

A LINE PASSES THROUGH THE POINT $(-8, 3)$ AND HAD A SLOPE OF $-3/4$. WRITE AN EQUATION IN POINT-SLOPE FORM

A LINE PASSES THROUGH THE POINT $(-8, 3)$ AND HAD A SLOPE OF $-3/4$. WRITE AN EQUATION IN POINT-SLOPE FORM

UNDERSTANDING HOW TO WRITE THE EQUATION OF A LINE IS A FUNDAMENTAL SKILL IN ALGEBRA, ESPECIALLY WHEN DEALING WITH POINT-SLOPE FORM. IF YOU ARE GIVEN A SPECIFIC POINT AND THE SLOPE OF A LINE, SUCH AS THE POINT $(-8, 3)$ AND A SLOPE OF $-3/4$, YOU CAN EASILY DETERMINE ITS EQUATION USING THE POINT-SLOPE FORMULA. THIS ARTICLE WILL GUIDE YOU THROUGH THE PROCESS STEP-BY-STEP, PROVIDING CLARITY AND DETAILED EXPLANATIONS TO HELP YOU MASTER THIS CONCEPT.

WHAT IS THE POINT-SLOPE FORM OF A LINE EQUATION?

DEFINITION AND PURPOSE

THE POINT-SLOPE FORM IS A WAY OF EXPRESSING THE EQUATION OF A LINE WHEN YOU KNOW:

- A SPECIFIC POINT THROUGH WHICH THE LINE PASSES, REPRESENTED AS (x_1, y_1)
- THE SLOPE OF THE LINE, REPRESENTED AS m

THE GENERAL FORM OF THE POINT-SLOPE EQUATION IS:

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

THIS FORM IS PARTICULARLY USEFUL BECAUSE IT ALLOWS YOU TO WRITE THE EQUATION DIRECTLY FROM THE GIVEN POINT AND SLOPE WITHOUT NEEDING TO FIND THE Y-INTERCEPT FIRST.

ADVANTAGES OF USING POINT-SLOPE FORM

- IT'S STRAIGHTFORWARD WHEN A POINT AND SLOPE ARE KNOWN
- SERVES AS A STEPPING STONE TO CONVERT INTO SLOPE-INTERCEPT FORM ($y = mx + b$)
- HELPS IN GRAPHING LINES QUICKLY ONCE THE EQUATION IS KNOWN

STEP-BY-STEP GUIDE TO WRITING THE EQUATION

STEP 1: IDENTIFY THE GIVEN DATA

IN THIS CASE:

- POINT: $(-8, 3)$
- SLOPE: $-3/4$

STEP 2: RECALL THE POINT-SLOPE FORMULA

THE FORMULA IS:

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

SUBSTITUTING THE KNOWN VALUES:

$$[y - 3 = -\frac{3}{4}(x - (-8))]$$

STEP 3: SIMPLIFY THE EQUATION

SINCE SUBTRACTING A NEGATIVE IS EQUIVALENT TO ADDITION:

$$[y - 3 = -\frac{3}{4}(x + 8)]$$

THIS IS THE POINT-SLOPE FORM OF THE LINE PASSING THROUGH $(-8, 3)$ WITH A SLOPE OF $-3/4$.

INTERPRETING THE EQUATION IN POINT-SLOPE FORM

UNDERSTANDING THE COMPONENTS

- $(y - 3)$: REPRESENTS THE CHANGE IN Y FROM THE POINT (3)
- $(x + 8)$: REPRESENTS THE CHANGE IN X FROM THE POINT (-8)
- $(m = -\frac{3}{4})$: THE SLOPE INDICATES THE RATE OF CHANGE OF Y WITH RESPECT TO X

USING THE EQUATION FOR GRAPHING

THIS FORM DIRECTLY PROVIDES THE BASIS FOR GRAPHING:

- STARTING AT THE POINT $(-8, 3)$
- USING THE SLOPE OF $-3/4$ TO DETERMINE THE RISE OVER RUN

FOR EXAMPLE:

- MOVE 4 UNITS TO THE RIGHT (X INCREASES BY 4)
- MOVE 3 UNITS DOWN (Y DECREASES BY 3)

PLOTTING THESE POINTS AND CONNECTING THEM CREATES THE GRAPH OF THE LINE.

CONVERTING POINT-SLOPE TO SLOPE-INTERCEPT FORM

WHY CONVERT?

SOMETIMES, IT'S HELPFUL TO EXPRESS THE LINE IN SLOPE-INTERCEPT FORM $(y = mx + b)$ FOR EASIER INTERPRETATION OR GRAPHING.

