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Use this handy tool to solve any quadratic equations given in standard form.First, enter the coefficients a, b, and c (a0) of the quadratic equation ax2+bx+c=0. Make sure you have entered the correct number of digits using our sig fig calculator.Next, click on the "Calculate" button and the solution will be displayed.Our quadratic equation calculator can solve quadratic equations with real or complex roots. It will calculate the discriminant D=(b2-4ac) and determine whether it is equal to, greater than, or less than zero.If the discriminant is equal to zero, the equation has one real root (called a double root); if it is greater than zero, the equation has two distinct real roots; if it is less than zero, the equation has two complex roots.Quadratic Formula CalculatorThe calculator uses the following formula:x = (-b D) / 2a, where D = b2 - 4acThis formula calculates the solution of quadratic equations (ax2+bx+c=0) where x is unknown, a is the quadratic coefficient (a 0), b is the linear coefficient and c represents the equation's constant. The letters a, b and c are known numbers and are the quadratic equation's coefficients.Quadratic Equation ExampleFor example, let's take the equation 2x2-6x+3=0, where a = 2, b = -6, and c = 3.D = b2 - 4ac = (-6)2-423 = 36-24 = 12Since the discriminant is greater than zero, the equation has two real roots. These roots are found using the quadratic formula:x(1,2) = (-b D) / 2ax1 = (-b + D) / 2a = (-(-6)+3.46) / 22 = 9.46 / 4 = 2.37 (rounded to 3 sig figs)x2 = (-b - D) / 2a = (-(-6)-3.46) / 22 = 2.54 / 4 = 0.63 (rounded to 3 sig figs)The solution is x1=2.37, x2=0.63 Calculators :: Solving Equations :: Quadratic Equation Solver This calculator solves quadratic equations using three different methods : the quadratic formula method, completing the square, and the factoring method. Calculator shows all the work and provides detailed explanation on how to solve an equation. thumb_up 21K thumb_down Get Widget Code Examples Solve x2+3x-4=0 by factoring. Solve 4x2-x-3=0 by completing the square. Solve -2x2-0.5x+0.75=0 using the quadratic formula. Solve 2/3x2-1/3x-5=0. Find more worked-out examples in our database of solved problems. TUTORIAL The most commonly used methods for solving quadratic equations are: 1. Factoring method 2. Solving quadratic equations by completing the square 3. Using quadratic formula In the following sections, we'll go over these methods. If a quadratic trinomial can be factored, this is the best solving method. We often use this method when the leading coefficient is equal to 1 or -1. If this is not the case, then it is better to use some other method. Example 01: Solve x2-8x+15=0 by factoring. Here we see that the leading coefficient is 1, so the factoring method is our first choice. To factor this equation, we must find two numbers a and b with a sum of a + b = 8 and a product of a b = 15 After some trials and errors, we see that a = 3 and b = 5. Now we use a formula x2-8x+15=(x-a)(x-b) to get factored form: x2-8x+15=(x-3)(x-5) Divide the factored form into two linear equations to get solutions. $$ \begin{aligned} x^2 - 8x + 15 &= 0 \\ (x - 3)(x - 5) &= 0 \\ x -3 &= 0 ~~ \text{or} ~~ x - 5= 0 \\ x &= 3 ~~ \text{or} ~~ x = 5 \end{aligned} $$ Example 02: Solve x2-8x=0 by factoring. In this case, (when the coefficient c = 0) we can factor out x out of x2-8. $$ \begin{aligned} x^2 - 8x &= 0 \\ \color{blue}{x} \cdot (x - 8) &= 0 \\ x &= 0 ~~ \text{or} ~~ x - 8 = 0 \\ x &= 0 ~~ \text{or} ~~ x = 8 \end{aligned} $$ Example 03: Solve x2-16=0 by factoring. In this case, (when the middle term is equal 0) we can use the difference of squares formula. $$ \begin{aligned} x^2 - 16 &= 0 \\ x^2 - 4^2 &= 0 \text{ use } a^2 - b^2 = (a-b)(a+b) \\ (x - 4)(x+4) &= 0 \\ x - 4 &= 0 ~~ \text{or} ~~ x + 4 = 0 \\ x &= 4 ~~ \text{or} ~~ x = -4 \end{aligned} $$ This method solves all types of quadratic equations. It works best when solutions contain some radicals or complex