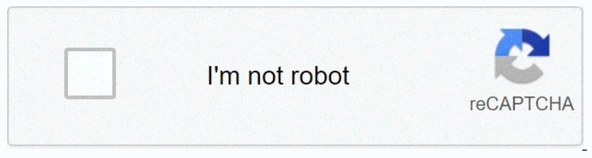

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Quadratic equation standard form calculator

Step 1: Enter the quadrant function in terms of x. Step 2: Select the command related to the f(x) function that you specified above. Resolve f(x) = 0: i Factoring quadratic. (ii) Use of the quadrant formula. iii) Filling in the square. Type f(x) in form a(x ± b)2 ± c by filling in the square. For parabola y = f(x), calculate the following: (i) Concaeit (ii) x-intercepts (iii) y-intercept (iv) Symmetry axis (v) Vertex Plot parabola y = f(x). Calculate the discriminatant f(x) = 0. Calculate the number of roots f(x) = 0. Solving equations is a central theme of algebra. All acquired skills eventually lead to the ability to solve equations and simplify solutions. In the previous chapters, we solved the equations of the first degree. Now you have the necessary skills to solve the equations of the second degree, which are known as quadratic equations. QUADRATICS solved factoring goals After completing this section you should be able to: Identify quadratic equations. Place the quadrant equation in standard form. Revel in the quadrant equation by factoring. A quadratic equation is a polynomic equation that contains the second degree, but no higher degree variable. The standard form of the quadratic equation is ax2 + bx + c = 0 when ≠ 0 a, b and c are the actual numbers. All quadratic equations can be given in standard form, and any equation that can be given in standard form is a quadratic equation. In other words, the standard form represents all quadratic equations. Equation resolution is sometimes referred to as the root of an equation. This phrase is proven in most college algebra books. An important sentence that cannot be demonstrated at the level of this text says: Every polynomoma equation of grade n has exactly n roots. The use of this fact tells us that quadratic equations will always have two solutions. It is possible that the two solutions are the same. The quadratic equation will have two solutions because it is grade two. The simplest method of dealing with quadrant is factoring. This method cannot always be used because not all polynomies are factoritable, but it is used whenever factoring is possible. The method of dealing with factoring is based on a simple sentence. If AB = 0, then either A = 0 or B = 0. In other words, if the two factors are zero, then at least one of the factors is zero. We will not attempt to prove this sentence, but we are keeping a close eye on what it states. We can never multiply two numbers and get a zero answer if at least one of the numbers is zero. Of course, both numbers can be zero from (0) (0) = 0. Workaround Insert step 1 into the standard form. We have to subtract six from both sides. Step 2 Factor completely. Recall how the trinomials factor. Step 3 Set each factor to zero and the solution for x. Since we have (x - 6) (x + 1) = 0, we know that x - 6 = 0 or x + 1 = in this case x = 6 or x = - 1. This applies to the above sentence, which says that at least one of the factors must be zero. Step 4 Check the solution in the original equation. If x = 6, then x2 - 5x = 6 happens Checking your solutions is a sure way to find out if you solved the equation correctly. Therefore, the solution is x = 6. If x = - 1, then x2 - 5x = 6 becomes Therefore - 1 is the solution. Solutions can be indicated either by typing x = 6 and x = - 1, or by using the set write and writing {6, - 1}, which we read the solution set for x is 6 and - 1. We will use the notation set in this text. In this example, 6 and -1 are called set elements. Note in this example that the equation is already in standard form. Again, checking solutions assures you that you have not made a mistake in solving the equation. are also called the roots of the equation. (x + 1) is the least common denominator of all fractions in the equation. Note that each equation expression must be multiplied (x +1). Check the solutions in the original equation. Check the original equation to make sure you don't get a denominator with a value of zero. Note here the two solutions are the same. This occurs only when the trinomial is the perfect square. INCOMPLETE QUADRATICS GOALS After completing this section, you should be able to: Identify an incomplete quadratic equation. You can get an incomplete quadrant equation. If, when the equation is placed in standard form ax2 + bx + c = 0, either b = 0 or c = 0, the equation is incomplete quadratic. Example 1 5x2 - 10 = 0 is incomplete quadratic because the middle term is missing and therefore b = 0. When you come across an incomplete quadratic with c-0 (the third term missing), it can still be solved by factoring. x is a common factor. The two-factor is zero. Therefore, we use the sentence from the previous section. Check these solutions. Note that if the C term is missing, you can always factor in x from other conditions. This means that in all such equations, one solution will be zero. An incomplete quadratic with the missing term b must be solved by another method, since factoring will only be possible in specific cases. Example 3 Resolution x if x2 - 12 = 0. Solution Since x2 - 12 does not have a common factor and there is no difference of squares, it cannot be counted as rational factors. But