CHAPTER 12: QUADRATIC EQUATIONS

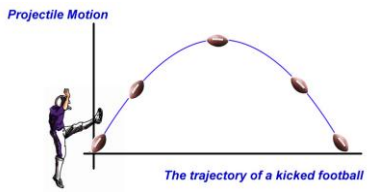
Graphing Quadratics Part #3 - Projectile Motion

OBJECTIVES

- I can create a quadratic equation that models projectile motion
- I can use a quadratic equation that models projectile motion to find maximum height, time in air and distance traveled

PART 1: PROJECTILE MOTION

- When an object is thrown in the air it is considered a **projectile.**
- The path of a projectile is a parabola (excluding air resistance)



PART 1: PROJECTILE MOTION

These problems use a **FUNCTION** that represents the object's height which depends on

1. The force of gravity pulling it back down (always -16 when dealing with ft/sec, and on the squared term)
2. The initial velocity (v_0) at which it was thrown/dropped (always goes with the middle term)
3. The initial height (s_0) from which it was thrown/dropped

$$s(t) = -16t^2 + v_0t + s_0$$

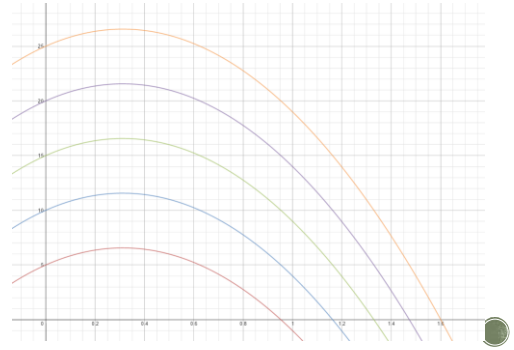
- t represents time (usually in seconds). It is what we're usually trying to solve for!

PART 1: PROJECTILE MOTION

1. $y = -16x^2 + 10x + 5$
2. $y = -16x^2 + 20x + 5$
3. $y = -16x^2 + 30x + 5$
4. $y = -16x^2 + 40x + 5$
5. $y = -16x^2 + 50x + 5$

PART 1: PROJECTILE MOTION

1. $y = -16x^2 + 10x + 5$
2. $y = -16x^2 + 10x + 10$
3. $y = -16x^2 + 10x + 15$
4. $y = -16x^2 + 10x + 20$
5. $y = -16x^2 + 10x + 25$



PART 1: PROJECTILE MOTION

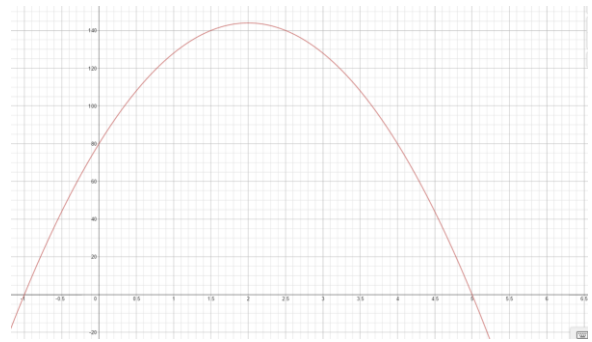
An object is launched directly upward at 64 feet per second from a platform 80 feet high. Write the function for the height of this object at any given time (t seconds)

s(t) = _____

When will the object reach it's maximum height? (What is this really asking?)

What will that maximum height be? (What is this really asking?)

GRAPH



PART 1: PROJECTILE MOTION

B) A baseball is thrown straight up in the air with an initial velocity of 29 feet per second from a point exactly 6 feet off the ground. Write the function for the height of this object at any time (t seconds)

s(t) = _____

When will this object return and hit the ground? (What is this really asking?)

GRAPH

CAN YOU?? PROVE IT!!

- I can create and use a quadratic equation that models projectile motion to find maximum height, time in air and distance traveled

1. Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His initial height was 480 feet. His initial upward velocity was 16 feet per second.

Write an equation that would model his height as a function of time. Then use your equation to answer the following questions.

1. How long did it take to reach max height?
2. How high did Jason get?
3. How long did it take for him to hit the water?