

What's Going On?

Checking In

Minds on

What's my equation?

Action!

Applications of Quadratics

Consolidation

Gimme 5?

Learning Goal - I will be able to create equations to model real-world scenarios.

Minds on**What's my Equation?**

What is the equation of a parabola with vertex $(-6, 8)$ and step pattern $(-4, -12, -20, \dots)$?

$$a = -4 \quad h = -6 \quad k = 8$$

$$y = -4(x + 6)^2 + 8$$

What is the equation of the parabola with vertex (4, 3) that goes through the point (1, -6)?

h k

x y

$$y = a(x-h)^2 + k$$

$$-6 = a(1-4)^2 + 3$$

$$-6 = a(-3)^2 + 3$$

$$-6 = a(9) + 3$$

$$\frac{-9}{9} = \frac{a(9)}{9}$$

$$a = -1$$

$$y = -1(x-4)^2 + 3$$

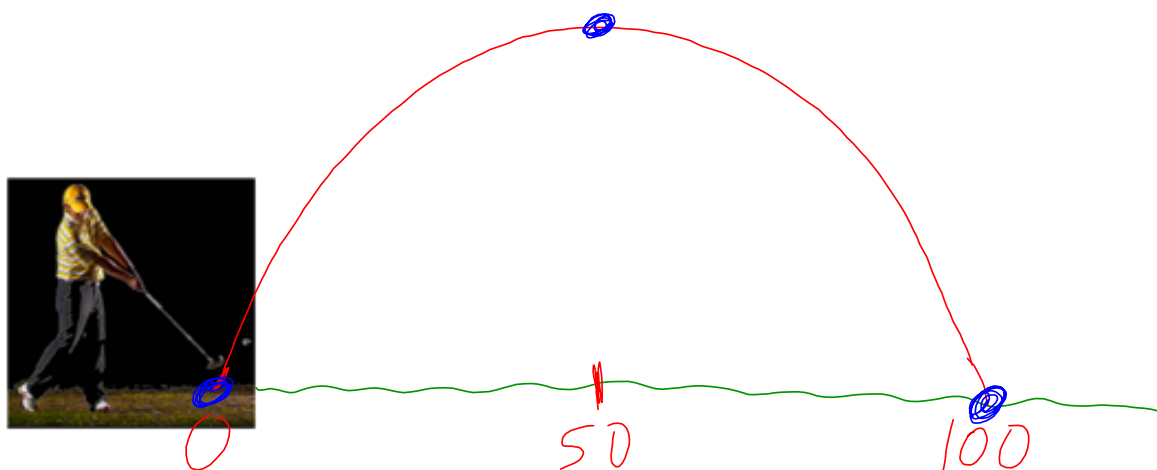
Action!

Parabolas in Real Life

One very common application of parabolas is projectile motion.

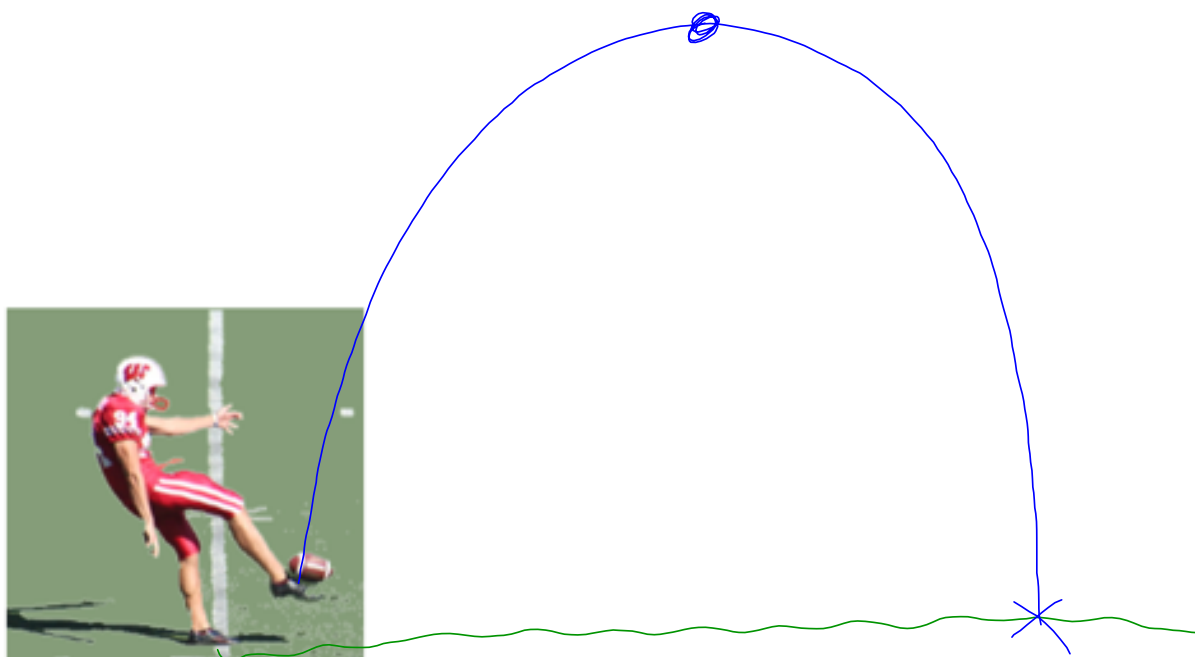
A snowboarder going off a jump, a golf ball being hit down the fairway and an angry bird being shot from a slingshot all follow parabolic paths.

