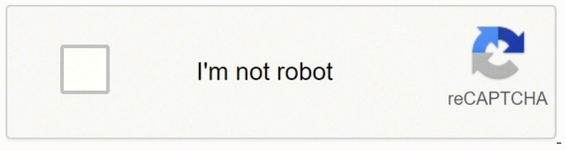

Continue

How to graph f(x)=4

Contents: This page corresponds to § 1.5 (p. 128) of the text. Suggested Problems from Text p. 135 #1, 2, 4, 9, 11, 13, 15, 18, 21, 25, 28, 31, 36, 38, 41, 44 Common Graphs There are several functions that appear very frequently and you should know the shapes of their graphs. Of course, you could use a graphing utility to draw these graphs; but, that would be like getting out your calculator to multiply 3*4. f(x) = c, where c is a constant f(x) = x. f(x) = | x | = abs(x). Use abs(x) for |x| in the Java Tools. f(x) = sqrt(x). f(x) = x2 = x^2. f(x) = x3 = x^3. Throughout this page we will be starting with a function f(x), usually one of the common graphs listed above, then building new functions from f. The idea is that if we know the shape of the graph of f, then we know the shapes of the new graphs. For the rest of this lesson, c will denote a positive number. Return to Contents Shifting Vertical Shifts: Let g(x) = f(x) + c. The graph of g is obtained from the graph of f by shifting up c units. Example 1. f(x) = x2, g(x) = x2 + 3 If we subtract c from f(x), then we shift the graph down. Let h(x) = f(x) - c. The graph of h is obtained from the graph of f by shifting down c units. Click here for a Toolbook program that illustrates vertical shifts. Exercise 1: (a) Sketch the graphs of f(x) = x2, g(x) = f(x) + 2, and h(x) = f(x) - 5 in the same coordinate plane. (b) Sketch the graphs of f(x) = abs(x), g(x) = f(x) + 4, and h(x) = f(x) - 3 in the same coordinate plane. You can use a graphing utility to check your work, but you should be able to sketch these graphs without help. To check your work with the Java Grapher, you type the formula for f in the f box. Then in the g box you may use f(x) instead of retyping the formula for f, then add or subtract the appropriate constant. Horizontal Shifts: Let g(x) = f(x - c). Then the graph of g is obtained from the graph of f by shifting right c units. Example 2. f(x) = x2, g(x) = f(x - 2) = (x - 2)2 Notice the difference between f(x) - 2, and f(x - 2). If f(x) = x2, then f(x) - 2 = x2 - 2, while f(x - 2) = (x - 2)2 = x2 - 4x + 4. For instance, f(3) - 2 means "evaluate f at 3, then subtract 2," while f(3 - 2) means "subtract 2 from 3, then evaluate f at the result." Let h(x) = f(x + c). The graph of h is obtained from the graph of f by shifting left c units. Exercise 2: Sketch the graphs of f(x) = x3, g(x) = f(x - 4), and h(x) = f(x) - 4 in the same coordinate plane. Horizontal and Vertical shifts can be used together, as in the following example. Example 3. Let f(x) = x2 and g(x) = f(x + 3) - 2 = (x + 3)2 - 2. The graph of g is obtained from the graph of f by shifting 3 units to the left, then shifting 2 units down, as pictured below. Exercise 3: Sketch the graphs of f(x) = abs(x) and g(x) = f(x + 5) + 3 in the same coordinate plane. Return to Contents Reflecting If g(x) = -f(x), then the graph of g is obtained from the graph of f by reflecting about the x-axis. Suppose, for example, that f(2) = 3, so the point (2,3) is on the graph of f. Since g(x) = -f(x), then g(2) = -f(2) = -3, and the point (2,-3) is on the graph of g. These two points are reflections of each other about the x-axis. So, if you choose any point on the graph of f, the reflection about the x-axis of that point is on the graph of g, and vice versa. Therefore, the graph of g is the reflection of the graph of f. If g(x) = f(-x), then the graph of g is obtained from the graph of f by reflecting about the y-axis. Exercise 4: Graph the functions f(x) = x2 -2x +2, g(x) = f(-x), and h(x) = -f(x). Answer Exercise 5: Look again at the graph of f(x) = x2 -2x +2 from Exercise 4. This graph is the result of shifting the graph of x2. Find the shifts and show that the formula obtained from shifts is equal to the formula for f. Answer Exercise 6: Find a function whose graph is Verify your answer by graphing the function you find and comparing with the graph above. Return to Contents Stretching Let g(x) = cf(x). Then the graph of g is obtained from the graph of f by a vertical stretch if c > 1, and a vertical shrink if 0 < c < 1. Stretching and shrinking change the distance a point is from the x-axis by a factor of c. For example, if g(x) = 2f(x), and f(5) = 3, then (5,3) is on the graph of f. Since g(5) = 2f(5) = 2*3 = 6, (5,6) is on the graph of g. We think of the point (5,3) as being stretched away from the x axis by a factor of 2 to reach the point (5,6). Exercise 7: The graphs of two functions, f and g, are are shown below. How are these functions related? Videos: Animated Gif, MS Avi File, or Real Video File Return to Contents Yusuke Kawasaki/Flickr Xacuti, xiaolongbao, ximenia, xoconostle and xpinec are just some of the foods that begin with the letter “X.” Because so few words begin with the letter “X” in English, all of these foods come from countries outside the United States. Xacuti This brown curry comes from the village of Arambol in the Indian region of Goa and is usually made with chicken or seafood. Xacuti is often served with rice, bread or even over an omelet. It can vary in spiciness. Ingredients include pepper, onion, white poppy seeds, fresh and dried chilies, turmeric, cinnamon, cloves, nutmeg and other spices. Xiao Long Bao A small (xiao) basket (long) bun (bao) is a steamed dumpling filled with broth and pork. Originally from Shanghai, China, xiao long baos can now sometimes be found in American Chinese restaurants in big cities like Chicago. Eating these dumplings