APPLICATIONS OF QUADRATIC EQUATIONS pdf

1: Quadratic Equations

Section Applications of Quadratic Equations. In this section we're going to go back and revisit some of the applications that we saw in the Linear Applications section and see some examples that will require us to solve a quadratic equation to get the answer.

Math Worksheets Examples, solutions, videos, worksheets, games and activities to help Algebra 1 students learn how to solve word problems that involve quadratic equations. Applications of Quadratic Equations - Quadratic Equation Word Problems, part 1 How to approach word problems that involve quadratic equations? Solving word problems with quadratic equations - consecutive integer and rectangle dimensions problems. The product of two consecutive integers is 5 more than three times the larger. The width of a rectangle is 5 feet less than its length. Find the dimensions of the rectangle if the area is 84 square feet. Applications of Quadratic Equations - Quadratic Equation Word Problems, part 2 How to approach word problems that involve quadratic equations. Solving projectile problems with quadratic equations. A projectile is launched from a tower into the air with an initial velocity of 48 feet per second. How long was the projectile in the air? When did it reach its maximum height? Application Of Quadratic Equations Example: The height of a triangle is 4 times its base. The area of the triangle is cm2. Find the base and length of the triangle. Learn how to solve application involving quadratic equations. One leg of a right triangle is 2 feet longer than the shorter side. If the length of the hypotenuse is 18 feet. How long is each leg? You can use the free Mathway calculator and problem solver below to practice Algebra or other math topics. Try the given examples, or type in your own problem and check your answer with the step-by-step explanations. We welcome your feedback, comments and questions about this site or page. Please submit your feedback or enquiries via our Feedback page.

APPLICATIONS OF QUADRATIC EQUATIONS pdf

2: Application of Quadratic Equations (examples, solutions, videos, worksheets, games, activities)

For a parabolic mirror, a reflecting telescope or a satellite dish, the shape is defined by a quadratic equation. Quadratic equations are also needed when studying lenses and curved mirrors. And many questions involving time, distance and speed need quadratic equations.

The letter X represents an unknown, and a b and c being the coefficients representing known numbers and the letter a is not equal to zero. Calculating Room Areas People frequently need to calculate the area of rooms, boxes or plots of land. An example might involve building a rectangular box where one side must be twice the length of the other side. For example, if you have only 4 square feet of wood to use for the bottom of the box, with this information, you can create an equation for the area of the box using the ratio of the two sides. This equation must be less than or equal to four to successfully make a box using these constraints. Figuring a Profit Sometimes calculating a business profit requires using a quadratic function. So, to decide where to set your price, use P as a variable. Your revenue, therefore, will be the price times the number of glasses sold: Using however much your lemonade costs to produce, you can set this equation equal to that amount and choose a price from there. Sciencing Video Vault Quadratics in Athletics In athletic events that involve throwing objects like the shot put, balls or javelin, quadratic equations become highly useful. For example, you throw a ball into the air and have your friend catch it, but you want to give her the precise time it will take the ball to arrive. Use the velocity equation, which calculates the height of the ball based on a parabolic or quadratic equation. Begin by throwing the ball at 3 meters, where your hands are. The answer is approximately 2. Finding a Speed Quadratic equations are also useful in calculating speeds. Avid kayakers, for example, use quadratic equations to estimate their speed when going up and down a river. Assume a kayaker is going up a river, and the river moves at 2 km per hour. The total time is equal to 3 hours, which is equal to the time going upstream plus the time going downstream, and both distances are 15km. Solving for x, we know that the kayaker moved his kayak at a speed of References Math is Fun: His work has been published with Kaplan, Textbooks.

APPLICATIONS OF QUADRATIC EQUATIONS pdf

3: Quadratic Applications â€“ She Loves Math

Applications of Quadratic Equations In this section we want to look at the applications that quadratic equations and functions have in the real world.