This means that they can all be represented in quadratic equations.

Action!**Sketching Some Curves**

The vertex represents: the highest point / max height of the ball.

The zeroes represent: where the ball hits / is on the ground.

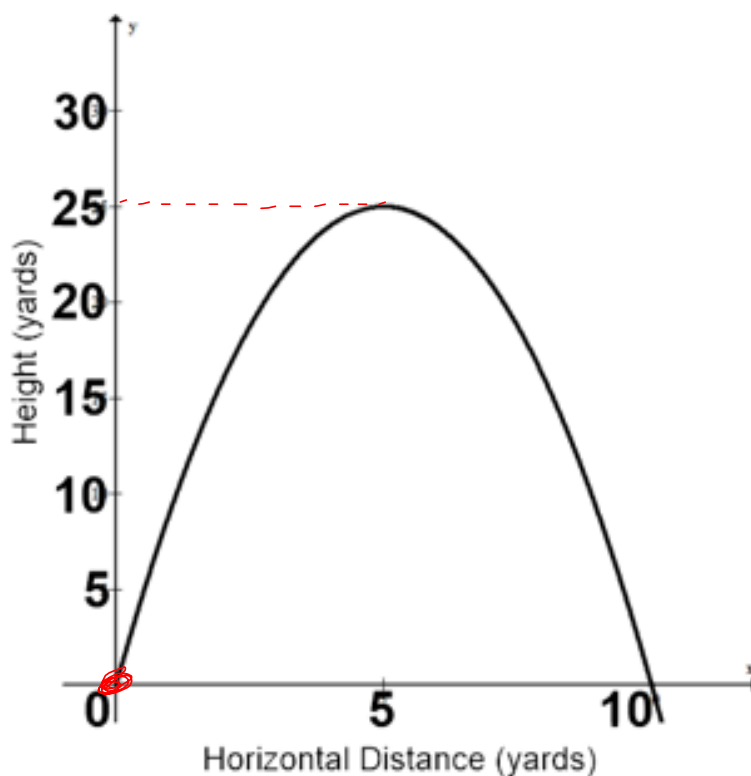
Action!

The vertex represents: max height

The zeroes represent: when / where the football is on the ground

Action!**Getting Information from a Graph**

The graph below shows the path of a golf ball.



a. What is the maximum height reached by the ball?

about 25 yds

b. How far did the ball travel?

10 yds

c. How high off the ground was the ball when it was hit?

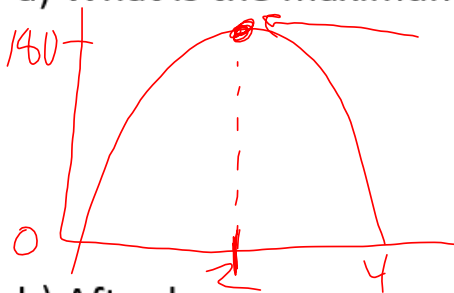
0 yds

Action!

Fireworks

The path of a firework is modelled by the relation $h = -4.9(t - 2)^2 + 180$ where h is the rocket's height above the water, in meters, and t is the time, in seconds.

a) What is the maximum height of the firework?



