

Role Model Video: Video Game Production Designer- Shaun McCabe

Keyword: Quadratics

Common Core Standards: A. SSSE. 3a,3b, 3c
A. CED. 1, 2, 3, 4
F. IF. 4, 5, 6, 7, 8, 9

Synopsis: The making of video games often involves a lot of math concepts. This lesson uses the idea of a very popular game today, Angry Birds! The birds are always bombing those pigs! The flight path of each bird just happens to be parabolic. In this lesson, the students will use Fathom to find the flight path.

Notes: Students should have worked with Fathom some and understand the basic working of the programs and its menus. You could extend this lesson by using the motion detector probes and collecting your own data by setting up your own game.

Angry Birds

"The Parabolic Version"

Materials: Fathom, calculator, pencils

Goal: You need to figure out which bird hit the King Pig and Mustache Pig. You should also be able to determine which bird flew the highest and traveled the longest.

Directions:

Red Bird, Yellow Bird, and Black Bird are angry with the pigs. The pigs stole the bird's eggs. The birds want their eggs back and will stop at nothing to get them back. The flight of the birds can be modeled with a parabola. Use "x" as the distance and "y" as the height.

Each bird will come with different characteristics about the flight. You should be able to answer the following questions for each bird.

1. What is the equation that best describes the flight path?
2. What is the maximum height your bird flew?
3. What is the axis of symmetry of the bird's flight?
4. What was the total distance your bird traveled?
5. What bird flew the highest?
6. What bird traveled the longest?
7. Finally, figure out which one of the birds hit King Pig located at (21, 19.5) and Mustache Pig located at (9, 21).

Red Bird: He starts his flight from point (10, 0). His flight path reaches a maximum height of 18 yards and lands at the point (38, 0).

Yellow Bird: His flight path can be modeled by the quadratic equation $y = -x^2 + 14x - 24$.

Black Bird: The table below contains data from part of his flight path.

x	8	9	10	11	12	13	14	15	16	17
y	0	7.5	14	19.5	24	27.5	30	31.5	32	31.5

Open Fathom. Drag a new table down. Add the new attributes: distance and height. ENter in the data for the bird you are working with. Drag down a new graph. Drop the distance attribute on the x-axis and the height attribute on the y-axis. You can use Plot Function under the Graph menu to plot functions such as the horizontal line for a maximum height or the quadric equation. To set up your quadratic function, you will need to drag down 3 sliders. Label them a, b, and c and then plot the function $ax^2 + bx + c$. The sliders should now control the function. Drag the sliders until the fight path matched the characteristics you have been given.