numbers. Example 05: Solve equation $ 2x^2 + 3x - 2 = 0$ by using quadratic formula. Step 1: Read the values of a, b, and c from the quadratic equation. (a is the number in front of x2, b is the number in front of x and c is the number at the end) a = 2, b = 3 and c = -2 Step 2:Plug the values for a, b, and c into the quadratic formula and simplify. $$ \begin{aligned} x_1, x_2 &= \frac{-b \pm \sqrt{b^2-4ac}}{2a} \\ x_1, x_2 &= \frac{-3 \pm \sqrt{3^2-4 \cdot 2 \cdot (-2) }}{2 \cdot 2} \\ x_1, x_2 &= \frac{-3 \pm \sqrt{9+ 16 }}{4} \\ x_1, x_2 &= \frac{-3 \pm \sqrt{25}}{4} \\ x_1, x_2 &= \frac{-3 \pm 5}{4} \end{aligned} $$ Step 3: Solve for x1 and x2 $$ \begin{aligned} x_1 = & \frac{-3 \color{blue}{+} 5}{4} = \frac{2}{4} = \frac{1}{2} \\ x_2 = & \frac{-3 \color{blue}{-} 5}{4} = \frac{-8}{4} = -2 \end{aligned} $$ This method can be used to solve all types of quadratic equations, although it can be complicated for some types of equations. The method involves seven steps. Example 04: Solve equation 2x2+8x-10=0 by completing the square. Step 1: Divide the equation by the number in front of the square term. $$ \begin{aligned} 2x^2 + 8x - 10 &= 0 ~~ / ~ \color{orangered}{:2} \\ \frac{2x^2}{2} + \frac{8x}{2} - \frac{10}{2} &= \frac{0}{2} \\ x^2 + 4x - 5 &= 0 \end{aligned} $$ Step 2: move -5 to the right: x2+4x=5 Step 3: Take half of the x-term coefficient $ \color{blue}{\dfrac{4}{2}} $, square it $ \color{blue}{\left(\dfrac{4}{2} \right)^2} $ and add this value to both sides. $$ x^2 + 4x + \color{blue}{\left(\frac{4}{2} \right)^2} = 5 + \color{blue}{\left(\frac{4}{2} \right)^2} $$ Step 4: Simplify left and right side. x2+4x+22=9 Step 5: Write the perfect square on the left. $$ \left(x + 2 \right)^2 = 9 $$ Step 6: Take the square root of both sides. $$ \begin{aligned} x + 2 &= \pm \sqrt{9} \\\ x + 2 &= \pm 3 \end{aligned} $$ Step 7: Solve for x_1 and x_2 . $$ \begin{aligned} x_1 & = +3 - 2 = 1 \\ x_2 & = -3 - 2 = - 5 \end{aligned} $$ Search our database with more than 300 calculators 452 861 664 solved problems Quadratic equations word problems are math problems in which the equations are not given directly. These problems can be solved by using the given information to obtain a quadratic equation of the form $latex ax^2+bx+c$. We can then use the factoring method, the completing the square method or the quadratic formula to solve the equation. Here, we will look at 10 quadratic equations word problems with answers. In addition, you will also be able to practice with 5 word problems to solve. Relevant for Learning to solve word problems of quadratic equations. See problems Relevant for Learning to solve word problems of quadratic equations. See problems The following problems are solved by forming a quadratic equation with the given word problem. Write down the solution. If the sum of two numbers is equal to 17 and their product is equal to 60, what are the numbers? We can use the letters X (smaller number) and Y (larger number) to represent both numbers. Then, from the statement, we can obtain the following equations: $latex X+Y=17~~[1]$ $latex XY=60~~[2]$ Now, we can rearrange equation 1 to get $latex Y=17-X$. Substituting this expression into the second equation, we have: $latex X(17-X)=60$ Expanding the parentheses and rearranging the equation, we have: $latex 17X-X^2=60$ $latex X^2-17X+60=0$ Now, we can factor the equation to solve: $latex X^2-17X+60=0$ $latex (X-12)(X-5)=0$ $latex X-12=0~~$ or $latex ~~X-5=0$ $latex X=12~~$ or $latex ~~X=5$ Therefore, we have: If $latex X=5$, we have $latex Y=17-5=12$. This solution is correct because X 0, the vertex is a minimum.if a < 0, the vertex is a maximum. Since a = 0.00002 and 0.00002 is bigger than 0, the quadratic equation will give a minimum.x =- -0.04/2 0.00002To minimize the cost, the company should produce 1000 tires.Problem #4: You want to frame a collage of pictures with a 9-ft strip of wood. What dimensions will help you maximize the area?Solution:First, we need to find the quadratic equation.Area = l