can be difficult for people who haven’t tried them before. They are served in a bamboo steamer while extremely hot, making it risky to eat one too soon. However, the longer you wait for the xiao long bao to cool, the more likely it is that the bottom will tear, losing the delicious broth. To overcome these challenges, pick the dumpling up with chopsticks and place it on a soup spoon. (You may wish to add vinegar and ginger to the spoon beforehand for added flavor.) As the dumpling cools on the spoon, consider piercing the skin of the dumpling with a fork or your teeth to help it reach a safe temperature faster. Once a few minutes have gone by and the dumpling is ready, slide the dumpling (and any vinegar and ginger) into your mouth and enjoy. Ximenia Ximenia is the name of both a tree and its fruit that grows in countries such as Ethiopia, Tanzania and South Africa. Its English name comes from Francisco Ximenez, a Spanish monk. The fruit is orange or red with white spots and only slightly longer than an inch. The taste is bitter and tart. The skin should be peeled and discarded before eating, although the nut is edible. Ximenia fruit are used for jams, jellies, deserts and as a sweetener for porridge. They are also eaten raw. Additionally, the roots and leaves of the tree can be used for medicinal purposes, such as treating fevers or inflamed eyes. Xnipec The name of this fiery salsa comes from the Mayan words for “dog’s nose” or “dog’s snout,” probably because the heat of it will make your nose run wet like a dog’s. Xnipec is originally from the Yucatan Peninsula, the southeastern part of Mexico where Mayans still live today, but it has since made its way north of the border. The spiciness of this salsa comes from habanero peppers, so be careful when preparing and eating xnipec. Xonocostle Like Ximenia, Xonocostle is a fruit. It comes from a cactus that goes by the same name and grows in Central Mexico. It’s used in marinades, salsas, mole de olla and even beverages. Sometimes it’s also dried or candied before being eaten. The cactus itself is pale green, while the fruit is deep red and grows at the end of paddle-shaped growths. The taste of xonocostle is sour and acidic. MORE FROM REFERENCE.COM Gerd Altmann/Pixabay If you’re trying to figure out what x squared plus x squared equals, you may wonder why there are letters in a math problem. That’s because, in the case of an equation like this, x can be whatever you want it to be. To find out what x squared plus x squared equals, you have to multiply x times itself. Then you add that number to itself to get your final answer.Examples of X Squared Plus X Squared Here are some examples of that equation to make it easier to understand. If x equals 2, then x squared, or x times itself, equals 4. Add four to itself, and you get 8. Therefore, 2 squared plus 2 squared equals 8. To use another example, let’s see what happens when x equals 3. In that case, x squared equals 9. Then, 9 plus 9 equals 18. The beauty of this equation is that x can equal anything, and you can solve it using whatever value you want for x. Math that Uses Letters We call mathematics that uses letters to take the place of different values algebra. Algebra uses symbols — in most cases, letters — to represent quantities that don’t necessarily have the same value all the time. These quantities are called variables, and you can figure out what those variables mean when you use algebra. Equations are like sentences that explain the relationships between numbers and variables. You figure out what the variables in an equation are by solving it. When you solve an equation in algebra, you break it down to its simplest form and discover what the variables mean. A Brief History of Algebra Since ancient times, mathematicians have worked with unknown variables in different ways. Islamic scholars began to give the science of working with variables a name. They called this type of math the “science of restoration and balancing,” and the Arabic word for “restoration,” or “al-jabru,” became the root word for the word “algebra.” As mathematicians in the Middle Ages experimented with the principles of algebra, they realized they could solve equations for two- and three-dimensional items, which led to even more discoveries of what algebra could do. Modern scholars have found even more complex equations that algebra can solve. Algebra in Everyday Life You may have heard people say that you’ll never use algebra in your everyday life, but you’d be surprised at how often you use algebra. Algebra comes in handy when you’re trying to figure out how much a group of items costs per item. When you’re trying to figure out how to split a restaurant bill or how much gas you can buy for a certain amount. You can use algebra to figure out the dimensions of a room or even as you make up your shopping list. Algebra is a versatile form of math that you use more often than you might think and, sometimes, you don’t even realize that you’re solving math problems. Why It’s Important to Learn Algebra Learning algebra is important for more than just solving equations. Educators consider algebra the gateway to higher forms of math, so if you or your child wants to explore a career in science or technology, algebra can unlock so many more new ideas. Algebra can also help students with critical thinking and logic skills. Using algebra is like exercise that helps make your brain stronger. Putting algebra to use in your everyday life can help you in so many ways. MORE FROM REFERENCE.COM