Drawing graphs of quadratic functions worksheet

Hand-chosen by: Related Topics: More Lessons for Geometry More Lessons for Algebra Math Worksheets In this lesson, we learn to graph square functions by tracing points to graphically square function of the shape y = ax2 properties graphic y = ax2 to graph a square function given in general form. graphically a square function given in factored form. to graphically a square function given in the form of a vertex. Square charts of form y = ax2 (a ≠ 0) Example: Draw the graph y = 2x2 for ≤ x ≤ 3, using a scale of 1 cm to 1 unit on the x axis and from 1 cm to 5 units on the y axis. Solution: Step 1 : Build the value table. x –3 –2 –1 0 1 2 3 y 18 8 2 0 2 8 18 Step 2 : Draw the points on the graph. Step 3: Draw a smooth curve that passes through the dots. Properties of square graphs y = ax2 The curves of the functions you have drawn so far are called parables. From the example above, you may have noticed the following properties. See the following chart when you study these properties. 1. The graphs of y = ax2 (a ≠ 0) pass through the origin (0, 0). 2. The y axis is the line of symmetry 3. (a) When one is positive, each graph has the lowest point (origin) and opens upwards. This point is known as the minimum point. (b) The lower the value a, the wider the graph opens. 4. (a) When a is negative, each graph has the highest point (origin) and opens down. This point is known as the maximum point. (b) The lower the value |a|, the wider the chart opens. Activity to explore the graph of a square equation graphs square functions in general form The general form the general form of a square equation is y = ax2 + bx + c where a, b and c are real numbers and not equal to zero. to Chart Square Functions given in general form? Show Step by Step Graphics Solutions Square Functions This video presents a little recipe for things to examine when graphically a square function by hand. An example of graphing a square function is also displayed Show step-by-step solutions The general shape of an isy square equation = a(x + b)(x + c) where a, b, and c are real numbers and not equal. Charts in factorized form y = a(x − r)(x − s) Show step-by-step solutions Graphics a square function in factored form Shows step-by-step Solutions Charts of parables in factorized form If you have a square in factored form, it is easy to see when crossing the x axis. You can also see the shape of the curve, which allows you to get vertex quickly. Show step-by-step solutions The peak shape of a square equation is y = a(x − h)2 + k where a, h, and k are real numbers and not equal to zero. We can convert the square functions from general shape to peak or factored form. to Chart Square Functions given in Vertex Shape? Show step-by-step solutions graphical square functions in shape The vertex form is also sometimes called the standard form. This video explains how to square functions in the form y = a(x - h)2 + k. Show step-by-step Solutions Try the free Mathway computer and problem solver below to practice various math subjects. Try the examples given or type your own problem and check the answer with the step-by-step explanations. We welcome your feedback, comments and questions about this site or page. Please send your feedback or requests via our feedback page. That's how we talked in the last lesson, the square equation is a function whose formula is given as a square expression or: $ ax ^ 2 + bx + c = $0 If a ≠ 0, b, c are given real numbers. Because each function has its own special graph, so does a square graph. The graph of each square equation is a parable. Parabola is a set of points in a plane that are all as far removed from the given line called directrix and the given point of focus that is not on that line. Many aspects affect the behavior of this graph, so we start from the simplest. Notice we only have the driving coefficient different from zero. And it equals exactly one. Since we still don't know exactly this graph shows, we'll start by drawing a lot of points and see where this leads us. Now we have nine orderly pairs of numbers that we can draw on a numerical plane. We have something that looks like this: Now we have to find a curve that perfectly binds these points. If we continue the process of finding points in this graph we would start to get a clear picture of what this should look like. The final graph of the function $\ f(x) = x^2$ is: Let's see this graph and see what we can conclude. This graph is only on the positive side of the y-axis and is