

WHAT ARE THE Y- AND X- INTERCEPTS FOR THE GRAPH OF THE EQUATION $3x - y = 2$?

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UNDERSTANDING THE CONCEPTS OF X- AND Y-INTERCEPTS IS FUNDAMENTAL IN GRAPHING LINEAR EQUATIONS AND ANALYZING THEIR BEHAVIOR. INTERCEPTS PROVIDE CRUCIAL POINTS WHERE THE GRAPH CROSSES THE AXES, OFFERING INSIGHT INTO THE EQUATION'S RELATIONSHIP WITH THE COORDINATE PLANE. IN THIS ARTICLE, WE WILL EXPLORE WHAT X- AND Y-INTERCEPTS ARE, HOW TO FIND THEM FOR THE SPECIFIC EQUATION $3x - y = 2$, AND WHY THESE POINTS ARE ESSENTIAL FOR GRAPHING AND INTERPRETING LINEAR FUNCTIONS.

UNDERSTANDING INTERCEPTS IN A GRAPH

WHAT ARE X- AND Y-INTERCEPTS?

- X-INTERCEPT: THE POINT WHERE A GRAPH CROSSES THE X-AXIS. AT THIS POINT, THE Y-COORDINATE IS ZERO.
- Y-INTERCEPT: THE POINT WHERE A GRAPH CROSSES THE Y-AXIS. AT THIS POINT, THE X-COORDINATE IS ZERO.

THESE INTERCEPTS HELP IN SKETCHING THE GRAPH OF THE EQUATION EFFICIENTLY AND UNDERSTANDING THE FUNCTION'S BEHAVIOR WITHOUT PLOTTING NUMEROUS POINTS.

IMPORTANCE OF INTERCEPTS IN GRAPHING

- THEY SERVE AS KEY POINTS TO PLOT THE GRAPH ACCURATELY.
- PROVIDE QUICK INSIGHTS INTO THE SOLUTION SET OF THE EQUATION.
- ASSIST IN IDENTIFYING THE SLOPE AND INTERCEPTS TO WRITE THE EQUATION IN SLOPE-INTERCEPT FORM.

ANALYZING THE EQUATION $3x - y = 2$

REARRANGING THE EQUATION FOR CLARITY

TO EFFECTIVELY FIND THE INTERCEPTS, IT'S HELPFUL TO REWRITE THE EQUATION IN SLOPE-INTERCEPT FORM ($y = mx + b$):

STARTING WITH:

$$3x - y = 2$$

SUBTRACT $3x$ FROM BOTH SIDES:

$$-y = -3x + 2$$

NOW, THE EQUATION IS IN THE FORM $y = mx + b$, WHERE:

- $M (\text{SLOPE}) = -3$
- $B (\text{Y-INTERCEPT}) = 2$

THIS FORM SIMPLIFIES FINDING BOTH INTERCEPTS.

FINDING THE X-INTERCEPT

METHODOLOGY

- TO FIND THE X-INTERCEPT, SET $Y = 0$ BECAUSE AT THIS POINT THE GRAPH CROSSES THE X-AXIS.
- SUBSTITUTE $Y = 0$ INTO THE EQUATION $Y = -3X + 2$.

CALCULATIONS

SET $Y = 0$:

$$0 = -3X + 2$$

SOLVE FOR X:

$$-3X = -2$$

$$X = (-2)/(-3) = 2/3$$

X-INTERCEPT POINT

- THE X-INTERCEPT OCCURS AT $(2/3, 0)$.

THIS POINT INDICATES WHERE THE LINE CROSSES THE X-AXIS.

FINDING THE Y-INTERCEPT

METHODOLOGY

- TO FIND THE Y-INTERCEPT, SET $X = 0$ BECAUSE AT THIS POINT THE GRAPH CROSSES THE Y-AXIS.
- SUBSTITUTE $X = 0$ INTO THE SLOPE-INTERCEPT FORM $Y = -3X + 2$.

CALCULATIONS

SET $X = 0$:

$y = -3(0) + 2 = 0 + 2 = 2$

Y-INTERCEPT POINT

- THE Y-INTERCEPT OCCURS AT $(0, 2)$.

THIS POINT SHOWS WHERE THE LINE CROSSES THE Y-AXIS.

SUMMARY OF INTERCEPTS FOR THE EQUATION $3x - y = 2$

INTERCEPT TYPE	COORDINATES	EXPLANATION
X-INTERCEPT	$(2/3, 0)$	POINT WHERE THE LINE CROSSES THE X-AXIS.
Y-INTERCEPT	$(0, 2)$	POINT WHERE THE LINE CROSSES THE Y-AXIS.

