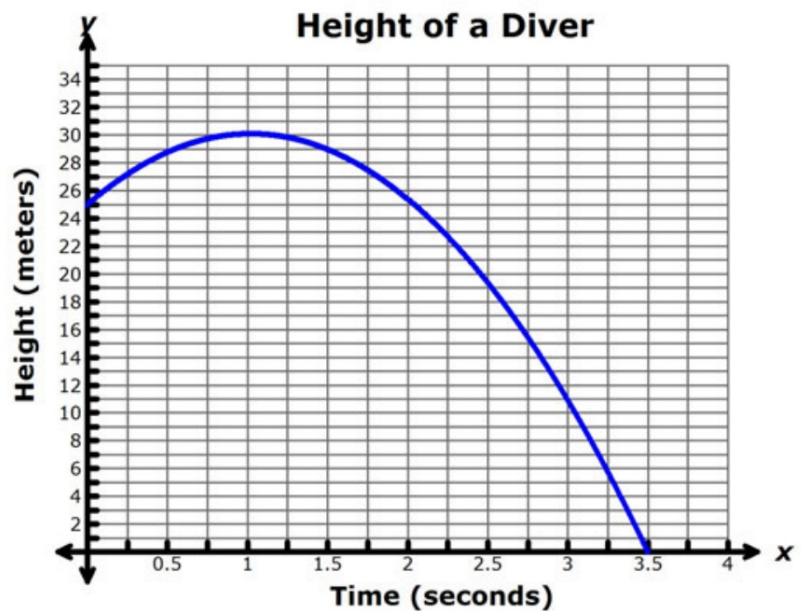


Bellwork: Algebra 1

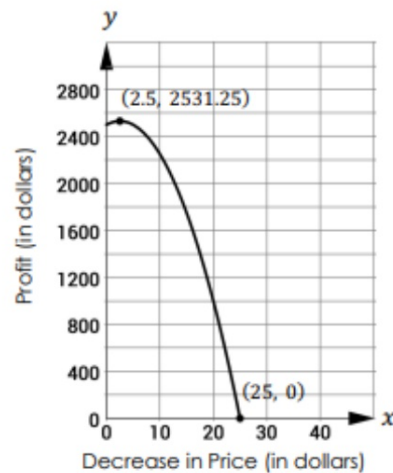
1. We made it to another Friday!!
2. Take out your homework.
3. Check your folder to get your graded work.
4. You need a calculator and your Algebra Nation Book
5. Answer the following question on your FRIDAY Bellwork:

Why is the graph only in the first quadrant?

Think of a real world situation when the x-values or y-values of a quadratic could be negative?



1. The function below shows the revenue for t-shirt sales. For every \$1 decrease in price, 5 more t-shirts can be sold.



Part A: What is the maximum of this graph and what does the maximum represent?

Maximum profit that can be made is \$2,531.25

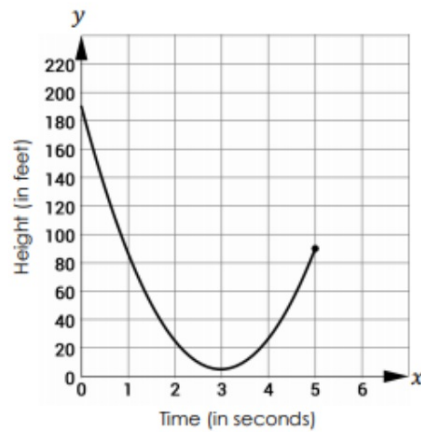
Part B: What is the y-intercept of the graph? What does it represent?

(0, 2500) Original price before price decreases

Part C: Does the graph have zero(s)? If so, identify the zero and what it represents.

(25, 0)

3. The height over time graph of the first jump, down and back up, of a bungee jumper.



Part A: What is the minimum of this graph and what does it represent?

About 5 feet, closest point to the ground for the jumper

Part B: What is the y -intercept of the graph? What does it represent?

(0,190) Initial height before they jump

Part C: Does the graph have zero(s)? If so, identify the zero and what it represents.