w Perimeter = 2l + 2w9 = 2l + 2w. Solve for l and replace l in the formula for the area.9 - 2w = 2l A = -w2 + 4.5wA = -w2+ 4.5w + 0Since a = -1 and -1 is smaller than 0, the quadratic equation will give a maximum.To maximize the area, l = w = 2.25 If you found the word problems involving quadratic equations on this lesson difficult to understand, review the lesson aboutfactoring trinomialsWord problems involving quadratic equations We've updated our Privacy Policy effective December 15. Please read our updated Privacy Policy and tap \mathrm{lcm} \mathrm{gcf} \mathrm{factors} \mathrm{long\:addition} \mathrm{scientific} See All AI may present inaccurate or offensive content that does not represent Symbolab's views. View Full Notebook Calculating expenditures and measuring distances are only two examples of the kinds of issues that may be solved with the aid of mathematics, which is an important component of our daily lives. Word problem solving is excellent to develop critical thinking skills. The resolution of word problems, on the other hand, may often be difficult since they need the translation of language into mathematical equations. In order to make this procedure more straightforward, a Word Problem Calculator might be an effective tool. The functionality of a word problem calculator, its features, the many kinds of word problems that it can answer, and the practical applications that it has in everyday life are all discussed in this article.2. What exactly is a word problem, then?A mathematical exercise that is written in a textual style and involves logical reasoning and numerical calculation to answer is referred to as a word problem when it is written in this way. In many different fields of study, such as mathematics, algebra, geometry, and physics, students are required to solve word problems. In most cases, these issues demand the interpretation of the information that is provided, the establishment of mathematical equations, and the computation of the appropriate response.Example 1: A Word Problem Containing ArithmeticThe issue is that John has five apples. He goes out and purchases eight more apples. What is the total number of apples that he possesses?Solution: + =When you add 5 and 8, you get 13 apples.Example 2: Word Problem in Algebraic ExpressionsThe problem is that a vehicle rental firm charges a basic price of 50 in addition to an hourly rate of 10. How much will Alice have to pay for a vehicle rental that she has for four hours?Solution:Base Price = 50 , Suppose x be base priceHourly Price = 10 , Suppose y be hourly priceIf Alice took vehicle rental for 4 hour then she need to base price and hourly price as well according to the number of hours.Price paid by Alice = x + 4y(Note: x is independent of number of hours)Substituting the values= 50 + 4 X 10= 50 + 40= 90Alice paid 90 for a vehicle rental that Alice had for four hours.3. It is time to introduce the calculator for word problemsA Word Problem Calculator is a web-based application that is intended to simplify mathematical formulas that are generated from issues that are based on language. It does this by automatically analyzing the issue and executing the relevant computations, which means that it assists people in finding answers more rapidly. The usage of this application is beneficial for professionals, students, and anybody else who is interested in solving complicated issues without the need for manual calculation.Advantages of Utilizing a Calculator for Word Problems:It offers solutions in a step-by-step format.This decreases the likelihood of mistakes caused by humans.Both time and effort are saved.Allows for the solution of a wide variety of mathematical problems.4. The Characteristics of a Calculator for Word ProblemsIn order to improve its usefulness and accuracy, a decent word problem calculator will come equipped with a number of different functions.Principal Characteristics: The process of converting words into mathematical formulae is known as text