GRAPHING THE EQUATION USING INTERCEPTS

STEP-BY-STEP GUIDE

1. PLOT THE Y-INTERCEPT: MARK THE POINT $(0, 2)$ ON THE Y-AXIS.
2. PLOT THE X-INTERCEPT: MARK THE POINT $(2/3, 0)$ ON THE X-AXIS.
3. DRAW THE LINE: CONNECT THESE TWO POINTS WITH A STRAIGHT LINE.
4. EXTEND THE LINE: CONTINUE THE LINE ACROSS THE GRAPH, AND OPTIONALLY, ADD MORE POINTS FOR ACCURACY.

BENEFITS OF USING INTERCEPTS IN GRAPHING

- SIMPLIFIES THE PROCESS OF SKETCHING THE GRAPH.
- ENSURES THE LINE IS ACCURATELY POSITIONED.
- PROVIDES A VISUAL UNDERSTANDING OF THE EQUATION'S LINEAR RELATIONSHIP.

ADDITIONAL INSIGHTS AND APPLICATIONS

UNDERSTANDING SLOPE IN CONTEXT

- THE SLOPE OF -3 INDICATES THAT FOR EVERY INCREASE OF 1 UNIT IN x , y DECREASES BY 3 UNITS.
- THE INTERCEPTS HELP VISUALIZE THIS RATE OF CHANGE AND THE LINE'S INCLINATION.

REAL-WORLD APPLICATIONS

- LINEAR MODELS IN ECONOMICS, PHYSICS, AND SOCIAL SCIENCES OFTEN UTILIZE INTERCEPTS TO INTERPRET DATA.
- FOR EXAMPLE, THE Y-INTERCEPT COULD REPRESENT STARTING CONDITIONS, WHILE THE SLOPE INDICATES THE RATE OF CHANGE.

EXTENSIONS AND RELATED CONCEPTS

- HOW TO FIND INTERCEPTS FOR NON-LINEAR EQUATIONS.
- THE SIGNIFICANCE OF INTERCEPTS IN SYSTEMS OF EQUATIONS.
- USING INTERCEPTS TO ANALYZE INEQUALITIES AND REGIONS ON THE GRAPH.

CONCLUSION

IN SUMMARY, FOR THE EQUATION $3x - y = 2$, THE KEY INTERCEPTS ARE:

- X-INTERCEPT: $(\frac{2}{3}, 0)$
- Y-INTERCEPT: $(0, 2)$

THESE POINTS ARE DERIVED BY SETTING $y = 0$ AND $x = 0$, RESPECTIVELY, AND SOLVING THE RESULTING EQUATIONS. RECOGNIZING AND CALCULATING INTERCEPTS ARE ESSENTIAL SKILLS IN ALGEBRA THAT FACILITATE GRAPHING AND INTERPRETING LINEAR FUNCTIONS. WHETHER FOR ACADEMIC PURPOSES, PROBLEM-SOLVING, OR REAL-WORLD APPLICATIONS, UNDERSTANDING HOW TO FIND AND UTILIZE INTERCEPTS ENHANCES YOUR ABILITY TO ANALYZE LINEAR EQUATIONS EFFECTIVELY.

KEYWORDS: X-INTERCEPT, Y-INTERCEPT, LINEAR EQUATION, GRAPHING, INTERCEPTS, $3x - y = 2$, SLOPE, COORDINATE PLANE, ALGEBRA, GRAPH ANALYSIS

FREQUENTLY ASKED QUESTIONS

WHAT IS THE X-INTERCEPT OF THE EQUATION $3x - y = 2$?

TO FIND THE X-INTERCEPT, SET y TO 0 AND SOLVE FOR x : $3x - 0 = 2$, SO $3x = 2$, GIVING $x = \frac{2}{3}$.

WHAT IS THE Y-INTERCEPT OF THE EQUATION $3x - y = 2$?

TO FIND THE Y-INTERCEPT, SET x TO 0 AND SOLVE FOR y : $3(0) - y = 2$, SO $-y = 2$, GIVING $y = -2$.

HOW DO YOU DETERMINE THE X-INTERCEPT FOR THE EQUATION $3x - y = 2$?

SET y TO 0 IN THE EQUATION AND SOLVE FOR x : $3x - 0 = 2$, RESULTING IN $x = \frac{2}{3}$.

HOW DO YOU FIND THE Y-INTERCEPT FOR THE EQUATION $3x - y = 2$?