symmetrical to the y-axis. This will always be true for functions in the form of: $\ f(x)= ax^2$The next thing we will reveal is the function acts when we increase or decrease the driving coefficient. Let's try to draw a graph of a function, so what exactly happened? Let's try drawing this function and function $\ f(x) = x^2$ and compare them. After you can see, the function $\ f(x) = 2x^2$ is much narrower than the function $\ f(x) = x^2$. And that's exactly the result we could expect, because if you take a large number as the main coefficient the function will increase rapidly, which means it will look narrower. The tip of a parable with the main coefficient will always be at the point (0, 0). On the other hand, if the main coefficient is a lower number than one (but still a positive number), the graph will show wider, because the function values will grow much slower. Now we're going to draw the graph of a function Now, what if the driving coefficient is negative? Let's try drawing functions $\ f(x) = -x^2$, $\ f(x) = – 2x^2$ and $ f(x) = \frac{-1}{2}x^2$ All these they're back. Now all the values of their function are negative numbers. Note: Every time you see a negative driving coefficient this will mean your parable will be turned upside down. Now let's see what happens when we include the linear coefficient. Linear. try drawing the $\ f(x) function = x^2 – 2x$Let's take a set of points again and calculate the value of the functions in them. From here we can't accurately draw our parable because we don't know much about it. In the first case we showed, we knew that the tip of a parable will be in the center and that its graph will be symmetrical according to y - axis. Now we know that none of this applies to this graph. The first thing you should do is find the tip. X – the coordinates of a parabola tip of any kind is given with the formula: $ V_x = – \frac{b}{2a}$ When you know x coordinates you can simply put it into function and take your y coordinates. For this function: $\ a = $1, $\ b = $ 2, which means that $V_x = $1 and $V_y = f (V_x) = $1 The second thing that is useful to know when drawing a graph of a square equation is zeros. Zeros are points where the graph bisects the x-axis. You will get these points by calculating f(x) = 0 and calculating the square equation zeros you get. For this function I calculate $\ x^2 – 2x = $0 and I get $x_1 = $0, $\ x_2 = $2. From here it is quite simple to draw this graph. Of course, this procedure is exactly the same when coefficients change their signs. The last thing is the function that has all non-negative coefficients. We'll use the formula again to find its tip and try to find its zeros. Draw a function $f(x) = 2x^2 – 4x + $3 $a = 2, b= – 4, c = $3 $V_x = – \frac{b}{2a} = \frac{4}{4} = $1 $V_y = f(V_x) = 2 – 4 + 3 = $1 This means that our vertex is at point $\ V = (1, 1)$. Now at zeros: $\ f(x) = $0 -> $\ 2x^2 – 4x + 3 = 0 $ \ x = \frac{(4 +- \sqrt[2](16-24))}{4}$ We have imaginary solutions. This will always mean that our chart does not bisection the x-axis . Since you already know your tip, you know the line over which chart is symmetrical. All you need is a few more points you calculate and you can draw the chart. Specifically, you can also calculate where the y-axis graph will be cut at the point where x = 0 or, in our case, the point (0, 3). Some useful hacks for when you already get a hang of it: You can draw all these graphs using minimal calculations if you find out translate this graph. For example, if you want to draw a $\ f(x)=x^2 – 4x – $4 function, you can convert it to $\ f(x) = (x – 2)^2$ which is nothing more than a graph of a $\ f(x) function = x^2$ translated by two to the right. When, for example, you have a $\ f(x) graph = x^2 + $2, it will look exactly like the graph of a function $\ f(x) = x^2$ translated only by two on the y axis – . Each graph you draw is a kind of combination of these two, which means that you can, by filling in the square, draw all these graphs without really calculating anything. For example, if you want to draw a graph $\ f(x) = 2x^2 – 4x + $5 First fill in the square: $\ f(x) = – 2x) + 5 = 2(x – 1)^2 + 3$ This graph will be like the graph of a function $\ f(x) = 2x^2$ translated from 1 to the right on and 3 to y – the axis moves upwards. Charts square equations worksheetgraph graphic square functions - Standard shape (1.7 MiB, 751 hits) Graphic square functions - Vertex shape (1.8 MiB, 799 hits) Graphic square functions - Advanced shape (1.9 MiB, 715 hits) hits) hits)