



Algebra 2 with Trigonometry Angry Birds Project



In small cooperative learning groups (2-3 students), your task is to use <http://www.desmos.com> to neatly find and model the parabolic paths traveled by 4 angry birds to see if they hit the target pigs.



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

Step 1: The data for each bird is attached. For each bird, you need to determine the following:

- 1) The maximum height
- 2) The axis of symmetry
- 3) The distance traveled
- 4) The function on which the pig travels in one of the following forms:

$$f(x) = ax^2 + bx + c \quad g(x) = a(x - h)^2 + k \quad h(x) = a(x - p)(x - q)$$



Step 2: Create a graph in Desmos representing each bird's trajectory. Include the pigs on the graph. (Suggestions: Figure out the paths traveled first. Then upload the image files of the birds, pigs, and backdrop.)

Step 3: Answer the following questions:

- 1) Which bird flew the highest?
- 2) Which bird flew the longest?
- 3) Which bird hit which pig?



Directions in Desmos:

STEP 1: Create a Desmos account (everyone needs an account but only one person needs to submit this portion of the project)

You can either sign in with your HPS Google Account or under your own e-mail address and password. You each need an account so you can save and share your work.

STEP 2: Figure out the functions for the trajectories of the four different birds. Use function notation, i.e.: $f(x)$, $g(x)$, $h(x)$, $i(x)$. Include domain restrictions on the functions so that they appear in the first quadrant only. For any function that makes contact with the pig, stop the function at the point of impact.

STEP 3: Upload the photos of the Angry Birds and Backdrop

Save the file folder of images to your desktop. In Desmos, click on the (+) button and click on image → Upload. Once the images are uploaded Color Code your parabolas (use dashed and solid styles to distinguish who hit the pig) and make folders for each bird and one folder for the pigs. *See how-to list for animating pictures.*

STEP 4: When you're done, get the link to your work. This can be done with the share button in the top right corner of the website, *if you're logged in.*



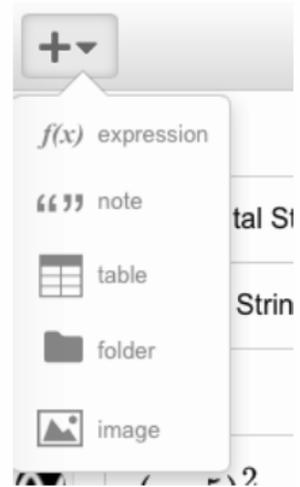
Some quick how-tos:

How do I turn graphs on and off?

Click the graph icon to turn graphs on or off.

Note that if you click and hold a graph icon, it will give you color, transparency, and

style options.



How do I make my parabolas thicker?

Click on the  tool on the top right and select "Projector Mode"

How do I create domain restrictions?

After typing in the equation for the graph, put in brackets { } and write a compound inequality.

$$y = -x \{ -3 < x < .75 \}$$

How do I make folders?

Press the big + sign in the top left corner below the black bar. You'll get a menu like the one above. "Folder" is the fourth option. You can then drag your equations into folders.

How do I change colors?

Click the gear icon at the  top of the equations list:

From there, if you click on a graph icon  it will give both color and style options:



How do I have Desmos find the line of fit for me?

Type in the kind of function you are trying to create. For example, type in $f(x) = a|x - h| + k$ and when it says

add slider:

click on "all" and in another line type (h, k) to create a vertex point that you can drag.

How do I share this project with people in my group?

Click on the  icon and send an email directly to the person or copy the link into an email.

How do I animate an image file?

First the image file needs to be uploaded. Then click on the image file where it lists its coordinates and type over the x and y values of the coordinates. Each bird will need a different slider value for x. If I wanted a particular bird to move along the trajectory for $f(x)$ I would change its coordinates to $(a, f(a))$, if I wanted another bird to move along $g(x)$ I would change its coordinates to $(b, g(b))$.



How do I make the object move? Slow it down? Speed it up?

Use the  to make the object move. Use the  to speed up or slow down.

How do I put 'x' restrictions on a slider?

Click on the slider and change its parameters