180m

y-value of vertex
is max
height

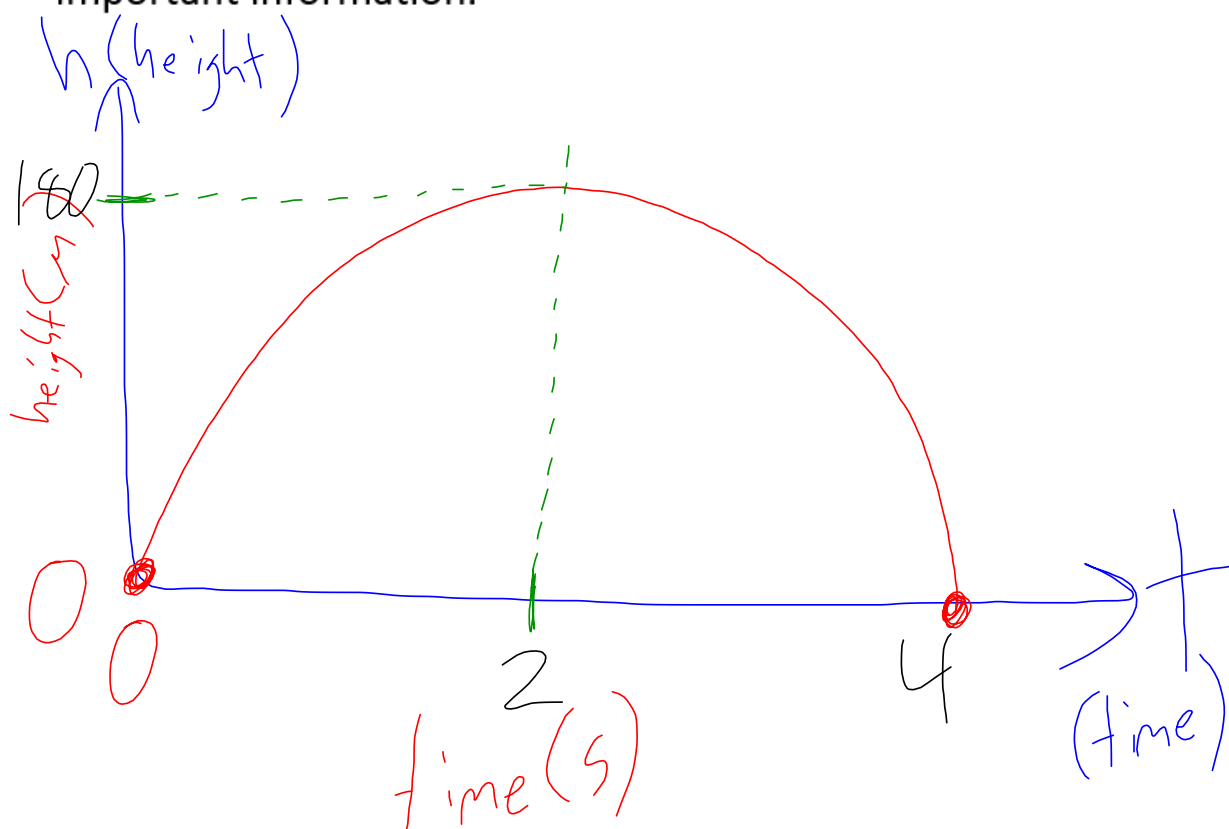
b) After how many seconds does the rocket reach its maximum height?

2 seconds

c) What is the height of the rocket 6 seconds after it is launched?

The rocket landed after 4 seconds!
This question is nonsense!

