Parabola word problems with solutions pdf

As we mentioned at the beginning of the chapter, parabola is used to design many objects used daily, such as telescopes, suspension bridges, microphones and radar equipment. Parabolic mirrors, such as those used to illuminate the Olympic torch, have a very unique reflective feature. When the light rays, parallel to the axis of symmetry of the parabola, are directed to any surface of the mirror, the light is reflected directly into the focus. That's why the Olympic torch lights up when it's considered the focus of a parabolic mirror. Figure 12: The reflective feature of parabola parabola mirrors has the ability to concentrate solar energy at one point, raising the temperature by hundreds of degrees in seconds. Thus, parabolic mirrors are featured in many low-cost, energy-efficient solar products such as solar cookers, solar heaters, and even travel-sized fire starters. The cross-section of the travel-sized solar fire starter design is shown in Figure 13. The sun's rays reflect a parabolic mirror toward an object attached to an igniter. Since the igniter is located in the center of the parable, the reflected rays cause the object to burn in seconds. Find the parable equation that simulates the fire starter. Let's say that the apex of the parabolic mirror is the origin of the coordinate plane. Use the equation found in part a to find the depth of the fire starter. Figure 13: The cross-section of the travel-sized solar fire starter solution Is the origin of the coordinate plane, so the parable took the standard form [latex]{x}^{2}=4py[/latex], where [latex]p>0[/latex]. The burner, which is the focus, is 1.7 inches above the top of the dish. So we have [latex] p=1.7 [/ latex]. [latex]\starts with{array}{ll}{x}^{2}=4py\hfill & \begin{array}{cccc}& & \end{array}\text{Standard upward-facing parabola with vertex form (0,0)}\hfill \\ {x}^{2}=4\left(1.7\right)y\hfill & \begin{array}{cccc}& & & & & \end{array}\text{Substitute 1}\text{.7 for }p.\hfill \\ {x}^{2}=6.8y\hfill & \begin{array}{cccc}& & & & \end{array}\text{text Multiply}.\hfill \end{array}[/latex] The dish extends [latex]\frac{4.5}{2}=2.25[/latex] inches on both sides of origin. We can change the 2.25 [latex] x [/latex] equation partially (a) to find the depth of the dish. [latex]\begin{array}{ll}\text{ }{x}^{2}=6.8y\hfill & \text{found in Equation part (a)}.\hfill \\ {\left(2.25\right)}^{2}=6.8y\hfill & \text{Substitute 2}\text{.25 for }x.\hfill \\ \text{ }y\ssas 0.74 \hfill & \text{Solve for }y.\hfill \end{array}[/latex] The dish is about 0.74 inches deep. Balcony-sized solar cookers were designed for families living in India. The top of the dish is 1600 mm in diameter. The sun's rays reflect the parabolic mirror towards the stove, which is 320 mm from the base. A. which simulates the solar cooker. Let's say that the apex of the parabolic mirror is the origin of the coordinate plane and that the parable opens to the right (i.e. the x-axis is its axis of symmetry). B. To find the depth of the stove, use the equation found in part a. Solution SolutionThe x interceptions are the intersection of the parable with the x-axis, which is x-axis points, so their y coordinates are equal to 0. So we need to solve the equation:0 = - x 2 + 2 x + 3Factor on the right side of the equation: -(x - 3)(x + 1)()() = 0x interceptions are: Solve x: x= 3 and x = -1 ,y interceptions are the intersection of the parabola with y axis, which is the points of the y axis, therefore its x coordinates are equal to 0y interception: y = - (0) 2 + 2 (0) + 3 = 3 ,The apex is found by writing the parable equation in the form of a vertebra y = a(x - h) 2 + k and identifying the coordinates of the apex h and k.y = - x 2 coordinates + 2 x + 3 = -(x 2 - 2 x - 3) = -((x - 1) 2 - 1 - 3) = -(x - 1) at 2 + 4Vertex point (1 , 4)You can check all the above points using the following y = - x 2 + 2 x + 3 graph. SolutionSogging points are simultaneous equations 2x + 3y = 7 and y = - 2 x 2 + 2 x + 5.Whereas y = - 2 x 2 + 2 x + 5 , substitute y - 2 x 2 + 2 x + 5 in equation 2x + 3y = 7, as follows2x + 3(- 2 x 2 + 2 x + 5) = 7Write square equation, obtained above in standard form-6x 2 + 8x + 8 = 0All equation conditions 2,-3x 2 + 4x + 4 = 0Solve xx = 2 , x = -