CONVERSION PROCESS

STARTING WITH:

$$[y - 3 = -\frac{3}{4}(x + 8)]$$

DISTRIBUTE THE SLOPE:

$$[y - 3 = -\frac{3}{4}x - \frac{3}{4} \times 8]$$

$$[y - 3 = -\frac{3}{4}x - 6]$$

ADD 3 TO BOTH SIDES:

$$[y = -\frac{3}{4}x - 6 + 3]$$

$$[y = -\frac{3}{4}x - 3]$$

NOW, THE LINE'S EQUATION IN SLOPE-INTERCEPT FORM IS:

$$\left[y = -\frac{3}{4}x - 3 \right]$$

THIS FORM CLEARLY SHOWS THE SLOPE AND Y-INTERCEPT, MAKING IT EASY TO GRAPH AND ANALYZE.

PRACTICAL APPLICATIONS OF WRITING LINE EQUATIONS

REAL-WORLD CONTEXTS

UNDERSTANDING HOW TO WRITE THE EQUATION OF A LINE FROM A POINT AND SLOPE IS VITAL IN VARIOUS FIELDS:

- PHYSICS: DESCRIBING MOTION OR FORCE
- ECONOMICS: ANALYZING COST FUNCTIONS
- ENGINEERING: DESIGNING STRUCTURES AND SYSTEMS
- DATA ANALYSIS: MODELING RELATIONSHIPS BETWEEN VARIABLES

SOLVING RELATED PROBLEMS

- FIND THE EQUATION OF A LINE PASSING THROUGH A SPECIFIC POINT WITH A GIVEN SLOPE
- DETERMINE IF A POINT LIES ON A PARTICULAR LINE
- CALCULATE THE INTERSECTION POINT OF TWO LINES

SUMMARY AND TIPS FOR MASTERY

KEY TAKEAWAYS

- THE POINT-SLOPE FORM IS IDEAL WHEN A POINT AND SLOPE ARE GIVEN.
- ALWAYS SUBSTITUTE THE KNOWN POINT (x_1, y_1) AND SLOPE (m) INTO THE FORMULA.
- SIMPLIFY CAREFULLY, ESPECIALLY WHEN DEALING WITH NEGATIVE SIGNS AND FRACTIONS.
- CONVERT TO SLOPE-INTERCEPT FORM FOR EASIER INTERPRETATION AND GRAPHING.

PRACTICE EXAMPLES

TO REINFORCE YOUR UNDERSTANDING, TRY SOLVING THESE:

1. WRITE THE EQUATION OF A LINE PASSING THROUGH $(2, -1)$ WITH A SLOPE OF 5.
2. FIND THE POINT-SLOPE FORM OF THE LINE PASSING THROUGH $(0, 0)$ WITH A SLOPE OF $-2/3$.
3. CONVERT THE EQUATION $\left[y - 4 = \frac{1}{2}(x + 6) \right]$ INTO SLOPE-INTERCEPT FORM.

CONCLUSION

WRITING THE EQUATION OF A LINE IN POINT-SLOPE FORM IS A FOUNDATIONAL SKILL IN ALGEBRA THAT FACILITATES UNDERSTANDING OF LINEAR RELATIONSHIPS. USING THE GIVEN POINT $(-8, 3)$ AND THE SLOPE OF $-3/4$, THE POINT-SLOPE FORM IS:

$$\left[y - 3 = -\frac{3}{4}(x + 8) \right]$$

THIS FORM NOT ONLY HELPS IN GRAPHING THE LINE ACCURATELY BUT ALSO SERVES AS A STEPPING STONE FOR FURTHER ALGEBRAIC MANIPULATIONS AND APPLICATIONS. MASTERING THIS PROCESS ENHANCES YOUR ABILITY TO ANALYZE AND INTERPRET LINEAR EQUATIONS IN VARIOUS MATHEMATICAL AND REAL-WORLD CONTEXTS.

FREQUENTLY ASKED QUESTIONS

WHAT IS THE POINT-SLOPE FORM OF THE LINE PASSING THROUGH $(-8, 3)$ WITH A SLOPE OF $-3/4$?

THE POINT-SLOPE FORM IS $y - 3 = -3/4 (x + 8)$.

HOW DO YOU WRITE THE EQUATION OF A LINE IN POINT-SLOPE FORM GIVEN A POINT AND SLOPE?

USE THE FORMULA $y - y_1 = m(x - x_1)$, SUBSTITUTING THE GIVEN POINT AND SLOPE.

WHAT IS THE SIGNIFICANCE OF THE POINT $(-8, 3)$ IN THE EQUATION?

IT IS A POINT THROUGH WHICH THE LINE PASSES AND IS USED AS (x_1, y_1) IN THE POINT-SLOPE FORM.

IF THE SLOPE OF THE LINE IS $-3/4$ AND IT PASSES THROUGH $(-8, 3)$, WHAT IS THE EQUATION IN POINT-SLOPE FORM?

$y - 3 = -3/4 (x + 8)$.