Due to the nature of the mathematics on this site it is best views in landscape mode. If your device is not in landscape mode many of the equations will run off the side of your device should be able to scroll to see them and some of the menu items will be cut off due to the narrow screen width. Also, as we will see, we will need to get decimal answer to these and so as a general rule here we will round all answers to 4 decimal places. Example 1 We are going to fence in a rectangular field and we know that for some reason we want the field to have an enclosed area of 75 ft2. We also know that we want the width of the field to be 3 feet longer than the length of the field. What are the dimensions of the field? Therefore, the length of the field is 7. The width is 3 feet longer than this and so is Notice that the width is almost the second solution to the quadratic equation. The only difference is the minus sign. Do NOT expect this to always happen. In this case this is more of a function of the problem. For a more complicated set up this will NOT happen. Now, from a physical standpoint we can see that we should expect to NOT get complex solutions to these problems. Upon solving the quadratic equation we should get either two real distinct solutions or a double root. Also, as the previous example has shown, when we get two real distinct solutions we will be able to eliminate one of them for physical reasons. Example 2 Two cars start out at the same point. One car starts out driving north at 25 mph. Two hours later the second car starts driving east at 20 mph. How long after the first car starts traveling does it take for the two cars to be miles apart? So we have the following distances traveled for each car. In the sketch we will assume that the two cars have traveled long enough so that they are miles apart. So, we have a right triangle here. So, it looks like the car A traveled for Notice as well that this is NOT the second solution without the negative this time, unlike the first example. Example 3 An office has two envelope stuffing machines. Working together they can stuff a batch of envelopes in 2 hours. Working separately, it will take the second machine 1 hour longer than the first machine to stuff a batch of envelopes. How long would it take each machine to stuff a batch of envelopes by themselves? Here are those computations. In fact, they will need to so we can solve for it! Machine B will need 4. Again, unlike the first example, note that the time for Machine B was NOT the second solution from the quadratic without the minus sign.

APPLICATIONS OF QUADRATIC EQUATIONS pdf

4: Everyday Examples of Situations to Apply Quadratic Equations | Sciencing

When solving word problems, some common quadratic equation applications include projectial motion problems and Geometry area problems. The most important thing when solving these types of problems is to make sure that they are set up correctly so we can use the quadratic equation to easily solve them.

However, in the good old quadratic equation, which we all learned about in school, was all of those things. Where we begin It all started at a meeting of the National Union of Teachers. The quadratic equation was held aloft to the nation as an example of the cruel torture inflicted by mathematicians on poor unsuspecting school children. Intrigued by this accusation, the quadratic equation accepted a starring role on prime time radio where it was questioned by a formidable interviewer more used to taking on the Prime Minister. The London Times took space in its leader column, more usually reserved for weighty discussions on the moral or otherwise health of the modern world, to proclaim that the quadratic equation was useless, maths was useless and that no one wanted to study maths anyway, so why bother. Concerned lest dangerous admissions by the quadratic equation remain unchallenged, the vital importance of the equation to the survival of the UK was debated a positive view was taken, you may be glad to know in the British House of Commons. Where would it all end? Was the quadratic equation really dead? Are mathematicians really evil monsters who only want to inflict quadratic equations on a younger generation as a means of corrupting their immortal souls? In fact, the quadratic equation has played a pivotal part in not only the whole of human civilisation as we know it, but in the possible detection of other alien civilisations and even such vital modern activities as watching satellite television. What else, apart from the nature of divine revelation, could be considered to have had such an impact on life as we know it? Indeed, in a very real sense, quadratic equations can save your life. The Babylonians Babylonian cuneiform tablets recording the 9 times tables It all started around BC with the Babylonians. They plotted the paths of the Sun, the Moon and the planets, and recorded them on clay tablets which you can still see in the British Museum. To the Babylonians we owe the modern ideas of angle, including the way that the circle is divided up into degrees owing to a small miscalculation, one per day. We also owe the Babylonians for the rather less pleasant invention of the dreaded taxman. And this was one of the reasons that the Babylonians needed to solve quadratic equations. Somewhere on your farm you have a square field on which you grow some crop. What amount of your crop can you grow on the field? Double the length of each side of the field and you find that you can grow four times as much of the crop as before. The reason for this is that the amount of the crop that you can grow is proportional to the area of the field, which is in turn proportional to the square of the length of the side. In mathematical terms, if is the length of the side of the field, is the amount of crop you can grow on a square field of sidelength 1, and is the amount of crop that you can grow, then This is our first quadratic equation, naked and blinking in the sunlight. Quadratic equations and areas are linked together like brothers and sisters in the same family. Cheerily he says to the farmer "I want you to give me crops to pay for the taxes on your farm. We can answer this question easily, in fact Finding square roots by using a calculator is easy for us, but was more of a problem for the Babylonians. In fact they developed a method of successive approximation to the answer which is identical to the algorithm called the Newton-Raphson method used by modern computers to solve much harder problems than quadratic equations. Now, not all fields are square. Yet the Babylonians came up with the answer again. First we divide by to give.