2/3Substitute x in the above solutions 2 x + 3y = 7 to find y.x = 2 , y = 1 and x = -2/3 , y = 25/9seze points are: (2 , 1) and (-2/3 , 29/5). Check the answer graphically below. SolutionTwo parabolic intersection points are concurrent equation solutions y = -(x - 3) 2 + 2 and y = x 2 - 4x + 1.-(x - 3) 2 + 2 = x 2 - 4x + 1-2x 2 + 10 x - 8 = 0-x 2 + 5 x - 4 = 0Solutions: x = 1 and x = 4Reduce one of their equations by finding y:x = 1 in equation y = -(x - 3) 2 + 2, to obtain y = -(1 - 3) 2 + 2 = -2x = 4 in equation y = -(x - 3) 2 + 2, to get y = -(4 - 3) 2 + 2 = 1 Points: (1 , -2) and (4 , 1)Check the answer graphically below. SolutionPoints (-1,-5) and (2,10) are parabola y = 2 x 2 + b x + c graph, so.-5 = 2 (-1) 2 + b (-1) + c10 = 2 (2) 2 + b (2) + c Rewrite the above mentioned system in the form of standards b and c.- b + c = - 72 b + c = 2Sequipment system set out in detail to obtain: c = - 4 and b = 3Equation parabola, which passes through points (-1,-5) and (2,10) is: y = 2 x 2 + b x + c = 2 x 2 + 3 x - 4Reducing the graphic plot to check the answer by drawing y = 2 x 2 + 3 x - 4 graphs and check that the graph goes by points (-1,-5) and (2,10). Solution Parable equation with x interceptions x = 2 and x = -3 can be written as the result of two factors with zeros x yes:y = a(x- 2)(x + 3)Now we use the y interception (0 , 5), which is the point, through which the parabola passes, write:5 = a(0 - 2)(0 + 3)Solve aa = - 5 / 6Equation: y = (-5/6)(x - 2)(x + 3)Graph y = (--5/6)(x - 2)(x + 3) and check whether the chart contains x and y interceptions x = 2 , x = -3 and y = 5.SolutionPoints (0,3), (1,-4) and (-1,4) are parables y = x 2 + b x + c in the graph and therefore there are parable equation solutions. So we write the 3-equation system as follows:3 = a (0) 2 + b (0) + c-4 = a (1) 2 + b (1) + c4 = a (-1) 2 + b (-1) + cc = 3Substitute c to 3 in the last towing equation seaa + b = -7a - b = 1Solve system a and ba = - 3 and b = - 4Equation: y = x 2 + b x + c = -3 x 2 - 4x + 3Plot graphs y = -3 x 2 - 4x + 3 and check, or the graph passes through points (0.3), (1,-4) and (-1.4). Solution The parable equation with a vertical axis of symmetry is y = x 2 + b x + c or in the form of a vertex y = a(x - h) 2 + k when the apex is at the point (h , k). In this case, it is tangent to the horizontal line y = 3 x = -2, which means that its apex is at the point (h , k) = (-2 , 3). Thus, the equation for this parable can be written as follows: y = a(x - h) 2 + k = a(x(x)) 2 + 3 = a(x + 2) 2 + 3Y your graph goes by point (0 , 5). So5 = a(0 + 2) 2 + 3 = 4 a + 3Solve above aa = 1 / 2Equation: y = (1/2)(x + 2) 2 + 3Plot graphs, with y = (1/2)(x + 2) 2 + 3, and check that the graph is tangent to horizontal line y = 3 x = -2, as well as the graph passing through the point (0 , 5). SolutionA line and parable are tangent if they have only one intersection point, which is the point at which they touch. Junction points are found by addressing systemy = m x - 3 and y = 3 x 2 - xmx - 3 = 3 x 2 - xWrite as a standard square equation:3 x 2 - x(1 + m) + 3 = 0Discriminal: Δ = (1 + m) 2 - 4(3) (3)The graphs have one intersection point, if Δ = 0 (for the une solution of the square equation)(1 + m) 2 to 4(3)(3) = 0Solve m(1 + m) 2 = 36 Degrees of decision: m = 5 and m = -7Consuasure the graphical plotter, to check the answer by drawing y = 5 x - 3 (m = 5 solution) graphs , y = -7 x - 3 (m = 7 solution) and y = 3 x 2 - x and check that the two lines are tangent to the parabola y = 3 x 2 - x.SolutionCooting points are found by solving systemy = 2 x + b and y = - x 2 - 2 x + 12 x + b = - x 2 - 2 x + 1Write as standard square equation :- x 2 - 4 x + 1 - b = 0Diriminant: Δ = (-4) 2 - 4(-1) (1 - b)The graphs have two intersection points if Δ > 0 (in the case of two square equation solutions)16 + 4 - 4 b > 0Solve bb < 5Reduce the graphic plotter to check the answer by drawing y = - x 2 - 2 x + 1 graphs and lines with equations y = 2 x + b for values b > 5 , b < 5 and b = 5 to see how many points of intersection points and the line is for each of the following b.Solution Values Intersection points are found in the system = x 2 + x and y = 3 x + 13 x + 1 = x 2 + xWrite as standard square equation:a x 2 - 2 x - 1 = 0 Dissrimiinant: Δ = (-2) 2 to 4(a)(-1) = 4 + 4 aMesters are tangent if they have one point of intersection (in the case of one square equation solution), if Δ = 0. So4 + 4 a = 0Solve aa = -1Equation parabola: y = -x 2 + xGraph y = - x 2 + x and y = 3 x + 1 to check the above answer. SolutionStart: y = x 23 units to the left: y = (x + 3) 2reflection on x axis: y = -(x + 3) 2shift 4 units up: y = -(x + 3) 2 + 4SolutionGiven: y = - x 2 + 4 x + 6 x form by filling the square: y = - x 2 + 4 x + 6 = - (x - 2) 2 + 10Start: y = x 22 units to the right: y = (x - 2) 2reflection x axis : y = -(x - 2) 2shift 10 pieces up : y = -(x + 2) 2 + 10Solution Any points specified in the following graph can be used to find the parable equation. However, x, y interceptions and apex are better ways to find a parable equation, the graph of which is shown below. Two methods of probe resolution are provided:Method 1:Use two x intrusions (-5 , 0) and (-1 , 0) methods to write the parable equation as follows:y = a(x + 1)(x + 5)Use y interception (0 , -5) to write- 5 = a().50 + 1) (0 + 5) = 5 aSolve aa = -1Write the parable equation : y = -(x + 1)(x + 5) = - x 2 -6 x - 5method 2:Use top at (h , k) = (-3 , 4) to record the parable equation in vertex as follows:y = a(x - h) 2 + k = a(4) x + 3) 2 + 4Use y interception (0 , -5) to find a.- 5 = a(0 + 3) 2 + 4Solve above: a = -1y = -(x + 3) 2 + 4 = - x 2 -6 x - 5 5