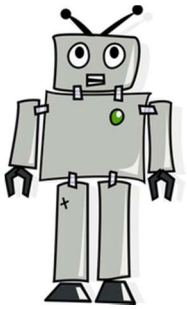
ALGEBRA 2 B – UNIT 5 PROJECT – ROBOT DESIGN



Assignment Description:

Your assignment is to design a robot, or any kind of machine that does something. And, it can be a very simple design.

You will draw your design with the Desmos graphing calculator.

You have a few days to do this assignment, so take your time to play around with the Desmos features and different kinds of equations.

Your design may include any variety of shapes, but it must include at least three of the four types of conic sections.

Note: The four types of conic sections are: circle, ellipse, parabola, and hyperbola.

You will answer, in writing, three questions about your robot design.

1. What is your robot designed to do?
2. How does your robot do that?
3. What type of shape(s) did you use for each part of your robot? (For example: I used an ellipse for the head, a triangle for the body, etc.)

Items to Submit by Webmail:

- A screen snip of your completed design as drawn with the Desmos graphing calculator.
- Screen snip(s) of the equations you used to draw your design. Note: You may need to scroll down on the equations section of the Desmos screen and take more than one screen snip to get all of the equations you used.
- Written answers to the three questions. These answers may be typed or clearly handwritten.

TIPS for the Robot Design Project:

How to do a screen snip:

From the program menu of your computer, find the Snipping Tool. Click on this to activate the tool. Select "New", then use the cursor to drag an outline around the section you want snipped. From the tool's menu, under "File", choose "Save As", name your file, and save it.

How to graph part of an equation (like a line segment, instead of the infinite line):

Decide what the horizontal or vertical limits are that you would like your graph to stop at. Then, after typing in your equation, keep going and tell what section of the graph you want shown by using braces { } and an inequality.

For example, if you want the line y=2x only from y=0 to y=5, you would type into Desmos:

y=2x {0<y<5}

How to change colors or change solid to dashed lines:

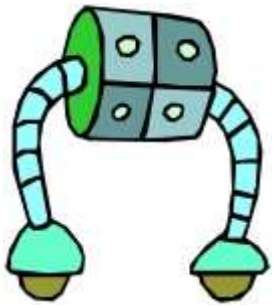
In Desmos, choose the settings icon to "edit list". Click on the color circle for the equation you want to change and select a new color or style.

How to fill in spaces:

Change the equals sign to a less than or greater than sign.

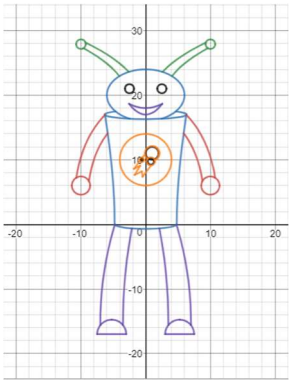
How to modify basic equations to get the size and location you want on your graph:

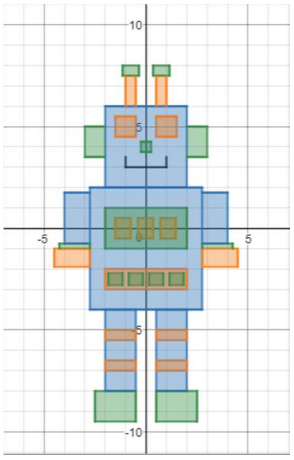
Remember all the transformations we've done.
A multiplier will stretch or compress the graph.
A number added or subtracted with the x in the equation will shift the graph horizontally.
A number added or subtracted with the y in the equation will shift the graph vertically.

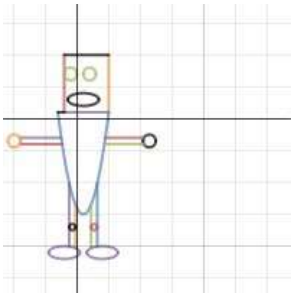


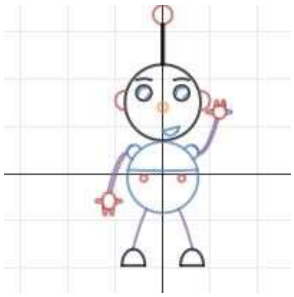
PLEASE NOTE: The design you submit MUST be your original work!!

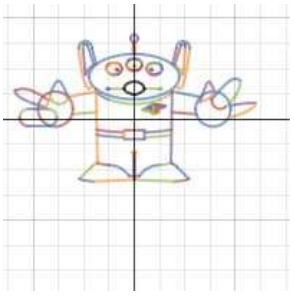
DO NOT submit variations of what you find online, such as . . . .