No

4. Describe two real-world situations that could be modeled by a quadratic function.

An object falling in relation to the time it takes to hit the ground

Section 5: Quadratic Equations and Functions –

Part 1

Section 5 – Topic 1

Real-World Examples of Quadratic Functions

P. 121

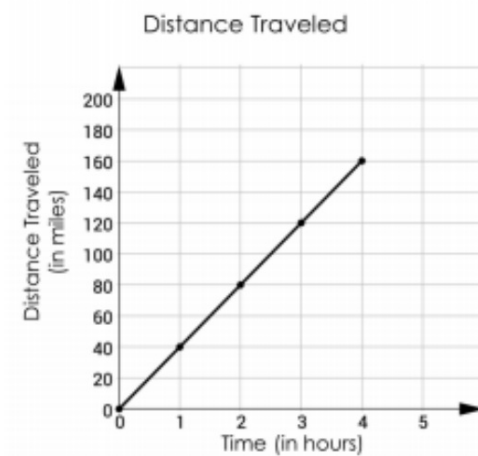
Let's revisit linear functions.

Imagine that you are driving down the road at a constant speed of 40 mph. This is a linear function.

Time (in hours)	Distance Traveled (in miles)
1	40
2	80
3	120
4	160

We can represent the distance traveled versus time on a table (to the right).

We can represent the scenario on a graph.



We can represent the distance traveled $d(t)$, in terms of time, t , with the equation $d(t) = 40t$.

Linear functions always have a constant rate of change. In this section, we are going to discover a type of non-linear function.

Consider the following situation.

Liam dropped a watermelon from the top of a 300 ft tall building. He wanted to know if the watermelon was falling at a constant rate over time. He filmed the watermelon's fall and then recorded his observations in the following table.

Time (in seconds)	Height (in feet)
0	300.0
1	283.9
2	235.6
3	155.1
4	42.4

16.1
48.8
80.5
112.7

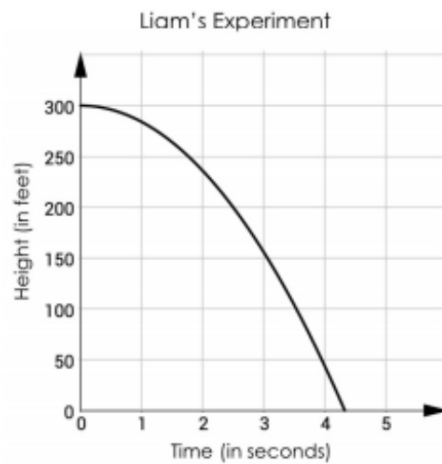
What do you notice about the rate of change?

Not constant

Why do you think that the rate of change is not constant?

gravity

Liam entered the data of the falling watermelon into his graphing calculator. The graph below displays the first quadrant of the graph.



What is the independent variable?

time (x-axis)

What is the dependent variable?

height (y-axis)

Liam then used his calculator to find the equation of the function, $h(t) = -16t^2 + 300$.

-9.8m

-16 300

$y = mx + b$

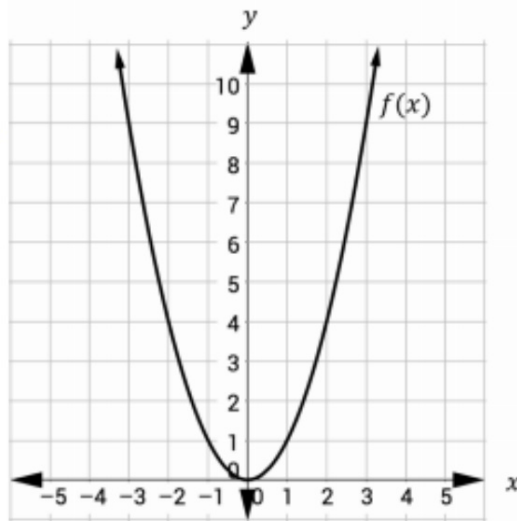
Important facts:

- We call this non-linear function a quadratic
- The general form of the equation is

$$f(x) = ax^2 + bx + c$$
$$y = ax^2 + bx + c$$

The graph of $f(x) = x^2$ is shown below.

$$y = x^2$$



- This graph is called a parabola.