SET x TO 0 AND SOLVE FOR y : $3(0) - y = 2$, WHICH SIMPLIFIES TO $y = -2$.

ARE THE INTERCEPTS FOR THE EQUATION $3x - y = 2$ RATIONAL OR IRRATIONAL NUMBERS?

BOTH INTERCEPTS ARE RATIONAL NUMBERS: X-INTERCEPT IS $\frac{2}{3}$ AND Y-INTERCEPT IS -2 .

WHAT IS THE SIGNIFICANCE OF THE Y-INTERCEPT IN THE GRAPH OF $3x - y = 2$?

THE Y-INTERCEPT (-2) IS THE POINT WHERE THE GRAPH CROSSES THE Y-AXIS, AT $(0, -2)$.

CAN THE X-INTERCEPT OF $3x - y = 2$ BE A WHOLE NUMBER?

IN THIS CASE, THE X-INTERCEPT IS $\frac{2}{3}$, WHICH IS NOT A WHOLE NUMBER, BUT IT CAN BE IF THE EQUATION YIELDS AN INTEGER VALUE.

WHAT IS THE SLOPE OF THE LINE REPRESENTED BY $3x - y = 2$?

REARRANGED IN SLOPE-INTERCEPT FORM $y = 3x - 2$, THE SLOPE IS 3 .

HOW DO THE X- AND Y-INTERCEPTS HELP IN GRAPHING THE EQUATION $3x - y = 2$?

THEY PROVIDE KEY POINTS WHERE THE LINE CROSSES THE AXES, ENABLING ACCURATE SKETCHING OF THE GRAPH.

ADDITIONAL RESOURCES

UNDERSTANDING THE X- AND Y-INTERCEPTS OF THE EQUATION $3x - y = 2$: AN EXPERT BREAKDOWN

WHEN EXPLORING THE FASCINATING WORLD OF ALGEBRAIC EQUATIONS, ONE OF THE FOUNDATIONAL CONCEPTS STUDENTS AND MATHEMATICIANS ALIKE ENCOUNTER IS THE IDEA OF INTERCEPTS. THESE POINTS—WHERE A GRAPH CROSSES THE AXES—ARE CRUCIAL FOR VISUALIZING, INTERPRETING, AND UNDERSTANDING THE BEHAVIOR OF DIVERSE FUNCTIONS AND EQUATIONS. TODAY, WE DELVE INTO THE SPECIFIC EQUATION:

$$\{ 3x - y = 2 \}$$

TO UNCOVER ITS X-INTERCEPT AND Y-INTERCEPT WITH CLARITY, PRECISION, AND EXPERT INSIGHT. WHETHER YOU'RE A STUDENT PREPARING FOR EXAMS, A TEACHER DESIGNING LESSONS, OR A MATHEMATICS ENTHUSIAST, UNDERSTANDING HOW TO FIND THESE INTERCEPTS UNLOCKS A DEEPER COMPREHENSION OF LINEAR EQUATIONS AND THEIR GRAPHICAL REPRESENTATIONS.

WHAT ARE X- AND Y-INTERCEPTS? AN OVERVIEW

BEFORE WE ANALYZE THE EQUATION ITSELF, LET'S ESTABLISH A SOLID FOUNDATION BY DEFINING WHAT INTERCEPTS ARE AND WHY THEY MATTER.

DEFINING INTERCEPTS

- X-INTERCEPT: THE POINT (OR POINTS) WHERE A GRAPH CROSSES THE X-AXIS. AT THIS POINT, THE Y-COORDINATE IS ZERO BECAUSE THE GRAPH IS ON THE X-AXIS.

- Y-INTERCEPT: THE POINT WHERE THE GRAPH CROSSES THE Y-AXIS. AT THIS POINT, THE X-COORDINATE IS ZERO BECAUSE THE

GRAPH IS ON THE Y-AXIS.

WHY ARE INTERCEPTS IMPORTANT?

- THEY PROVIDE QUICK, INITIAL INSIGHTS INTO THE GRAPH'S POSITION AND SHAPE.
- THEY SERVE AS KEY POINTS FOR SKETCHING THE GRAPH.
- THEY OFFER CLUES ABOUT THE SOLUTIONS OF THE EQUATION.

IN ESSENCE, INTERCEPTS ARE THE "ANCHOR POINTS" THAT HELP TRANSLATE AN ALGEBRAIC EQUATION INTO ITS GRAPHICAL FORM.