interpretation. Calculates solutions to a wide variety of problems, including those using probability, geometry, algebra, and arithmetic. Step-by-step solutions are solutions that break down the process of finding a solution for greater comprehension. Displays graphs and diagrams wherever they are appropriate. This is known as graphical representation. Unit Conversion: This feature automatically converts units when solving word problems that need specific measures. Friendly User Interface: Simple input choices for speedy problem-solving; user-friendly interface.5. A Guide to Utilizing the Calculator for Word ProblemsThere is no difficulty involved in using a word problem calculator. Take the following actions:Let's go into the issue: Enter the word problem into the calculator by typing it in or pasting it.The input is processed by the program, and a comprehensive answer is provided when you click the Solve button 'Go'.Proceed with the Steps: You will have a better understanding of the answer if you examine the step-by-step breakdown.Put the Solution into Practice: Make use of the outcome for your homework, tasks, or applications in the real world.Case 1: An Example of a Straightforward Addition ProblemSarah has three oranges and decides to purchase seven more. At this point, how many does she have?The output is three plus seven, which equals ten oranges.Case Study 2: The Problem of Distance, Speed, and TimeIt takes a train three hours to go at sixty miles per hour. Where does it go from here?Distance is equal to speed multiplied by time, which is sixty miles multiplied by three, which equals 180 miles.60 x 3 = 180 miles6. Different kinds of word problemsProblems with words may take many different shapes. Here are some samples of the key categories that are included here.1. Word problems using arithmeticIt is necessary to perform fundamental mathematical operations such as addition, subtraction, multiplication, and division.Example 1:Lisa has a problem: She has 120, but she needs to spend 45 on food. How much is there left?Solution: Total money Lisa had = 120Spent on food = 45Money Left with Lisa = 120 - 45 = 75Example 2:An issue is that a manufacturing generates 250 units every single day. Within a week, how many units are going to be manufactured?Solution: Since, there are 7 days in a weekSo, if we multiply 250 by 7, we get 1,750 units.The answer is 1750 units.2. Algebra Word ProblemsEquations need to be formulated and solved in order to solve these issues, which contain variables that are unknown.Example 1:It is necessary to determine the value of x if 5x equals 40.Solution : 5x = 40$$\ \ x =\frac{40}{5} = 8 $$The value of x is 40.Example 2:The problem is that the total of two numbers is 36, and one of the numbers is twice as large as the other. Figure out the numbers.Solution: Let x be the integer that is less than zero.As a result, the equation $2x + x = 36 3x = 36 x = 12$ is obtained.other number 12 x 2 = 24.It seems that the numerals are 12 and 24.3. Word problems using geometryShapes, areas, perimeters, and volumes are all included in this category.Example 1:Problem: The length of a rectangle is ten centimeters, and its breadth is six centimeters. Locate the region in question.Solution: Area = Length Width = 10 6 = 60 cm.Example 2:A circle has a circumference of 31.4 centimeters, determine the radius, approximate value of which is approximately equal to 3.14.Consider the following equation: Circumference = 2r 31.4 = 2 3.14 r r = 5 cm.The concepts of Probability and Statistics Issues with WordsProbability and the interpretation of data are the topics covered here.Example 1:A bag is filled with four red marbles, five blue marbles, and six green marbles. What is the likelihood of successfully sketching a marble that is red?Probability is $ \frac{4}{4+5+6} = \frac{4}{15} $ .Example 2:The average score on all five examinations is eighty, which is the problem. 