Unit 1 Lesson 11: Quadratic Word Problems

Algebraic and Graphic Solutions

Learning Targets

I understand that….

The calculator can be a useful tool in solving quadratic word problems.

A quadratic can be expressed in many forms (standard form/vertex form).

When solving quadratic word problems it is important to identify what the x variable and the y variable represent in the context of the problem.

The methods used to solve quadratic equations are applicable in real life situations.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Process to Find Algebraically | Process to Find Graphically | Sample Questions |
| Roots |  |  |  |
| Vertex |  |  |  |
| x-value given y -value |  |  |  |
| y-value given an x – value |  |  |  |

**Helpful Hints on Finding a Window (Solving Graphically)**

***Sample Question #1:***

A baseball player throws a ball from the outfield towards home plate.

 The ball’s height above the ground is modeled by the equation

 , where represents the height, in feet, and represents time, in seconds. The ball is initially thrown from a height of 6 feet. If necessary, round your answer to the nearest hundredth.

a) What is the maximum height, in feet, that the ball reaches?

b) What is the height of the ball after 2 seconds?

c) How many seconds after the ball is thrown will it again be 6 feet above the ground?

d) When will the ball hit the ground?

***Sample Question #2:***

Barb pulled the plug in her bathtub and it started to drain. The amount of water in the bathtub as it drains is represented by the equation L = -5t2 – 8 t + 120, where L represents the number of liters of water in the bathtub and t represents the amount of time, in minutes, since the plug was pulled.

a) How many liters of water were in the bathtub when Barb pulled the plug? Show your reasoning.

b) Determine, to the nearest tenth of a minute, the amount of time it takes for all of the water in the bathtub to drain.

***Sample Question #3***

A tour company has a ticket price that goes down for every additional person who signs up for a group trip. They charge, per person, , where is the number of people that go on the trip. Their total revenue, , as a function of the number of people who go on the trip is .

1. How many people maximize the revenue for the tour company?
2. What is the maximum number of people that can sign up in order for the tour company to *not* lose money on the trip?

***Sample Question #4***

The table below gives the average amount, in thousands of dollars, of an individual’s retirement fund.

|  |  |
| --- | --- |
| Year | Amount (in thousands of dollars) |
| 1985 | 9 |
| 1990 | 19 |
| 1995 | 45 |
| 2000 | 101 |
| 2005 | 196 |

a) Using x = 1 to represent 1985, find a quadratic regression model to represent this data rounding all coefficients to the nearest thousandth.

b) To the nearest thousand dollars, what will the fund be worth in 2015?

**Sample Question #5**

Which value, to the nearest hundredth, is a solution of if and ?