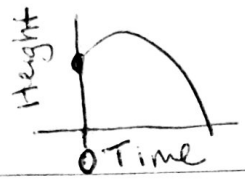
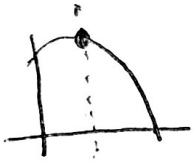
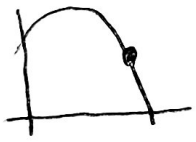
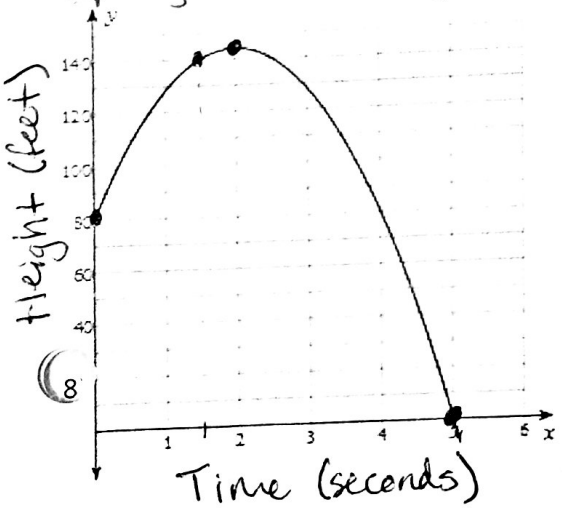
6.1 Quadratic Applications

ifferent parts of the parabola can tell you certain pieces of information, and you will need to know each of ese to be able to interpret the graph.

Critical Part	Graph	Key words
~~Intercept~~ y-intercept		Starting height Initial height
~~Intercepts~~ x-intercepts		Hit the ground
~~part of vertex~~ y-part of vertex		Max height Min height
~~part of vertex~~ x-part of vertex		Time of max/min height
Random coordinate point		What is the height at ___ seconds?

Example 1: Use the graphs to make predictions and estimate key features of a given scenario.

1) A rocket carrying fireworks is launched from a hill above the lake. The rocket will fall into the lake after exploding at its maximum height. The rockets height above the surface is modeled by the parabola below.



i) At what height does the rocket start?

y-intercept: 80 ft

ii) How high is the rocket after 1.5 seconds?

140 ft

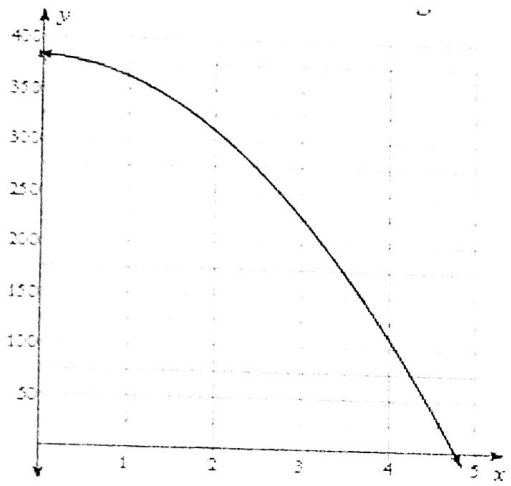
iii) At what height will the rocket explode?

y-part of vertex: 145 ft

iv) How long will it take the rocket to hit the lake?

x-intercept: 5 seconds

2) A rock is thrown from the top of a tall building. The distance, in feet, between the rock and the ground seconds after it is thrown is modeled by the parabola below.



i) At what height is the rock thrown?

y-intercept

ii) How long after the rock is thrown is it 370 feet off the ground.

iii) How high is the rock after 3 seconds?

iv) If a person is walking under the building 4 seconds after the rock is thrown, will the rock hit the person?

v) How long does it take for the rock to hit the ground?

3) The path of an arrow shot in the air can be modeled by the function: , where is the height, in feet, of the arrow above ground seconds after it is released.

i) What is the maximum height the arrow reaches?

y of vertex

ii) After how many seconds does it reach that height?

x of vertex

iii) How high will the arrow be at 6 seconds? At 8 seconds?

iv) At about what time will the arrow land on the ground?

x-intercept

4) A ball is thrown into the air. The path of the ball is represented by the equation where represents height and represents time.

i) What is the ball's maximum height?

ii) How long does it take for the ball to hit that maximum height?

iii) How high will the ball be after 5 seconds? 2 seconds?

iv) At what time will the ball bounce on the ground?

cer seconds, a ball is tossed in the air from ground level and reaches a height of given by the equation:

i) What is the height after 3 seconds?

ii) What is the maximum height the ball will reach?

iii) After how many seconds will the ball hit the ground?

6) A rocket carrying fireworks is launched from a hill above the lake. The rocket will fall into the lake after exploding at its maximum height. The rockets height above the surface is given by $h = -16t^2 + 80t + 96$

h = height (feet)
t = time (sec)

i) At what height does the rocket start?

y-intercept: 96 ft

ii) How high is the rocket after 1.5 seconds?

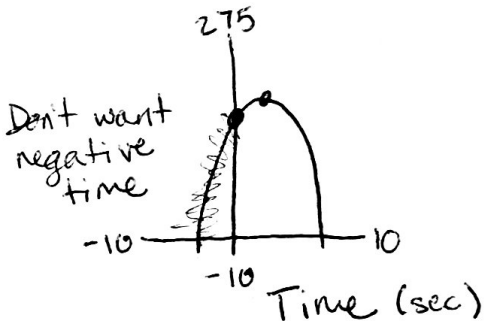
180 ft

iii) At what height will the rocket explode?

y-part of vertex: 196 ft

iv). After how many seconds will the rocket hit the lake?

x-intercept: 6 seconds



7) A softball is being thrown from the top of a hill to a friend at the bottom of the hill. The equation that models the curve the ball takes can be expressed by: . Use this equation to answer the following questions.

i) How high is the ball after 2 seconds? 5 seconds?

ii) What is the maximum height the ball reaches? How long does it take to reach the maximum height?

iii) At what time will the ball hit the ground?

iv) What was the starting height of the softball?

~~6.2 Writing Quadratic Equations~~