75, 82, 78, and 85 were the first four scores that were received. Find the score that is sixth.The solution to this problem is as follows:Average = $ \frac{\mathrm{Sum\ of\ score\ of\ 5\ examination}} {\mathrm{Total\ number\ of\ examinations}} $(75 + 82 + 78 + 85 + x) divided by 5 equals 80, which means that x equals 80 multiplied by 5 minus (75 + 82 + 78 + 85), which equals 80.7. Applications of the Word Problem Calculator in Real-World SituationsNot only is a word problem calculator helpful for students, but it also has a wide range of applications in the real world, spanning a variety of departments and industries.1. Budgeting and Financial MattersThe problem is that a person has a monthly income of 3,500 and a monthly expenditure of 2,100. How much money is saved?The solution is that the savings equal 3,500 - 2,100 = 1,400.2. Travel and LogisticsAn automobile may go a distance of 300 miles while using 10 gallons of petrol. Does it have a fuel economy that is measured in miles per gallon?Efficiency is 300 divided by ten, which equals 30 miles per gallon.3. Construction and Industrial EngineeringThe dimensions of a rectangular area are fifty meters by twenty meters. In order to complete the perimeter, how much fence is required?Perimeter is two times fifty plus twenty, which equals one hundred forty meters.4. Science and medical practiceProblem: The recommended dose for a medication is two milligrams per kilogram of body weight. How much should be provided to a person who weighs 70 kilograms?Solution: Dosage = 2 70 = 140 mg.Final ThoughtsA valuable instrument that facilitates the simplification of difficult mathematical problems, so saving both time and effort, is a word problem calculator. People that deal with numerical difficulties in their everyday lives, including students, professionals, and anybody else, may benefit from using it. This program makes it easier to solve word problems by automating computations and offering answers in a step-by-step format. Both of these features make the process more efficient. In the event that you are confronted with difficulties involving arithmetic, algebra, geometry, or probability, a word problem calculator is an indispensable tool that provides answers that are both correct and speedy. Frequently Asked Questions (FAQ) How do you solve word problems? To solve word problems start by reading the problem carefully and understanding what it's asking. Try underlining or highlighting key information, such as numbers and key words that indicate what operation is needed to perform. Translate the problem into mathematical expressions or equations, and use the information and equations generated to solve for the answer. How do you identify word problems in math? Word problems in math can be identified by the use of language that describes a situation or scenario. Word problems often use words and phrases which indicate that performing calculations is needed to find a solution. Additionally, word problems will often include specific information such as numbers, measurements, and units that needed to be used to solve the problem. Is there a calculator that can solve word problems? Symbolab is the best calculator for solving a wide range of word problems, including age problems, distance problems, cost problems, investments problems, number problems, and percent problems. An age problem is a type of word problem in math that involves calculating the age of one or more people at a specific point in time. These problems often use phrases such as 'x years ago,' 'in y years,' or 'y years later,' which indicate that the problem is related to time and age. Here, we will solve different types of quadratic equation-based word problems. Use the appropriate method to solve them: By Completing the Square By Factoring By Quadratic Formula By graphing For each process, follow the following typical steps: Make the equation Solve for the unknown variable using the appropriate method Interpret the result The product of two consecutive integers is 462. Find the numbers?Solution:Let the numbers be x and x + 1According to the