Graphing Quadratic Equations :

Quadratic equation

A quadratic equation is an equation of the form $y = ax^2 + bx + c$. The graph of the equation is a parabola with vertex at $x = -\frac{b}{2a}$. The vertex of a parabola is a maximum of the parabola opens downward. The vertex of a parabola is a minimum if the parabola opens upward. The solutions to a quadratic equation are called roots. When you find the roots to the equation you are finding the points where the graph crosses the x-axis at $y = 0$. These points may also be called zeros. To find the solutions to a quadratic equation there are three ways which are: square root rule, factoring, or the quadratic equation $\left(x = \frac{-b \pm (b^2 - 4ac)}{2a} \right)$. A quadratic equation might have two real-number zeros (the graph intersects the x-axis at two distinct places), one real-number zero (the vertex is on the x-axis), or no real-number zeros (the graph never intersects the x-axis).

Practice Aivity

Sketch a graph of the following parabolas. Use a t-chart to plot the points.

- $y = x^2 + 2x + 1$
- $y = -x^2 - 2x + 4$
- $y = -x^2 - 4x - 4$

Graph a linear equation in 2-variables :

A solution to a linear equation is any ordered pair that can be substituted for the variables in the equation to make it true. If you were to plot all the solutions on a coordinate plane, they would lie on a straight line. So, when you graph a linear equation, you graph all the points with ordered pairs that are solutions to the linear equation. There are a couple of ways to graph a linear equation.

Tables (T-bar or T-chart)

The first way to graph a linear equation is to find at least three solutions to the equation, then plot the points and graph the line that passes through them. To find these solutions, choose any arbitrary value for x or y, substitute it for that

variable in the equation, and solve for the other variable. Be careful about the values you chose, they can make the math easy or hard.

Slope-intercept form

Recall the slope-intercept form is $y = mx + b$, where slope $= m$ and the y-intercept $= b$. You can use the slope and the y-intercept to plot at least three points that are solutions to the linear equation. After plotting the points, graph the equation by connecting the line.

Graph a linear inequality in two variables :

Linear Inequality

A solution to a linear inequality is any ordered pair that can be substituted for the variables in the inequality to make it true. When you graph a linear inequality, you graph a shaded region that includes all the points with ordered pairs that are solutions to the linear inequality. The shaded region has a boundary line with points that may or may not be part of the solution to the inequality.

The following is a five-step process that will help you keep organized in your endeavor to graph a linear inequality in two variables.

- ✓ Step 1 Replace the inequality with an equal sign
- ✓ Step 2 Plot at least three points of the resulting equation
- ✓ Step 3 Connect the points and pay attention to the sign of the original inequality. Should the line be dotted or solid?
- ✓ Step 4 Select a point and test it.
- ✓ Step 5 Shade the side of the boundary line that satisfies the inequality.

Solutions of Systems of linear equations from a given graph :

System of equations

A system of linear equations consists of two or more linear equations. In this math prompt, we will focus on solving systems of linear equations containing two equations in two variables. We will solve the system by looking at the graphical representation.

Solution

A solution of a system of two equations in two variables is an ordered pair of numbers that is a solution of both equations in the system. Since a solution of a system of two equations in two variables is a solution common to both equations, it is also a point common to the graphs of both equations. Namely, the solution to the system is the point where the two lines intersect. This could result in many solutions, one solution or no solutions.

Consistent System

A consistent system has exactly one solution. The lines intersect at one point, and they might be perpendicular. These lines have different slopes.

Inconsistent System

An inconsistent system has no solution. The graphs of the equations are parallel to each other and will not touch. These two lines have the same slope but have different y-intercepts.

Dependent System

A dependent system has an infinite number of solutions. The graphs of the lines coincide, meaning that they will be exactly the same. This means that they have the same slopes and the same y-intercept.