

FIND THE SLOPE OF THE LINE THAT PASSES THROUGH (10, 6) AND (3, 11).SIMPLIFY YOUR ANSWER AND WRITE IT

FIND THE SLOPE OF THE LINE THAT PASSES THROUGH (10, 6) AND (3, 11). SIMPLIFY YOUR ANSWER AND WRITE IT

UNDERSTANDING HOW TO FIND THE SLOPE OF A LINE PASSING THROUGH TWO POINTS IS A FUNDAMENTAL CONCEPT IN COORDINATE GEOMETRY. WHETHER YOU'RE A STUDENT PREPARING FOR EXAMS, A TEACHER EXPLAINING THE BASICS, OR SOMEONE WORKING ON A MATH PROBLEM, MASTERING THIS SKILL IS ESSENTIAL. IN THIS COMPREHENSIVE GUIDE, WE WILL EXPLORE THE PROCESS OF CALCULATING THE SLOPE, UNDERSTAND ITS SIGNIFICANCE, AND WORK THROUGH THE SPECIFIC EXAMPLE OF POINTS (10, 6) AND (3, 11). BY THE END OF THIS ARTICLE, YOU'LL BE ABLE TO CONFIDENTLY DETERMINE THE SLOPE OF ANY LINE GIVEN TWO POINTS, SIMPLIFY YOUR ANSWER, AND ARTICULATE IT CLEARLY.

WHAT IS THE SLOPE OF A LINE?

DEFINITION OF SLOPE

THE SLOPE OF A LINE REPRESENTS ITS STEEPNESS AND DIRECTION. IT INDICATES HOW MUCH THE Y-COORDINATE (VERTICAL CHANGE) OF THE LINE INCREASES OR DECREASES RELATIVE TO THE X-COORDINATE (HORIZONTAL CHANGE). THE SLOPE IS USUALLY DENOTED BY THE LETTER M.

MATHEMATICAL REPRESENTATION

THE SLOPE BETWEEN TWO POINTS, SAY $((x_1, y_1))$ AND $((x_2, y_2))$, IS CALCULATED USING THE FORMULA:

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

THIS FORMULA ESSENTIALLY MEASURES THE RATIO OF THE CHANGE IN Y TO THE CHANGE IN X, OFTEN REFERRED TO AS THE "RISE OVER RUN."

WHY IS SLOPE IMPORTANT?

UNDERSTANDING THE SLOPE ALLOWS YOU TO:

- PREDICT THE BEHAVIOR OF THE LINE (INCREASING OR DECREASING).
- WRITE THE EQUATION OF THE LINE IN SLOPE-INTERCEPT FORM.
- ANALYZE RELATIONSHIPS BETWEEN VARIABLES.
- DETERMINE IF TWO LINES ARE PARALLEL OR PERPENDICULAR.

STEP-BY-STEP PROCESS TO FIND THE SLOPE

IDENTIFY THE COORDINATES

GIVEN TWO POINTS:

- POINT 1: $((x_1, y_1) = (10, 6))$

- POINT 2: $((x_2, y_2) = (3, 11))$

APPLY THE SLOPE FORMULA

PLUG THE COORDINATES INTO THE SLOPE FORMULA:

$$m = \frac{11 - 6}{3 - 10}$$

CALCULATE NUMERATOR AND DENOMINATOR

- NUMERATOR (CHANGE IN Y): $(11 - 6 = 5)$

- DENOMINATOR (CHANGE IN X): $(3 - 10 = -7)$

SIMPLIFY THE FRACTION

$$m = \frac{5}{-7}$$

WHICH SIMPLIFIES TO:

$$m = -\frac{5}{7}$$

THIS IS THE SLOPE OF THE LINE PASSING THROUGH THE POINTS $((10, 6))$ AND $((3, 11))$.

INTERPRETING THE SLOPE

SIGN OF THE SLOPE

SINCE THE SLOPE IS NEGATIVE $(-\frac{5}{7})$, THE LINE DECREASES AS IT MOVES FROM LEFT TO RIGHT. THIS INDICATES A DOWNWARD TREND WHEN MOVING ALONG THE X-AXIS.

STEEPNESS OF THE LINE

THE ABSOLUTE VALUE $(\frac{5}{7})$ SHOWS THE RATE AT WHICH Y CHANGES RELATIVE TO X. THE LINE RISES OR FALLS ROUGHLY 5 UNITS VERTICALLY FOR EVERY 7 UNITS HORIZONTALLY, BUT BECAUSE THE SLOPE IS NEGATIVE, IT ACTUALLY FALLS BY 5 UNITS FOR EVERY 7 UNITS MOVED TO THE RIGHT.