problem,x(x + 1) = 483=> x2 + x 483 = 0=> x2 + 22x 21x 483 = 0=> x(x + 22) 21(x + 22) = 0=> (x + 22)(x 21) = 0=> x + 22 = 0 or x 21 = 0=> x = {-22, 21}Thus, the two consecutive numbers are 21 and 22. The product of two consecutive positive odd integers is 1 less than four times their sum. What are the two positive integers.Solution:Let the numbers be n and n + 2According to the problem,=> n(n + 2) = 4[n + (n + 2)] 1=> n2 + 2n = 4[2n + 2] 1=> n2 + 2n = 8n + 7=> n2 6n 7 = 0=> n2 -7n + n 7 = 0=> n(n 7) + 1(n 7) = 0=> (n 7) (n + 1) = 0=> n 7 = 0 or n + 1 = 0=> n = {7, -1}If n = 7, then n + 2 = 9If n = -1, then n + 2 = 1The two numbers are either 7 and 9 or -1 and 1 A projectile is launched vertically upwards with an initial velocity of 64 ft/s from a height of 96 feet tower. If height after t seconds is reprented by h(t) = -16t2 + 64t + 96. Find the maximum height the projectile reaches. Also, find the time it takes to reach the highest point.Solution:Since the graph of the given function is a parabola, it opens downward because the leading coefficient is negative. Thus, to get the maximum height, we have to find the vertex of this parabola.Given the function is in the standard form h(t) = a2x + bx + c, the formula to calculate the vertex is:Vertex (h, k) = ${\left\{ \left(\dfrac{-b}{2a}\right) ,h\left(\dfrac{b}{2a}\right) \right\}}$=> ${\dfrac{-b}{2a}=\dfrac{-64}{2\times \left(-16\right) }}$ = 2 secondsThus, the time the projectile takes to reach the highest point is 2 seconds${h\left(\dfrac{-b}{2a}\right)}$ = h(2) = -16(2)2 64(2) + 80 = 144 feetThus, the maximum height the projectile reaches is 144 feet The difference between the squares of two consecutive even integers is 68. Find the numbers.Solution:Let the numbers be x and x + 2According to the problem,(x + 2)2 x2 = 68=> x2 + 4x + 4 x2 = 68=> 4x + 4 = 68=> 4x = 68 4=> 4x = 64=> x = 16Thus the two numbers are 16 and 18 The length of a rectangle is 5 units more than twice the number. The width is 4 unit less than the same number. Given the area of the rectangle is 15 sq. units, find the length and breadth of the rectangle.Solution:Let the number be xThus,Length = 2x + 5Breadth = x 4According to the problem,(2x + 5)(x 4) = 15=> 2x2 8x + 5x 20 15 = 0=> 2x2 3x 35 = 0=> 2x2 10x + 7x 35 = 0=> 2x(x 5) + 7(x 5) = 0=> (x 5)(2x + 7) = 0=> x 5 = 0 or 2x + 7 = 0=> x = {5, -7/2}Since we cannot have a negative measurement in mensuration, the number is 5 inches.Now,Length = 2x + 5 = 2(5) + 5 = 15 inchesBreadth = x 4 = 15 4 = 11 inches A rectangular garden is 50 cm long and 34 cm wide, surrounded by a uniform boundary. Find the width of the boundary if the total area is 540 cm.Solution:Given,Length of the garden = 50 cmWidth of the garden = 34 cmLet the uniform width of the boundary be = x cmAccording to the problem,(50 + 2x)(34 + 2x) 50 34 = 540=> 4x2 + 168x 540 = 0=> x2 + 42x 135 = 0Since, this quadratic equation is in the standard form ax2 + bx + c, we will use the quadratic formula, here a = 1, b = 42, c = -135x = ${x=\dfrac{-b\pm \sqrt{b^{2}-4ac}}{2a}}$=> ${\dfrac{-42\pm \sqrt{\left(42\right) ^{2}-4\times 1\times \left(-135\right) }}{2\times 1}}$=> ${\dfrac{-42\pm \sqrt{1764+540}}{2}}$=> ${\dfrac{-42\pm \sqrt{2304}}{2}}$=> ${\dfrac{-42\pm 48}{2}}$=> ${\dfrac{-42+48}{2}}$ and ${\dfrac{-42-48}{2}}$=> x = {-45, 3}Since we cannot have a negative measurement in mensuration the width of the boundary is 3 cm The hypotenuse of a right-angled triangle is 20 cm. The difference between its other two sides is 4 cm. Find the length of the sides.Solution:Let the length of the other two sides be x and x + 4According to the problem,(x + 4)2 + x2 = 202=> x2 + 8x + 16 + x2 = 400=> 2x2 + 8x + 16 = 400=> 2x2 + 8x 384 = 0=> x2 + 4x 192 = 0=> x2 + 16x 12x 192 = 0=> x(x + 16) 12(x + 16) = 0=> (x + 16)(x 12) = 0=> x + 16 = 0 and x 12 = 0=> x = {-16, 12}Since we cannot have a negative measurement in mensuration, the lengths of the sides are 12 and 16 Jennifer jumped off a cliff into the swimming pool. The function h can express her height