from previous observations, we have the following sentence. Note that there are two values that when square will be equal to A. With this sentence, we check these solutions. Add 10 to each page. Check these solutions. Here 7x is a common factor. Check these solutions. Note that in this example, we have a square of numbers equal to a negative number. This can never be true in a system of real people, and therefore we have no real solution. COMPLETE SQUARE GOALS AFTER COMPLETING THIS SECTION Should be able to: identify the perfect square trinomial. Finish the third term to make the perfect square trinomial. Solve quadratic equations by filling in the square. From your experience with factoring, you are already aware that not all polynomies are factorable. Therefore, we need a method of solving quadrants that are not factorable. The method used is called square completion. First, let's see the meaning of the perfect square trinomial. When we square binomial we get the perfect square trinomial. The general form is (a + b)2 = a2 + 2ab + b2. Remember, squaring binomial means multiplying it in itself. From the general form and from these examples we can give the following observations regarding the perfect square trinomial. Two of the three dates are perfect squares. 4x2 and 9 in the first example, 25x2 and 16 in the second example and a2 and b2 in general form. In other words, the first and third terms are perfect squares. The second term is either plus or minus twice the product square roots of the other two terms. -7 term immediately says that it can not be the perfect square trinomial. The task in filling the square is to find the number to replace -7 so that there will be the perfect square. Consider this problem: Fill in the blank so that x2 + 6x + ___ will be the perfect square trinomial. From the two conditions for the perfect square trivia we know that the empty must contain the perfect square and that 6x must be twice the part of the square root x2 and the number in the empty. Since x is already present in 6x and is the square root of x2, then 6 must be twice the square root of the number we place in the empty. In other words, if we first take half of 6 and then this result to the second, we get the necessary number for the empty space. Therefore x2 + 6x + 9 is the perfect square trinomial. Now let's see how we can use the completion of the square to solve quadratic equations. Example 5 Solve x2 + 6x - 7 = 0 by filling the square. Recall that instead of -7, +9 would make the expression the perfect square. Solution First we noticed that the -7 term must be replaced if we are to have the perfect square trinomial, so we will rewrite the equation so empty for the necessary number. At this point, be careful not to break any algebra rules. Note, for example, that the second form comes from adding +7 to both sides of the equation. Never add something to one side without adding the same thing to the other side. Now we find half of 6 = 3 and 32 = 9 to give us the number for blank. Again, if we place 9 in the empty we must also add 9 on the right as well. Remember that if 9 is added to the left side of the equation, it must also be added to the right side. Now the factor perfect square trinomial that gives now x2 + 6x + 9 can be written as (x + 3)2. Therefore, 1 and -7 are solutions or roots Example 6 Solution 2x2 + 12x - 4 = 0 by filling the square. Workaround This problem brings additional difficulties. The first term, 2x2, is not a perfect square. We will correct this by all the conditions of equation 2 and we will get in other words, we will get a coefficient of 1 for x2 period. Now we add 2 to both sides, which again, it's more apt. Example 7 Solve 3x2 + 7x - 9 = 0 by filling the square. Solution Step 1 Divide all expressions 3. Again, get a coefficient of 1 for x2 divided by 3. Step 2 Overwrite the equation and leave it blank for the deadline needed to complete the square. Step 3 Find the square of half of the x-coefficient and add to both sides. It looks complicated, but we follow the same precise rules as before. Step 4 Factor completed square. Factoring should never be a problem because we know that we have the perfect square trinomial, which means that we find square roots of the first and third term and use the sign of the middle period. You should check the arithmetic involved in adding numbers on the right at this time if you have any difficulties. Now we have step 5 Take the square root of each side of the equation. Step 6 Solution for x (two values). cannot be simplified. We could also write a solution to this problem in a more abbreviated form than follow the steps in the previous calculation and then note, especially the last ine. What is the conclusion when a square quantity equals a negative number? No real solution. What real number can we square and get -7? In summary, to solve a quadrant equation by filling in a square, follow this step-by-step method. Step 1 If x2 is not 1, divide all expressions by this coefficient. Step 2 Overwrite the equation as x2+bx+__=C+_Step 3 Find the square of one half of the x expression coefficient and add this quantity to both sides of the equation. Step 4 Factor the completed square and combine the numbers on the right side of the equation. Step 5 Find the square root of each side of the equation. Step 6 