DECIPHERING THE EQUATION: $3x - y = 2$

THE EQUATION AT HAND, $3x - y = 2$, IS A LINEAR EQUATION. ITS STRUCTURE SUGGESTS A STRAIGHT LINE WHEN GRAPHED ON THE COORDINATE PLANE. TO FIND ITS INTERCEPTS, IT'S OFTEN EASIEST TO MANIPULATE THE EQUATION INTO A MORE FAMILIAR FORMAT, SUCH AS THE SLOPE-INTERCEPT FORM, WHICH IS:

$$[y = mx + b]$$

WHERE:

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

LET'S PERFORM THE NECESSARY ALGEBRA TO REWRITE OUR EQUATION ACCORDINGLY.

REARRANGING TO SLOPE-INTERCEPT FORM

STARTING WITH:

$$[3x - y = 2]$$

SUBTRACT $(3x)$ FROM BOTH SIDES:

$$[-y = -3x + 2]$$

MULTIPLY BOTH SIDES BY -1 TO SOLVE FOR Y:

$$[y = 3x - 2]$$

NOW, THE EQUATION IS IN THE SLOPE-INTERCEPT FORM:

$$[y = 3x - 2]$$

THIS FORM DIRECTLY REVEALS THE Y-INTERCEPT AND SLOPE, SIMPLIFYING OUR TASK OF FINDING INTERCEPTS.

FINDING THE Y-INTERCEPT

GIVEN THE SLOPE-INTERCEPT FORM $(y = 3x - 2)$, THE Y-INTERCEPT IS IMMEDIATELY APPARENT.

STEP-BY-STEP PROCESS

1. IDENTIFY THE Y-INTERCEPT TERM: THE CONSTANT TERM (-2) IS THE Y-INTERCEPT WHEN $(x = 0)$.

2. SUBSTITUTE $(x = 0)$:

$$\begin{aligned} y &= 3(0) - 2 = 0 - 2 = -2 \end{aligned}$$

3. INTERPRETATION:

THE Y-INTERCEPT IS AT THE POINT:

$$\boxed{(0, -2)}$$

THIS MEANS THE GRAPH CROSSES THE Y-AXIS AT THE POINT WHERE $(y = -2)$.

SIGNIFICANCE OF THE Y-INTERCEPT

- IT OFFERS AN IMMEDIATE VISUAL CUE FOR GRAPHING THE LINE.
- IT HELPS IN PLOTTING THE LINE ACCURATELY BY PROVIDING A STARTING POINT.
- IT REFLECTS THE VALUE OF Y WHEN X IS ZERO, WHICH IS OFTEN USEFUL IN REAL-WORLD APPLICATIONS SUCH AS ECONOMICS, PHYSICS, AND ENGINEERING.

FINDING THE X-INTERCEPT

UNLIKE THE Y-INTERCEPT, WHICH IS DIRECTLY OBTAINED FROM THE EQUATION, THE X-INTERCEPT REQUIRES SETTING $(y = 0)$ AND SOLVING FOR (x) .

STEP-BY-STEP METHOD

1. SET $(y = 0)$ IN THE ORIGINAL OR REARRANGED EQUATION:

$$\begin{aligned} y &= 3x - 2 \\ &\text{BECOMES} \end{aligned}$$

$$\begin{aligned} 0 &= 3x - 2 \end{aligned}$$

2. SOLVE FOR (x) :

$$\begin{aligned} & \backslash[\\ & 3x = 2 \\ & \backslash] \\ & \backslash[\\ & x = \frac{2}{3} \\ & \backslash] \end{aligned}$$

3. INTERPRETATION:

THE X-INTERCEPT IS AT:

$$\backslash[\\ \boxed{\left(\frac{2}{3}, 0\right)} \\ \backslash]$$

THIS POINT INDICATES THAT THE LINE CROSSES THE X-AXIS AT $(x = \frac{2}{3})$.

SIGNIFICANCE OF THE X-INTERCEPT

- IT MARKS A SOLUTION TO THE EQUATION WHERE THE OUTPUT (Y) IS ZERO.
- IT HELPS IN SKETCHING THE LINE ACCURATELY, ESPECIALLY IN RELATION TO THE AXES.
- IT CAN BE CRITICAL IN REAL-WORLD SCENARIOS, SUCH AS DETERMINING BREAK-EVEN POINTS IN BUSINESS MODELS OR EQUILIBRIUM POINTS IN PHYSICS.