CAN THE POINT-SLOPE FORM BE CONVERTED TO SLOPE-INTERCEPT FORM? HOW?

YES, BY SIMPLIFYING THE POINT-SLOPE EQUATION AND SOLVING FOR y TO GET $y = mx + b$.

WHAT ARE COMMON MISTAKES TO AVOID WHEN WRITING THE POINT-SLOPE FORM OF A LINE?

ENSURE CORRECT SUBSTITUTION OF THE POINT COORDINATES AND SLOPE; WATCH OUT FOR SIGN ERRORS.

HOW CAN I VERIFY THAT THE LINE PASSES THROUGH THE POINT $(-8, 3)$?

SUBSTITUTE $x = -8$ AND $y = 3$ INTO THE EQUATION; IF BOTH SIDES ARE EQUAL, THE POINT LIES ON THE LINE.

WHAT IS THE NEXT STEP AFTER WRITING THE EQUATION IN POINT-SLOPE FORM?

YOU CAN CONVERT IT TO SLOPE-INTERCEPT FORM OR GRAPH THE LINE FOR VISUAL CONFIRMATION.

ADDITIONAL RESOURCES

A LINE PASSES THROUGH THE POINT $(-8, 3)$ AND HAS A SLOPE OF $-3/4$. WRITE AN EQUATION IN POINT-SLOPE FORM.

UNDERSTANDING HOW TO WRITE THE EQUATION OF A LINE WHEN GIVEN A POINT AND A SLOPE IS A FUNDAMENTAL SKILL IN ALGEBRA AND COORDINATE GEOMETRY. IN THIS GUIDE, WE'LL EXPLORE HOW TO FIND THE EQUATION OF A LINE THAT PASSES THROUGH THE POINT $(-8, 3)$ WITH A SLOPE OF $-3/4$ IN POINT-SLOPE FORM. THIS APPROACH NOT ONLY HELPS IN SOLVING MANY GEOMETRIC PROBLEMS BUT ALSO ENHANCES YOUR GRASP OF THE RELATIONSHIPS BETWEEN POINTS, SLOPES, AND LINE EQUATIONS.

BEFORE DIVING INTO THE SPECIFIC PROBLEM, IT'S ESSENTIAL TO UNDERSTAND THE GENERAL FORMS OF LINEAR EQUATIONS:

- SLOPE-INTERCEPT FORM: $y = mx + b$
- POINT-SLOPE FORM: $y - y_1 = m(x - x_1)$
- STANDARD FORM: $Ax + By = C$

EACH FORM OFFERS UNIQUE ADVANTAGES DEPENDING ON THE PROBLEM CONTEXT. FOR OUR CASE, THE POINT-SLOPE FORM IS MOST APPROPRIATE AS IT DIRECTLY INCORPORATES A KNOWN POINT AND THE SLOPE.

THE SIGNIFICANCE OF THE POINT $(-8, 3)$ AND SLOPE $-3/4$

GIVEN:

- POINT: $(-8, 3)$
- SLOPE: $-3/4$

THIS INFORMATION PROVIDES A STARTING POINT AND THE DIRECTION OF THE LINE:

- THE POINT TELLS US A SPECIFIC LOCATION THE LINE PASSES THROUGH.
- THE SLOPE INDICATES THE LINE'S INCLINATION, WITH NEGATIVE VALUE IMPLYING A DOWNWARD TREND AS x INCREASES.

STEP-BY-STEP GUIDE TO WRITING THE EQUATION IN POINT-SLOPE FORM

STEP 1: RECALL THE POINT-SLOPE FORMULA

THE GENERAL POINT-SLOPE FORM IS:

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

WHERE:

- (x_1, y_1) IS THE KNOWN POINT ON THE LINE.
- m IS THE SLOPE.

STEP 2: SUBSTITUTE THE KNOWN VALUES

INSERT THE GIVEN POINT $(-8, 3)$ AND THE SLOPE $-3/4$ INTO THE FORMULA:

$$y - 3 = (-3/4)(x - (-8))$$

SIMPLIFY THE DOUBLE NEGATIVE:

$$y - 3 = (-3/4)(x + 8)$$

THIS IS THE EQUATION OF THE LINE IN POINT-SLOPE FORM.

DEEP DIVE: UNDERSTANDING EACH COMPONENT

WHY USE POINT-SLOPE FORM?

- IT PROVIDES A QUICK WAY TO WRITE THE LINE'S EQUATION WHEN YOU KNOW ONE POINT AND THE SLOPE.
- IT IS ESPECIALLY USEFUL FOR PLOTTING THE LINE OR CONVERTING TO OTHER FORMS LATER.

THE ROLE OF THE SLOPE $(-3/4)$

- THE SLOPE INDICATES THAT FOR EVERY 4 UNITS MOVED HORIZONTALLY TO THE RIGHT, THE LINE DROPS 3 UNITS VERTICALLY.
- CONVERSELY, MOVING 4 UNITS LEFT (X DECREASES BY 4), Y INCREASES BY 3.