5: Quadratic Equation Calculator - Symbolab

Quadratic applications are very helpful in solving several types of word problems (other than the bouquet throwing problem), especially where optimization is involved. Again, we can use the vertex to find the maximum or the minimum values, and roots to find solutions to quadratics.

Finding Quadratic Equation from Points or a Graph Quadratic applications are very helpful in solving several types of word problems other than the bouquet throwing problem , especially where optimization is involved. Again, we can use the vertex to find the maximum or the minimum values, and roots to find solutions to quadratics. Note also that we will discuss Optimization Problems using Calculus in the Optimization section here. Find the highest point that her golf ball reached and also when it hits the ground again. Find a reasonable domain and range for this situation. If units are in meters, the gravity is â€”4. Since we need to find the highest point of the ball, we need to get the vertex of the parabola. Then we can use these two values to find a reasonable domain and range: This is the second root. We want the zero that is positive. We will discuss projectile motion using parametric equations here in the Parametric Equations section. Quadratics Trajectory Path Problem: What is the maximum height the ball reaches, and how far horizontally from Audrey does is the ball at its maximum height? How far does the ball travel before it hits the ground? To solve this, we should not expand the square out, but solve using the square root method; this Is much easier. Quadratic Application Problem A ball is thrown in the path, measured in feet: This means that the maximum height since the parabola opens downward is 8 feet and it happens 20 feet away from Audrey. The ball will hit the ground We could have also used a graphing calculator to solve this problem. Optimization of Area Problem: What would be the dimensions length and width of the garden with one side attached to the house to make the area of the garden as large as possible? What is this maximum area? Also, what is a reasonable domain for the width of the garden? Area depends on length and width â€” which makes sense. We know the width has to be positive, which means it has to be greater than zero. The profit from selling local ballet tickets depends on the ticket price. This problem is actually much easier since we are given the formula for the profit, given the price of each ticket. How much should the company charge for the purse so they can maximize monthly revenues? Then we can find the maximum of our quadratic to get our answers. Here is our equation: Bunny Rabbit Population Problem: This answers a and b above. For c , we need to see when the graph goes back down to 0; this is when there are no rabbits left on the island. To answer c above, the rabbit population will disappear from the island at around months from when the observations started. OK, use your imaginations on this one sorry! Taylor and Miranda are performing on a magic dimension-changing stage that is 20 yards long by 15 yards wide. The length is decreasing linearly with time at a rate of 2 yards per hour, and the width is increasing linearly with time at a rate of 3 yards per hour. When will the stage have the maximum area, and when will the stage disappear have an area of 0 square yards? Better get off that stage, Taylor and Miranda! After two hours, the length will be 16 yards, and the width will be 21 yards, and so on. Now we need to find when the stage will have no area left. We need to set the equation to 0, or find the rightmost root with the calculator: Pythagorean Theorem Quadratic Application: Here is the type of problem you may get: The hypotenuse of a right triangle is 4 inches longer than one leg and 2 inches longer than the other. Find the dimensions of the triangle. Also, find a reasonable domain for the hypotenuse. To get the reasonable domain for the hypotenuse, we know it has to be greater than 0, and since we have minus signs in the expressions for the legs, we have to look at those, too. You may encounter a problem like this â€” which is really not too difficult. Here is the problem: Here is one more problem. Welcome to She Loves Math! And, even better, a site that covers math topics from before kindergarten through high school.

