

Name:
Date:
Period:

U5.PT

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UNIT 5 PERFORMANCE TASK

The problems below will challenge you to pull together many concepts and skills of algebra that you have learned. Choose 2 problems to complete on a separate sheet of paper. Be sure to answer and label all parts of the question. **Show all your work (diagrams, tables or computations)**. If you do the work in your head, explain in writing how you did the work. You may answer 3 for extra credit.

BIG IDEA Solving Equations & Inequalities

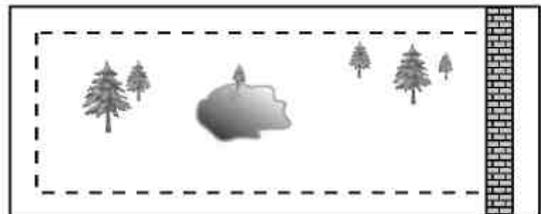
How are the real solutions of a quadratic equation related to the graph of the related quadratic function?

1. In order to celebrate the completion of the Tanzanian hospital, a feat that successfully provided a large scale health center to three adjacent towns, Joshua and his twin brother, Malachi, decided to sail around the southern tip of Africa to Equatorial Guinea to watch the opening of the *Africa Cup of Nations*. Shortly into their trip they encountered the storm of the century, and awoken on a deserted island with only a hatchet, a sextant, and two small flares. A rescue helicopter is dispatched several hours after their boat capsizes.
 - a. The value of h is 0 when Joshua fires the first flare. The flare will reach a height of 252 feet after 7 seconds and will hit the ground after 10 seconds. Let t be the time, in seconds, that has elapsed since Joshua fired his flare, and h be the height, in feet, of the flare. Write *an* equation in terms of t and h that models the trajectory of the first flare. Show or explain how you got your answer.
 - b. The helicopter is flying at an altitude of 320 feet. Will the flare pass the elevation of the helicopter? Show or explain how you got your answer.
 - c. Nine seconds after Joshua fires the first flare, Malachi fires a second flare from a cliff 110 feet above the ground. He calculates that 5 seconds after firing, the flare will reach its maximum height of 360 feet. The flare is in flight for a total of 11 seconds. Write *an* equation in terms of t and h that models the trajectory of the second flare. Show or explain how you got your answer.
 - d. Find the interval of time in which the second flare will pass within the pilot's line of vision. (*Hint: This will be the space of time in which the flare is equal to or greater than the elevation of the helicopter.*)

BIG IDEA Modeling

How can you model real-world situations using a quadratic function?

2. A town is planning a playground. It wants to fence in three sides of a rectangular space using an *existing brick wall*. What is the greatest area it can fence in using 100 feet of donated fencing?

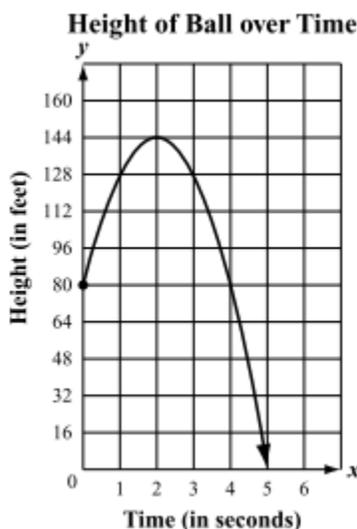


- Let l be the length of the playground. Write an expression for the width of the playground in terms of l .
- Write a quadratic equation to model the area of the playground.
- What is the value of l that produces the maximum area? Show or explain how you got your answer.
- What is the maximum area that the fence can enclose? Show or explain how you got answer.

BIG IDEA *Function*

How do key features of the graph of a quadratic function help you to represent a function using an equation?

- The graph below represents y , the height in feet of a ball, x seconds after the ball was thrown upward from a bridge that crosses a river.



- What is the y -intercept of the graph and what does it represent in the context of this situation?
- What is the vertex of the graph and what does it represent in the context of this situation?
- Write an equation for the ball's trajectory in standard form. Show or explain how you got your answer.
- Suppose the ball is thrown from the same height but with greater force. If the maximum height of the ball increased by 12 feet, write the equation, in vertex form, of the graph that results from this change. Show or explain how you got your answer.