(parent function)

Why did we only consider the first quadrant of Liam's graph?

positive time & height

In Liam's graph, how long did it take for the watermelon to hit the ground?

≈ 4.2 seconds

This is also the x -intercept.

- The x -intercept is the zero of the function.
- It is the solution of the function when it is set equal to zero.

There is only one zero to Liam's equation. Describe a situation where there could be two zeros.

air plane

What about no zeros?

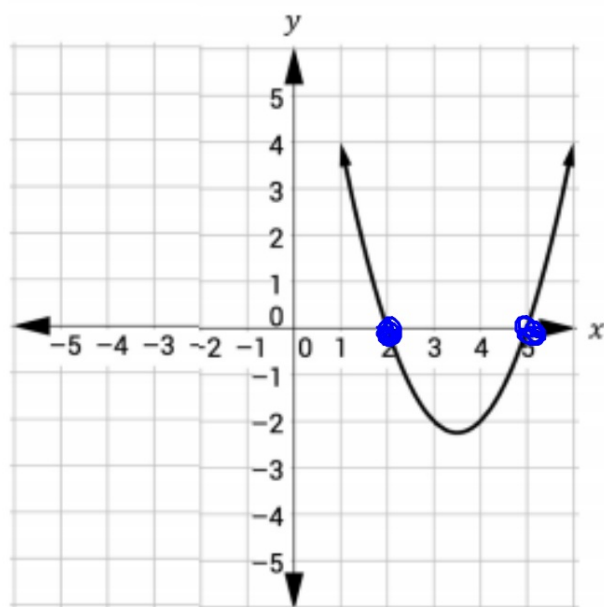
bungee jumping
swinging

To solve a quadratic equation using a graph:

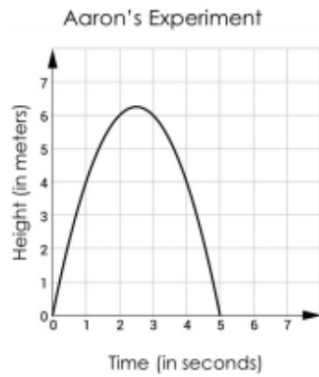
- Look for the x -intercepts of the graph.
- The zeros are the values where the graph intercepts the x -axis.

Let's Practice!

1. What are the zeros of the quadratic equation graphed below?



2. Aaron shot a water bottle rocket from the ground. A graph of height over time is shown below.



- a. What type of function best models the rocket's motion?

quadratic

- b. After how many seconds did the rocket hit the ground?

5 seconds

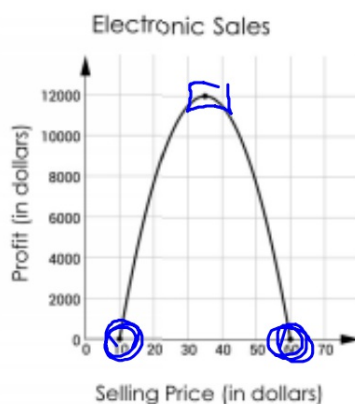
- c. Estimate the maximum height of the rocket.

~ 6.1 meters

The maximum or minimum point of the parabola is called the vertex.

BEAT THE TEST!

1. Jordan owns an electronics business. During her first year in the business, she collected data and created the following graph showing the relationship between the selling price of an item and the profit.



Part A: Circle the zeros of the quadratic function graphed above.

Part B: What do the zeros represent?

not making profit

Part C: Box the vertex of the graph.

Part D: What does the vertex represent?

Maximum profit

EXIT TICKET

SUPER BOWL MATH!

$$\text{Red 49ers helmet} = \text{Gold 49ers helmet}$$

$$\text{Red 49ers helmet} + \text{Red 49ers helmet} + \text{Gold 49ers helmet} = 57$$

$$\text{Katie Couric} = 26 \div \text{Tom Brady's helmet}$$

$$\text{Tom Brady's helmet} \times \text{Gold 49ers helmet} = 38$$

$$\text{Red 49ers helmet} + \text{Gold 49ers helmet} + \text{Katie Couric} + \text{Tom Brady's helmet} = ?$$