6: Quadratic equation - Wikipedia

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Both and are oscillating terms, which is to say they repeat periodically. This formula provides an insight into how the differential equation which modelled the damped pendulum, which has a solution of the form , can have oscillating solutions. Another very significant application of the imaginary number to the physical world comes from quantum theory. This theory deals with phenomena at a microscopic level where quantities such as electrons or photons of energy can behave both like particles and oscillating waves. As we have seen, oscillating behaviour can be described using. This is a partial differential equation involving , which can be written as This equation has very many practical applications. By using it to predict the motion of the electrons and holes in semi-conductors it is possible to design integrated circuits with huge numbers of components which can perform amazingly complex tasks. Such circuits are at the heart of much modern technology, including computers, cars, DVD players and mobile phones. Indeed, a mobile phone works by converting your speech into high frequency radio waves and the behaviour of these waves can then be calculated using further formulae involving. So we can say with justification that without the simple quadratic equation the mobile phone would never have been invented. A touch of quadratic chaos Imagine you are a biologist or ecologist who is interested in the way the population of a particular species of insect changes from year to year. Some insects have only one generation per year, and a simple model assumes that the population in the next year will depend only on the population in the current year. One very simple model assumes that a proportion, axn, say, breed successfully and that bxn2 die from overcrowding. To simplify the equations we may re-scale the coordinates to obtain the following quadratic equation: Strictly speaking, we have defined a whole family of quadratics, labelled by the constant r. Each member of this family is known as a logistic map. It is well worth performing some numerical experiments to investigate the behaviour of these insect populations. You can try these yourself using a spreadsheet such as Excel. To do this place the initial population into cell A1, which should be between 0 and 1. Now, copy the contents of the cell A2 into A3, A4 and so on. The great thing about Excel, and other spreadsheet packages, is that it automatically changes the reference to A1 in the formula to the cell above. Then Excel will automatically calculate the insect population for a number of years. You can change the initial population in cell A1. You can also change the value of r, which in the case of the example above was set to 4. If this is done, you will have to copy the new formula into all the cells again. The adventurous can also plot the values of the insect population on a graph. Notice the very complex-looking and unpredictable behaviour from the system. To the left is a graphical plot. This is a graphical procedure to help you visualize the behaviour of insect populations. To draw a cobweb plot, the first thing to do is choose the value of r and then plot the quadratic on the cobweb diagram. The value of x2 is rx1 1-x1 by definition, which is just the value of x1 on the graph. So draw a vertical line from x1 until it hits the graph. Now we have the position of x2 on the x-axis and can repeat the process. This graphical procedure can be repeated, without becoming blinded by lists of numbers. You can get an excellent sense of what is going on with a cobweb diagram. The interactive applet below will allow you to experiment with different values of r by pulling the maximum of the quadratic up and down. You can also change the initial population by pulling the horizontal bar with the mouse. Java Applet by Dr. Burbanks These quadratic logistic maps demonstrate chaos, which is a modern and exciting area of applied mathematics. Chaos is used to describe a system which behaves in an apparently random way, even when the system itself is not random. What is most surprising is that: Very simple systems behave in very complex ways. For example, below we show what happens when you take two initial populations that are very close together. After only a few generations the populations are doing completely different things! This kind of behaviour would be a disaster if you wanted to forecast the populations, but had to estimate the initial populations. Actually, chaos says a lot more. Indeed, if you make any error at all in estimating the initial insect populations then very soon your prediction will be hopelessly wrong. As you will discover, not all values of r will produce chaos. So instead of trying to forecast the insect population, which may be impossible, scientists and mathematicians try to understand when a particular system is chaotic. Knowing this allows us to know when a prediction is accurate and when it is hopeless. For more examples of chaos, see Finding order in chaos by Chris Budd, from issue 26 of Plus. Conclusion We have shown that the quadratic equation has many applications and has played a fundamental role in human history. Here are a few more applications in which the quadratic equation is indispensable. As a challenge, can you make this list up to ? That drop goal, grandfather clocks, rabbits, areas, singing, tax, architecture, sundials, stopping, electronics, micro-chips, fridges, sunflowers, acceleration, paper, planets, ballistics, shooting, jumping, asteroids, quantum theory, chaos, windows, tennis, badminton, flight, radio, pendulum, weather, falling, shower, differential equations, telescope, golf. Afterword This article was inspired in part by a remarkable debate in the British House of Commons on the subject of quadratic equations. They have recently written the popular mathematics book Mathematics Galore!

7: Steps for solving Quadratic application problems:

In uses of a quadratic equation: Part I in issue 29 of Plus we took a look at quadratic equations and saw how they arose naturally in various simple problems. In this second part we continue our journey.

8: Real World Examples of Quadratic Equations

In the "projectile motion" formula, the "g" is half of the value of the gravitational force for that particular body. For instance, the gravitational force on Earth is a downward 32 ft/s 2, but we used " 16 " in the equation.

9: Algebra - Applications of Quadratic Equations (Assignment Problems)

*The equation for the height of the ball as a function of time is quadratic. If you're seeing this message, it means we're having trouble loading external resources on our website. If you're behind a web filter, please make sure that the domains *www.enganchecubano.com and *www.enganchecubano.com are unblocked.*

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