PRACTICAL IMPLICATION

IF YOU WERE TO GRAPH THIS LINE, YOU'D SEE A GENTLE DOWNWARD SLOPE, ILLUSTRATING THE RELATIONSHIP BETWEEN THE TWO POINTS.

WRITING THE EQUATION OF THE LINE

KNOWING THE SLOPE ALLOWS YOU TO WRITE THE LINE'S EQUATION IN VARIOUS FORMS. THE MOST COMMON IS THE SLOPE-INTERCEPT FORM:

$$y = mx + b$$

WHERE:

- m IS THE SLOPE,
- b IS THE Y-INTERCEPT.

FINDING THE Y-INTERCEPT

USING ONE OF THE POINTS, FOR EXAMPLE, $(10, 6)$, AND THE SLOPE $-\frac{5}{7}$, WE SUBSTITUTE INTO THE EQUATION:

$$6 = -\frac{5}{7} \times 10 + b$$

CALCULATE:

$$6 = -\frac{5}{7} \times 10 + b$$
$$6 = -\frac{50}{7} + b$$

TO FIND b :

$$b = 6 + \frac{50}{7}$$

EXPRESS 6 AS A FRACTION WITH DENOMINATOR 7:

$$6 = \frac{42}{7}$$

So,

$$b = \frac{42}{7} + \frac{50}{7} = \frac{92}{7}$$

FINAL EQUATION OF THE LINE

SUBSTITUTING $(M = -\frac{5}{7})$ AND $(B = \frac{92}{7})$:

$$Y = -\frac{5}{7}X + \frac{92}{7}$$

THIS IS THE EQUATION OF THE LINE PASSING THROUGH THE TWO POINTS.

WHY SIMPLIFY THE SLOPE?

CLARITY AND PRECISION

EXPRESSING THE SLOPE IN SIMPLEST FORM MAKES IT EASIER TO INTERPRET AND COMMUNICATE. IT CLEARLY SHOWS THE RATIO WITHOUT ANY COMMON FACTORS.

EASE OF USE IN CALCULATIONS

SIMPLIFIED FRACTIONS ARE EASIER TO WORK WITH WHEN PLUGGING INTO FORMULAS, GRAPHING, OR PERFORMING FURTHER OPERATIONS.

STANDARD PRACTICE

MATHEMATICALLY, IT'S STANDARD TO PRESENT ANSWERS IN SIMPLIFIED FORM TO MAINTAIN CLARITY AND PRECISION.

COMMON MISTAKES TO AVOID

1. **SWAPPING THE POINTS:** ALWAYS ENSURE THE ORDER OF POINTS IS CONSISTENT WHEN CALCULATING THE CHANGE IN Y AND X.
2. **DIVIDING BY ZERO:** IF THE X-COORDINATES ARE THE SAME, THE SLOPE IS UNDEFINED. AVOID DIVIDING BY ZERO.
3. **INCORRECT SUBTRACTION:** CAREFULLY SUBTRACT THE Y-VALUES AND X-VALUES TO AVOID MISTAKES.
4. **NOT SIMPLIFYING THE FRACTION:** ALWAYS SIMPLIFY YOUR FINAL ANSWER TO ITS LOWEST TERMS.

SUMMARY OF KEY POINTS

- THE SLOPE FORMULA IS $(m = \frac{y_2 - y_1}{x_2 - x_1})$.
- FOR POINTS $((10, 6))$ AND $((3, 11))$, THE SLOPE IS $(-\frac{5}{7})$.
- SIMPLIFY YOUR FRACTION TO ITS LOWEST TERMS FOR CLARITY.
- THE NEGATIVE SLOPE INDICATES A DECREASING LINE AS X INCREASES.
- YOU CAN FIND THE LINE'S EQUATION USING THE SLOPE AND ONE OF THE POINTS.

CONCLUSION

FINDING THE SLOPE OF A LINE PASSING THROUGH TWO POINTS IS A STRAIGHTFORWARD PROCESS ONCE YOU UNDERSTAND THE FORMULA AND ITS APPLICATION. FOR THE SPECIFIC POINTS $(10, 6)$ AND $(3, 11)$, THE SLOPE IS $(-\frac{5}{7})$. REMEMBER TO ALWAYS SIMPLIFY YOUR FINAL ANSWER, INTERPRET THE SIGN CORRECTLY, AND UNDERSTAND WHAT THE SLOPE TELLS YOU ABOUT THE LINE'S BEHAVIOR. WITH PRACTICE, YOU'LL BE ABLE TO QUICKLY DETERMINE SLOPES FOR ANY PAIR OF POINTS AND CONFIDENTLY ANALYZE THEIR RELATIONSHIPS. WHETHER YOU'RE GRAPHING, SOLVING EQUATIONS, OR INTERPRETING DATA, MASTERING SLOPE CALCULATION IS AN ESSENTIAL SKILL IN THE REALM OF MATHEMATICS.