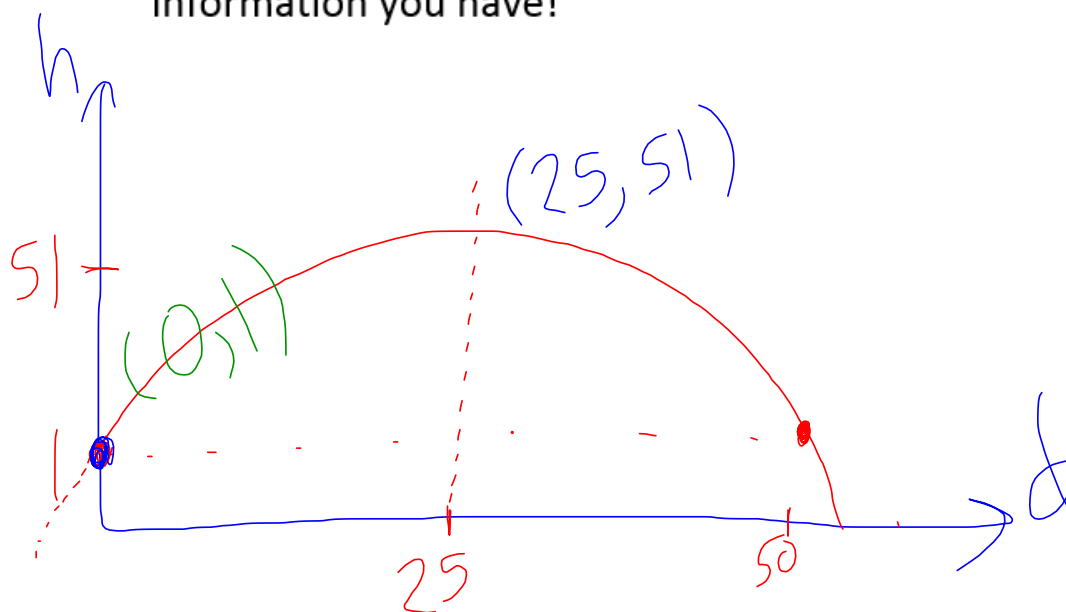
d) Draw a rough sketch of the path of the firework, labelling all important information.



Action!**Angry Birds**

An Angry Bird is launched from a sling shot from a height of 1m. The bird reaches its max height of 51m after travelling a horizontal distance of 25m.

- a. Draw a sketch of the situation. Be sure to label all information you have!



Action!

An Angry Bird is launched from a sling shot from a height of 1m. The bird reaches its max height of 51m after travelling a horizontal distance of 25m.

- b. Determine a quadratic equation that models the path of the Angry Bird.

$$\text{Vertex} = (25, 51)$$

$$\text{Point} = (0, 1)$$

$$y = a(x-h)^2 + k$$

$$1 = a(0-25)^2 + 51$$

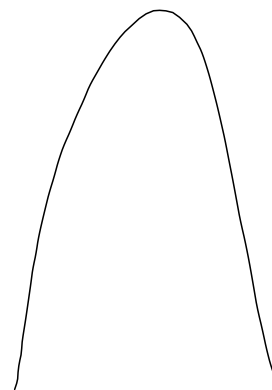
$$1 = a(-25)^2 + 51$$

$$1 = a(625) + 51$$

$$\frac{-50}{625} = \frac{a(625)}{625}$$

$$a = -0.08$$

$$y = -0.08(x-25)^2 + 51$$



Action!

An Angry Bird is launched from a sling shot from a height of 1m. The bird reaches its max height of 51m after travelling a horizontal distance of 25m.

c. How high was the angry bird after it had travelled 40 m?

$$y = -0.04(x - 25)^2 + 51$$

$$y = -0.04(40 - 25)^2 + 51$$

$$y = -0.04(15)^2 + 51$$

$$y = -0.04(225) + 51$$

$$y = -14 + 51$$

$$y = 37$$

∴ the bird is 37m off the ground

Action!

It's Good?

Ray Finkle kicks a field goal that hits the ground 40 yards down field, reaching a maximum height of 80 yards.

- a. Draw a diagram of the situation. Be sure to include all the information you have!

Action!

It's Good?

Ray Finkle kicks a field goal that hits the ground 40 yards down field, reaching a maximum height of 80 yards.

- b. Determine a quadratic equation to model the path of the football.

Action!

It's Good?

Ray Finkle kicks a field goal that hits the ground 40 yards down field, reaching a maximum height of 80 yards.

- c. Ray was trying to make a 38 yard field goal. If the uprights are 7 yards off the ground, did he make the kick?

Consolidation

Gimme 5

For each part of the unit indicated below, give yourself a ranking from 1 to 5. A 5 means you are totally comfortable with the concept, a 1 means you are completely lost.

Graphing vertex-form equations

Determining equations from graphs

Determining equations given the vertex and a point

Getting information from the graph of a real-world situation

Finding equations for real-world situations