THE SIGNIFICANCE OF THE POINT $(-8, 3)$

- THE POINT ANCHORS THE LINE'S POSITION IN THE COORDINATE PLANE.
- IT ENSURES THE LINE PASSES THROUGH THIS SPECIFIC POINT.

VISUALIZING THE LINE

IMAGINE PLOTTING THE POINT $(-8, 3)$ ON THE COORDINATE PLANE. FROM THIS POINT:

- MOVE HORIZONTALLY 8 UNITS LEFT (SINCE X IS -8).
- THE SLOPE IS $-3/4$, WHICH SUGGESTS:
 - FOR EVERY 4 UNITS MOVED TO THE RIGHT, Y DECREASES BY 3.
 - FOR EVERY 4 UNITS MOVED TO THE LEFT, Y INCREASES BY 3.

PLOTTING ADDITIONAL POINTS USING THE SLOPE CAN HELP VISUALIZE THE LINE'S DIRECTION AND STEEPNESS.

PRACTICE: CONVERTING TO OTHER FORMS

CONVERTING TO SLOPE-INTERCEPT FORM

STARTING FROM THE POINT-SLOPE FORM:

$$y - 3 = (-3/4)(x + 8)$$

DISTRIBUTE:

$$y - 3 = (-3/4)x - (3/4)8$$

CALCULATE:

$$(3/4)8 = (3/4)8 = 32 = 6$$

So:

$$y - 3 = (-3/4)x - 6$$

ADD 3 TO BOTH SIDES:

$$y = (-3/4)x - 6 + 3$$

SIMPLIFY:

$$y = (-3/4)x - 3$$

THIS IS THE SLOPE-INTERCEPT FORM, SHOWING THE Y-INTERCEPT AT $(0, -3)$.

CONVERTING TO STANDARD FORM

STARTING FROM THE PREVIOUS SLOPE-INTERCEPT FORM:

$$y = (-3/4)x - 3$$

MULTIPLY BOTH SIDES BY 4 TO CLEAR THE FRACTION:

$$4y = -3x - 12$$

BRING ALL TO ONE SIDE:

$$3x + 4y = -12$$

THIS STANDARD FORM IS OFTEN USEFUL FOR GRAPHING OR SOLVING SYSTEMS.

KEY TAKEAWAYS

- THE POINT-SLOPE FORM IS PARTICULARLY CONVENIENT WHEN A POINT AND SLOPE ARE KNOWN.
- CONVERTING BETWEEN FORMS (POINT-SLOPE, SLOPE-INTERCEPT, STANDARD) IS STRAIGHTFORWARD ONCE THE INITIAL EQUATION IS ESTABLISHED.
- VISUALIZING THE LINE HELPS IN UNDERSTANDING ITS BEHAVIOR AND IN VERIFYING CALCULATIONS.

ADDITIONAL TIPS FOR WORKING WITH LINE EQUATIONS

- ALWAYS DOUBLE-CHECK THE SIGNS WHEN SUBSTITUTING VALUES INTO THE FORMULAS.
- WHEN CONVERTING FORMS, ENSURE COEFFICIENTS ARE SIMPLIFIED WHEN NECESSARY.
- PLOT MULTIPLE POINTS USING THE SLOPE TO ACCURATELY SKETCH THE LINE.
- REMEMBER THAT THE SLOPE INDICATES THE DIRECTION AND STEEPNESS, CRITICAL FOR UNDERSTANDING THE LINE'S ORIENTATION.

CONCLUSION

WRITING THE EQUATION OF A LINE PASSING THROUGH A SPECIFIC POINT WITH A GIVEN SLOPE IN POINT-SLOPE FORM IS A FUNDAMENTAL SKILL THAT UNDERPINS MANY CONCEPTS IN ALGEBRA AND COORDINATE GEOMETRY. IN OUR EXAMPLE, A LINE PASSING THROUGH THE POINT $(-8, 3)$ WITH A SLOPE OF $-3/4$ IS SUCCINCTLY EXPRESSED AS:

$$y - 3 = (-3/4)(x + 8)$$

THIS EQUATION PROVIDES A FOUNDATION FOR FURTHER ANALYSIS, VISUALIZATION, AND CONVERSIONS, REINFORCING YOUR UNDERSTANDING OF LINEAR EQUATIONS AND THEIR APPLICATIONS. MASTERING THESE STEPS ENHANCES PROBLEM-SOLVING EFFICIENCY AND DEEPENS YOUR COMPREHENSION OF GEOMETRIC RELATIONSHIPS ON THE COORDINATE PLANE.

[A Line Passes Through The Point 8 3 And Had A Slope Of 3 4 Write An Equation In Point Slope Form](#)

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