanding the Slope: Visualize the slope as a ratio, which helps in quick sketching.

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## Conclusion and Summary

Graphing a line that contains the point $(-2, 7)$ with a slope of 4 is a foundational skill in algebra that combines conceptual understanding with practical application. By deriving the equation $y = 4x + 15$, plotting key points, and understanding the significance of the slope and y-intercept,

students can develop a comprehensive grasp of linear functions. This knowledge not only aids in academic pursuits but also provides tools for analyzing real-world data and relationships.

Mastering this concept involves recognizing the importance of the slope and point in defining a line, practicing accurate plotting, and understanding how the line behaves across the coordinate plane. Whether for academics, professional applications, or everyday problem-solving, the ability to graph and interpret lines like this one is a vital mathematical skill that forms the basis for more complex analytical methods.

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