as a function of time (t) = -16t2 +16t + 480, where t is the time in seconds and h is the height in feet.a) How long did it take for Jennifer to attain a maximum length.b) What was the highest point that Jennifer reached.c) Calculate the time when Jennifer hit the water?Solution:Comparing the given function with the given function f(x) = ax2 + bx + c, here a = -16, b = 16, c = 480a) Finding the vertex will give us the time taken by Jennifer to reach her maximum heightx = ${-\dfrac{b}{2a}}$ = ${\dfrac{-16}{2\left(-16\right) }}$ = 0.5 secondsThus Jennifer took 0.5 seconds to reach her maximum heightb) Putting the value of the vertex by substitution in the function, we get${h\left(\dfrac{1}{2}\right) =-16\left(\dfrac{1}{2}\right) ^{2}+16\left(\dfrac{1}{2}\right) +480}$=> ${-16\left(\dfrac{1}{4}\right) +8+480}$=> 484 feetThus the highest point that Jennifer reached was 484 feetc) When Jennifer hit the water, her height was 0Thus, by substituting the value of the height in the function, we get-16t2 +16t + 480 = 0=> -16(t2 + t 30) = 0=> t2 + t 30 = 0=> t2 + 6t 5t 30 = 0=> t(t + 6) 5(t + 6) = 0=> (t + 6)(t 5) = 0=> t + 6 = 0 or t 5 = 0=> x = {-6, 5}Since time cannot have any negative value, the time taken by Jennifer to hit the water is 5 seconds. Last modified on January 15th, 2025 Problem 1 :If the difference between a number and its reciprocal is , find the number.Solution :Let x be the required number. Then its reciprocal is be its reciprocal.5(x2- 1) = 24x5x2- 5 = 24x5x2- 24x - 5 = 05x2- 25x + 1x - 5 = 05x(x - 5) + 1(x - 5) = 0(5x + 1)(x - 5) = 05x + 1 = 0 or x - 5 = 0x = - or x = 5So, the required number is -or -5.Problem 2 :A garden measuring 12m by 16m is to have a pedestrian pathway that is w meters wide installed all the way around so that it increases the total area to 285 m2. What is the width of the pathway?Solution :From the picture above, length of the garden including pathway is (12 + 2w) and width is (16 + 2w).Total Area = 285 m2Length Width = 285(12 + 2w)(16 + 2w) = 285 192 + 24w + 32w + 4w2= 2854w2 + 56w + 192 - 285 = 04w2+ 56w - 93 = 0Solve the above quadratic equation using quadratic formula.w = -15.5 or w = 1.5Since w is the width of the pathway, it can not be negative. So, w = 1.5.Therefore , the width of the pathway is 1.5 m.Problem 3 :A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hr more, it would have taken 30 minutes less for the journey. Find the original speed of the bus.Solution :Distance covered = 90 kmLet x be the original speed of the bus.Increased speed = x + 15Time taken by the bus in original speed := Time taken by the bus in increased speed := From the given information, the difference between andand is 30 minutes or hour.2700 = x2+ 15xx2+ 15x - 2700 = 0x2+ 60x - 45x - 2700 = 0x(x + 60) - 45(x + 60) = 0(x - 45)(x + 60) = 0x = 45 or x = -60Since x represents the original speed of the bus, it can never be negative. So, x = 45.Therefore, the original speed of the bus is 45 km per hour.Problem 4 :John and Jivanti together had 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they have now is 124. Find the number marbles each one them had initially.Solution :Let x be the number of marbles that john has.Then, the number of marbles that Jivanthi has = 45 - xAfter losing 5 marbles,number of marbles with John = x - 5number of marbles with Jivanti = 45 - x - 5 = 40 - xThe product of number of marbles = 124(x - 5)(40 - x) = 12440x - x2- 200 + 5x = 12445x -x2- 200 = 124x2- 45x + 124 + 200 = 0x2- 45x + 324 = 0x2- 36x - 9x + 324 = 0x(x - 36) - 9(x - 36) = 0(x - 9)(x - 36) = 0x - 9 = 0 or x - 36 = 0x = 9 or x = 36If x = 9,= 45 - x = 45 - 9= 36If x = 36,= 45 - x = 45 - 36= 9So, John had 36 marbles, when Jivanti had 9 marbles or Jivanti had 36 marbles, when John had 9 marbles.Problem 5 :A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in dollars) was found to be 55 minus the number of toys produced in a day, the total cost of production was $750. Find the number of toys produced on that day.Solution :Let x be the number