Solve for x and simplify. If step 5 is not possible, the equation has no real solution. These steps will help you solve equations in the next exercise. Quadratic formula goals When you complete this section, you should be able to: Solve the general quadratic equation by filling in a square. Use a quadrant formula to reenciran any quadrant equation. Solve quadratic equations by filling in the square. The standard form of the quadratic equation is ax2 + bx + c = 0. This means that each quadratic equation can be in this form. In a sense then ax2 + bx + c = 0 represents all quadratics. If you can solve this equation, you will have a solution for all quadratic equations. We solve the general quadry equation by completing the square. This is to get x2 term coefficient 1. We have done this many times in the previous section. We have to add to each side. This form is called a quadratic formula and represents the solution for all quadratic equations. Remember this expression. To use a quadratic formula, you need to identify a, b, and c. For this procedure, the equation must always be placed in standard form. Carefully accumulate the values a, b and c in the formula. Not every quadratic equation will have a real solution. This equation is already in standard form. There is no real solution because -47 does not have a real square root. Again, this equation is in standard form. This solution should now be simplified. WORD PROBLEMS GOALS After you complete this section, you should be able to: Identify word problems that require a quadrant equation to solve them. Solve verbal problems involving quadratic equations. Some types of word problems can be solved by quadratic equations. The process of outline and set up the problem is the same as taught in Chapter 5, but with problems solved by quadratics you need to be very careful to check the solutions in the problem itself. Physical limitations within a problem can eliminate one or both solutions. Example 1 If the rectangle length is more than twice the width of one unit and the area is 55 square units, find the length and width. Workaround The formula for the rectangle area is Region = Length X Width. Let x = width, 2x + 1 = length. If x represents width, then 2x represents twice the width and 2x + 1 represents one more than twice the width. Place the quadrant equation in a standard form. This quadratic can be solved by factoring. At this point, you can see solution x = -11/2 is not valid because x represents a measure of width and negative numbers are not used for such measurements. Therefore, the solution is width = x = 5, length = 2x + 1 = 11. The measurement cannot be a negative value. Reciprocal of x's . Remember LCD means lowest common denominator. Each expression must be multiplied by 10x. Again, this quadratic can be counted. Check both solutions. Therefore, there is a set of solutions. There are two solutions to this problem. Example 3 If an integer is subtracting from 6 times its square, the result is 15. Find the integer. Workaround Let x = integer. Then, because neither solution is an integer, the problem has no solution. You might be tempted to put these values as a solution if you paid close attention to the fact that the problem asked for an integer. Example 4 The farm manager has a 200-metre fence on hand and wants to close the rectangular field so that it has an area of 2,400 square metres. What should be the dimensions of the field? Workaround Two formulas are involved here. P = 2 l + 2w for circumference and A = lw for area. First use P = 2l + 2w, we get Now we can apply the formula A = lw and (100 - l) for w, which field must be 40 meters wide 60 meters long. We could just as well solve for l getting l = 100 - w. Then note that in this issue we actually use the equation system P = 2 l + 2 w A = l w. In general, the system of equations in which the quadratic is involved will be solved by the substitution method. (See Chapter 6.) SUMMARY Keywords A quadratic equation is a polynomic equation in one unknown that contains a second degree but no higher degree variable. The standard form of the quadratic equation is ax2 + bx + c = 0 when ≠ 0. The incomplete quadratic equation is from ax2 + bx + c = 0 and either b = 0 or c = 0. Quadratic formula is Procedures The most proactive and generally simplest method of finding solutions to the quadratic equation is factoring. This method is based on theory: if AB = 0, then A = 0 or B = 0. To use this sentence we put the equation in standard form, factor, and set each factor equal to zero. To solve a quadrant equation by filling in a square, do the following: Step 1 If x2 is not 1, divide all expressions by this coefficient. Step 2 Rewrite the equation as x2 +bx+___ = c+___ Step 3 Find the square of one half of the x-coefficient expression and add this quantity to both sides of the equation. Step 4 Factor the completed square and combine the numbers on the right side of the equation. Step 5 Find the square root of each side of the equation. Step 6 Solve for x and simplify. The square completion method is used to derive a quadrant formula. To use a quadratic formula, type the equation in standard form, identify a, b, and c, and insert these values into the formula. All solutions should be simplified. Simplified.

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