FREQUENTLY ASKED QUESTIONS

HOW DO YOU FIND THE SLOPE OF A LINE PASSING THROUGH POINTS $(10, 6)$ AND $(3, 11)$?

TO FIND THE SLOPE, SUBTRACT THE Y-COORDINATES AND DIVIDE BY THE DIFFERENCE OF THE X-COORDINATES: $(11 - 6) / (3 - 10) = 5 / -7 = -5/7$.

WHAT IS THE FORMULA FOR CALCULATING THE SLOPE BETWEEN TWO POINTS?

THE SLOPE M IS GIVEN BY $m = (y_2 - y_1) / (x_2 - x_1)$.

WHAT IS THE SLOPE OF THE LINE PASSING THROUGH $(10, 6)$ AND $(3, 11)$?

THE SLOPE IS $-5/7$ AFTER SIMPLIFYING THE DIFFERENCE IN Y AND X COORDINATES.

HOW DO YOU SIMPLIFY THE SLOPE WHEN CALCULATING BETWEEN TWO POINTS?

YOU SUBTRACT THE Y-VALUES AND X-VALUES SEPARATELY AND THEN REDUCE THE RESULTING FRACTION TO ITS SIMPLEST FORM.

WHY IS IT IMPORTANT TO SIMPLIFY THE SLOPE TO ITS LOWEST TERMS?

SIMPLIFYING MAKES THE SLOPE EASIER TO INTERPRET AND WORK WITH IN EQUATIONS OR GRAPHING.

CAN THE SLOPE BE NEGATIVE, AND WHAT DOES THAT INDICATE?

YES, A NEGATIVE SLOPE INDICATES THAT THE LINE DECREASES AS X INCREASES, MEANING IT SLANTS DOWNWARD.

How would you write the slope in decimal form for the points (10, 6) and (3, 11)?

The slope in decimal form is approximately -0.7142857, obtained by dividing 5 by -7.

If the points were (10, 6) and (3, 11), how do you verify your slope calculation?

Plug the coordinates into the slope formula, perform the subtraction, and ensure the fraction simplifies correctly to $-5/7$.

Additional Resources

Find the slope of the line that passes through (10, 6) and (3, 11). Simplify your answer and write it. This is a common question encountered in algebra and coordinate geometry. Understanding how to determine the slope of a line given two points is fundamental for analyzing the line's steepness and direction. Whether you're a student brushing up on algebra skills or a teacher preparing instructional materials, mastering this process is essential for solving many geometric problems and interpreting graphs accurately.

In this guide, we'll explore the concept of slope in detail, walk through the step-by-step process to find the slope of the line passing through the given points, and provide tips to ensure your answer is fully simplified and clearly communicated.

Understanding the Concept of Slope

Before diving into calculations, let's clarify what the slope of a line represents. The slope indicates how much the y-coordinate (vertical change) of a point on the line changes relative to the x-coordinate (horizontal change). It is often denoted by the letter m .

Visualizing Slope

Imagine standing on a hill; the slope tells you how steep the hill is. If the hill is very steep, the slope is large; if it's gentle, the slope is small. When graphing, positive slopes rise from left to right, negative slopes fall from left to right, and a zero slope indicates a horizontal line.

Mathematical Definition

Given two points, (x_1, y_1) and (x_2, y_2) , the slope m is calculated as:

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

This formula calculates the ratio of the change in y to the change in x between the two points.

Step-by-Step Guide to Calculating the Slope

Let's now apply this understanding to find the slope of the line passing through the points (10, 6) and (3, 11).

Step 1: Identify the Coordinates

- Point 1: $(x_1, y_1) = (10, 6)$

- POINT 2: $(x_2, y_2) = (3, 11)$

STEP 2: WRITE DOWN THE SLOPE FORMULA

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

PLUGGING IN THE VALUES:

$$m = \frac{11 - 6}{3 - 10}$$

STEP 3: CALCULATE THE NUMERATOR (CHANGE IN Y)

$$11 - 6 = 5$$

STEP 4: CALCULATE THE DENOMINATOR (CHANGE IN X)

$$3 - 10 = -7$$

STEP 5: COMPUTE THE SLOPE

$$m = \frac{5}{-7}$$

WHICH SIMPLIFIES TO:

$$m = -\frac{5}{7}$$

STEP 6: SIMPLIFY YOUR ANSWER

THE FRACTION $(-\frac{5}{7})$ IS ALREADY IN ITS SIMPLEST FORM BECAUSE 5 AND 7 SHARE NO COMMON FACTORS OTHER THAN 1.