of toys produced in a particular day.Cost of production of one toy (in dollars) := 55 - xTotal cost = Number of toysCost of one toy750 = x (55 - x)750 = 55x - x2x2- 55x + 750 = 0x2- 30x - 25x + 750 = 0x(x - 30) - 25(x - 30) = 0(x - 30)(x - 25) = 0 x - 30 = 0 or x - 25 = 0 x = 30 or x = 25So, the number of toys produced on that particular day is 30 or 25.Problem 6 :The diagonal of a rectangular field is 60 meters more than the shorter side. If the longer side is 30 meters more than the shorter side, find the sides of the field.Solution :Let x be the length of shorter side of the rectangleThen,length of diagonal = x + 60length of longer side = x + 30Using Pythagorean Theorem in the right triangle ABC,(x + 60)2= x2+ (x + 30)2x2+ 602+ 2(x)(60) = x2 + x2+ 2(x)(30) + 302x2+ 3600 + 120x = 2x2+ 60x + 9002x2- x2+ 60x - 120x + 900 - 3600 = 0x2- 60x - 2700 = 0x2- 90x + 30x - 2700 = 0x(x - 90) + 30(x - 90) = 0(x + 30)(x - 90) = 0 x + 30 = 0 or x - 90 = 0 x = -30 or x = 90Because x representsbreadth of the rectangle, it can never be negative. So,x = 90.Therefore,length of the shorter side = 90 mlength of the longer side = 90 + 30 = 120 mProblem 7 :The difference of squares of two positive numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.Solution :Let x be the larger number andy be the smaller number.The square of the smaller number is 8 times the larger number.y2= 8x -----(1)The difference of squares of two numbers is 180.x2- y2= 180Substitutey2= 8x and solve for x.x2- 8x = 180x2- 8x- 180 = 0x2- 18x + 10x- 180 = 0x(x - 18) + 10(x - 18) = 0(x - 18)(x + 10) = 0x - 18 = 0 or x + 10 = 0x = 18 or x = -10Because the numbers are positive, x = -10 can not be accepted. So,x = 18.Substitute x = 18 into (1).y2= 8(18)y2= 144y =144y = 12Therefore, the larger number is 18and the smaller number is 12.Problem 8 :A train travels 360 miles at a uniform speed. If the speed had been 5 miles/hr more, it would have taken 1 hour less for the same journey. Find the speed of the train.Solution :Distance covered = 360 milesLet x be the original speed of the train.If the speed had been 5 km/hr more, it would have taken 1 hour less for the same journey.Increased speed = x + 5Time taken by the train in original speed :=Time taken by the train in increased speed := From the given information, the difference between andand is 1hour.1800 = x2+ 5xx2+ 5x - 1800 = 0x2- 40x + 45x - 1800 = 0x(x - 40) + 45(x - 40) = 0(x - 40)(x + 45) = 0x - 40 = 0 or x + 45 = 0x = 40 or x = -45Since x represents the original speed of the train, it can never be negative. So, x = 40.Therefore, the original speed of the train is 40 miles/hr.Problem 9 :Find two consecutive positive even integers whose squares have the sum 340.Solution :Let x and (x + 2) be the two positive even integers.Sum of their squares = 340x2 + (x + 2)2= 340x2 + (x + 2)(x + 2) = 340x2 + x2+ 2x + 2x + 4 = 3402x2 + 4x + 4 = 3402x2 + 4x - 336 = 0Divide both sides by 2.x2 + 2x - 168 = 0Solve by factoring.x2- 12x + 14x - 168 = 0x(x - 12) + 14(x - 12) = 0(x - 12)(x + 14) = 0x - 12 = 0 or x + 14 = 0x = 12 or x = -14Since the integers are positive, x can not be negative.So, x = 12x + 2 = 14Therefore, the two positive even integers are 12 and 14.Problem 10 :The sum of squares of three consecutive natural numbers is 194. Determine the numbers.Solution :Let x, x + 1 and x + 2 be three consecutive natural numbers.Sum of their squares = 194x2+ (x + 1)2+ (x + 2)2= 194x2+ (x + 1)(x + 1) + (x + 2)(x + 2) = 194x2+ x2+ x + x + 1 + x2+ 2x + 2x + 4 = 1943x2+ 6x + 5 = 1943x2+ 6x - 189 = 0Divide both sides by 3.x2+ 2x - 63 = 0Solve by factoring.x2- 7x + 9x - 63 = 0x(x - 7) + 9(x - 7) = 0(x - 7)(x + 9) = 0x - 7 = 0 or x + 9 = 0x = 7 or x = -9Since the numbers are natural numbers, xcan not be negative.So,x = 7x + 1 = 8x + 2 = 9Therefore, the threeconsecutive natural numbers are 7, 8 and 9. Kindly mail your feedback tov4formath@gmail.comWe always appreciate your feedback.All rights reserved. onlinemath4all.com

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