

Lesson Plan

Grade 10 Academic Math

Lesson: 5 - 5

Unit: Transformations of Quadratic Topic: Solving Problems Involving Quadratics

✚ *homework check:* Principles of Mathematics 10 p. 280 #2, 3, 4, 8, 11, 13

✚ *note:* Solving Problems Involving Quadratics

Since the y coordinate of the vertex represents the maximum or minimum value, it is this value that is usually required as the answer to a problem. There are two ways to find the max or min value. If we use the x intercepts to find the value of the axis of symmetry, we can also use this number as the x value in the equation to find the max or min of the quadratic. Another method for finding the max or min value is to complete the square. We will focus on method one today. Find the maximum/minimum value of the following:

$$a) y = x^2 + 3x - 10$$

$$y = (x - 2)(x + 5)$$

x intercepts: (2,0) and (-5,0)

$$\frac{2 - 5}{2} = \frac{-3}{2}$$

substitute into original to find max.min

$$y = (-1.5)^2 + 3(-1.5) - 10$$

$$y = -12.25$$

The minimum occurs value is -12.225

b) A large canon fires a cannon ball in the shape of a parabolic arch. If the total distance fired is 100m and the target is 85 m away at a height of 10 m, write an equation for this arch in vertex form.

*note: to write an equation in vertex form, we must find the coordinates of the vertex

Since we are given information that requires factored form of the quadratic equation, we start with $y = a(x - r)(x - s)$.

$$y = a(x - 0)(x - 100)$$

$$10 = a(85 - 0)(85 - 100)$$

$$10 = -1275a$$

$$a = -0.0078$$

$$y = -0.0078(x - 0)(x - 100)$$

$$y = -0.0078(x^2 - 100x)$$

$$y = -0.0078x^2 + 0.78x \text{ is the necessary equation}$$

substitute back into original

$$y = -0.0078(50)^2 + 0.78(50)$$

$$y = 19.5m$$

Therefore, the maximum height of the cannonball is 19.5 m making our vertex coordinates (3 , 19.5)

Therefore, the equation of the cannon ball parabola is $y = -0.0078(x - 3)^2 + 19.5$

✚ homework assignment: Principles of Mathematics 10 p. 293 # 7 – 11, 15