STEP 7: WRITE THE FINAL ANSWER CLEARLY

THE SLOPE OF THE LINE PASSING THROUGH $(10, 6)$ AND $(3, 11)$ IS $(-\frac{5}{7})$.

ADDITIONAL INSIGHTS AND TIPS

WHY IS SIMPLIFICATION IMPORTANT?

PRESENTING YOUR ANSWER IN SIMPLIFIED FORM ENSURES CLARITY AND PRECISION. IT ALSO MAKES IT EASIER TO INTERPRET AND USE IN FURTHER CALCULATIONS, SUCH AS FINDING THE EQUATION OF THE LINE OR PLOTTING THE GRAPH.

DEALING WITH NEGATIVE SLOPES

REMEMBER THAT THE SIGN OF THE SLOPE INDICATES THE DIRECTION OF THE LINE:

- POSITIVE SLOPE: LINE RISES FROM LEFT TO RIGHT.
- NEGATIVE SLOPE: LINE FALLS FROM LEFT TO RIGHT.
- ZERO SLOPE: HORIZONTAL LINE.
- UNDEFINED SLOPE: VERTICAL LINE (WHERE $(x_2 - x_1 = 0)$).

IN OUR EXAMPLE, THE NEGATIVE SLOPE INDICATES THAT AS X INCREASES, Y DECREASES ALONG THE LINE.

ALTERNATIVE METHODS

WHILE THE STANDARD FORMULA IS MOST STRAIGHTFORWARD, OTHER METHODS INCLUDE:

- USING THE POINT-SLOPE FORM TO WRITE THE LINE'S EQUATION ONCE THE SLOPE IS KNOWN.
- GRAPHICAL METHODS, PLOTTING THE POINTS TO ESTIMATE THE SLOPE VISUALLY (LESS PRECISE).

EXTENDING THE CONCEPT: EQUATION OF THE LINE

KNOWING THE SLOPE IS ESSENTIAL WHEN WRITING THE EQUATION OF THE LINE PASSING THROUGH THE TWO POINTS. USING THE POINT-SLOPE FORM:

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

SUBSTITUTING $(x_1, y_1) = (10, 6)$ AND $(m = -\frac{5}{7})$:

$$y - 6 = -\frac{5}{7}(x - 10)$$

THIS CAN BE EXPANDED AND SIMPLIFIED FURTHER TO GET THE SLOPE-INTERCEPT FORM $(y = mx + b)$.

SUMMARY

- THE SLOPE OF A LINE PASSING THROUGH TWO POINTS IS CALCULATED USING THE FORMULA:

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

- FOR THE POINTS $(10, 6)$ AND $(3, 11)$:

$$m = \frac{11 - 6}{3 - 10} = \frac{5}{-7} = -\frac{5}{7}$$

- THE SIMPLIFIED SLOPE IS $(-\frac{5}{7})$, INDICATING THE LINE SLOPES DOWNWARD FROM LEFT TO RIGHT.

MASTERING THIS CALCULATION NOT ONLY HELPS IN SOLVING ALGEBRA PROBLEMS BUT ALSO ENHANCES YOUR UNDERSTANDING OF THE GEOMETRIC RELATIONSHIP BETWEEN POINTS AND LINES. ALWAYS DOUBLE-CHECK YOUR WORK FOR SIGNS AND SIMPLIFICATION TO ENSURE ACCURACY AND CLEAR COMMUNICATION.

FINAL NOTES

- PRACTICE WITH DIFFERENT PAIRS OF POINTS TO BECOME COMFORTABLE WITH THE PROCESS.
- REMEMBER TO ALWAYS SIMPLIFY YOUR FRACTIONAL ANSWERS.
- USE THE SLOPE TO EXPLORE OTHER PROPERTIES OF LINES, SUCH AS THEIR EQUATIONS AND INTERSECTIONS.

BY FOLLOWING THIS DETAILED STEP-BY-STEP GUIDE, YOU ARE NOW EQUIPPED TO CONFIDENTLY FIND THE SLOPE OF ANY LINE GIVEN TWO POINTS, INCLUDING THE SPECIFIC CASE OF PASSING THROUGH $(10, 6)$ AND $(3, 11)$.

Find The Slope Of The Line That Passes Through 10 6 And 3 11 Simplify Your Answer And Write It

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