GRAPHICAL INTERPRETATION: PLOTTING THE INTERCEPTS

NOW THAT WE'VE IDENTIFIED THE INTERCEPTS, LET'S CONSIDER HOW THEY SHAPE THE GRAPH:

- Y-INTERCEPT AT (0, -2)
- X-INTERCEPT AT $(\left(\frac{2}{3}, 0\right))$

PLOTTING TIPS:

- PLOT THE Y-INTERCEPT POINT DIRECTLY ON THE Y-AXIS AT (0, -2).
- PLOT THE X-INTERCEPT AT APPROXIMATELY (0.666..., 0).
- DRAW A STRAIGHT LINE THROUGH THESE TWO POINTS, EXTENDING ACROSS THE COORDINATE PLANE.

THIS PROCESS PROVIDES A CLEAR VISUAL UNDERSTANDING OF THE LINE'S SLOPE AND POSITION.

ANALYZING THE SLOPE AND OVERALL GRAPH

BEYOND THE INTERCEPTS, THE SLOPE OF THE LINE IS A VITAL CHARACTERISTIC:

$$\backslash[y = 3x - 2 \backslash]$$

- SLOPE $(m = 3)$: FOR EACH UNIT INCREASE IN (x) , (y) INCREASES BY 3 UNITS.
- POSITIVE SLOPE: THE LINE ASCENDS FROM LEFT TO RIGHT.

IMPLICATIONS:

- THE STEEPNESS OF THE LINE IS RELATIVELY HIGH, REFLECTING RAPID INCREASES IN (y) RELATIVE TO (x) .
- THE LINE CROSSES THE Y-AXIS AT $(0, -2)$ AND THE X-AXIS AT APPROXIMATELY $(0.666, 0)$.

SUMMARY OF KEY FINDINGS

PARAMETER	VALUE	DESCRIPTION
Y-INTERCEPT	$(0, -2)$	THE POINT WHERE THE LINE CROSSES THE Y-AXIS.
X-INTERCEPT	$(\frac{2}{3}, 0)$	THE POINT WHERE THE LINE CROSSES THE X-AXIS.
SLOPE	3	THE RATE OF CHANGE OF (y) WITH RESPECT TO (x) .

PRACTICAL APPLICATIONS AND INSIGHTS

UNDERSTANDING INTERCEPTS ISN'T SOLELY AN ACADEMIC EXERCISE; IT HAS PRACTICAL APPLICATIONS ACROSS VARIOUS FIELDS:

- ECONOMICS: DETERMINING BREAK-EVEN POINTS WHERE REVENUE EQUALS COSTS (X-INTERCEPT) OR PROFIT MARGINS (Y-INTERCEPT).
- PHYSICS: ANALYZING MOTION GRAPHS WHERE INTERCEPTS INDICATE INITIAL POSITIONS OR TIMES.
- ENGINEERING: DESIGNING SYSTEMS BY UNDERSTANDING WHERE SIGNALS OR RESPONSES CROSS THRESHOLDS.

MOREOVER, MASTERING THE PROCESS OF CALCULATING INTERCEPTS FOSTERS PROBLEM-SOLVING SKILLS AND ENHANCES ONE'S ABILITY TO INTERPRET REAL-WORLD DATA THROUGH THE LENS OF MATHEMATICS.

FINAL THOUGHTS

THE EQUATION $(3x - y = 2)$ SERVES AS AN EXCELLENT EXAMPLE OF HOW ALGEBRAIC MANIPULATION SIMPLIFIES THE PROCESS OF IDENTIFYING KEY GRAPH FEATURES. BY CONVERTING TO SLOPE-INTERCEPT FORM, WE CLARIFIED THE INTERCEPTS AND GAINED INSIGHTS INTO THE LINE'S BEHAVIOR.

IN CONCLUSION:

- THE Y-INTERCEPT IS AT $(0, -2)$, INDICATING WHERE THE LINE CROSSES THE Y-AXIS.
- THE X-INTERCEPT IS AT $(\frac{2}{3}, 0)$, SHOWING WHERE IT CROSSES THE X-AXIS.

THESE POINTS ACT AS FOUNDATIONAL ANCHORS FOR GRAPHING AND INTERPRETING THE LINE, MAKING COMPLEX VISUALIZATION MANAGEABLE. WHETHER YOU'RE PLOTTING POINTS BY HAND OR ANALYZING DATA, UNDERSTANDING INTERCEPTS IS AN INDISPENSABLE TOOL IN THE MATHEMATICIAN'S TOOLKIT.

EMBRACE THE POWER OF INTERCEPTS TO UNLOCK THE FULL POTENTIAL OF LINEAR EQUATIONS, TRANSFORMING ABSTRACT FORMULAS INTO TANGIBLE, VISUAL INSIGHTS!

What Are The Y And X Intercepts For The Graph Of The Equation $3x - y = 2$

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