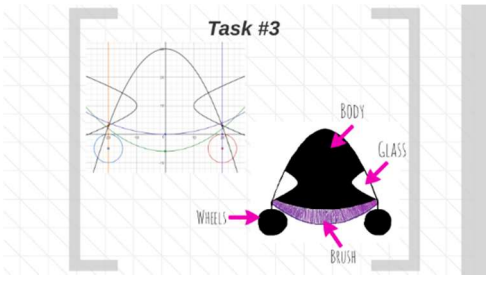




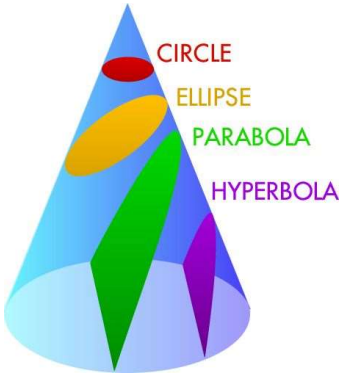








THE BASIC EQUATIONS FOR CONIC SECTIONS



*Remember, changing the value for h will shift the shape horizontally, and changing the value for k will shift the shape vertically.

PARABOLA

$$y = a(x - \mathrm{h})^2 + k \qquad \text{or} \qquad x = a(y - k)^2 + \mathrm{h}$$

Here, the value for "a" will stretch or compress the shape, and if "a" is negative it will reflect the shape.

CIRCLE

$$(x - \mathrm{h})^2 + (y - k)^2 = r^2$$

Here, the point (h, k) will be the center of the circle, and "r" will be the length of the radius of the circle.

ELLIPSE

$$\frac{(x-\mathrm{h})^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

Here, if a > b, then it will be horizontal. But if b>a, then it will be vertical.

HYPERBOLA

$$\frac{(x-\mathrm{h})^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

To switch the orientation for this one, switch the x and y.

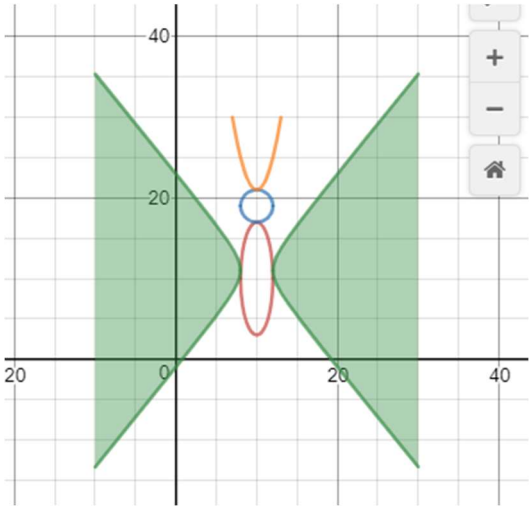
***TRY entering these into Desmos with different numbers for h, k, a, and b to see what kind of shape you get and in what location on the graph.**

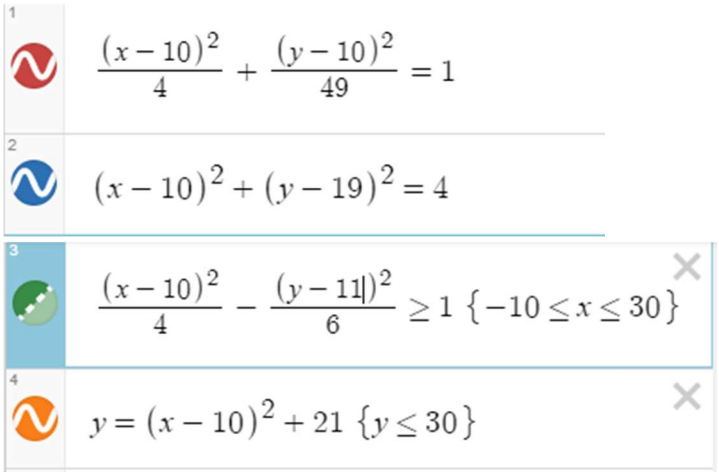
Play around with these so you can use them in your design. ☺

MY EXAMPLE PORTFOLIO

This is my basic graph of a butterfly using conic sections on the Desmos graphing calculator. If I had added stripes or polka dots or other non-functional design features, I would have gotten extra credit.

You will be designing a robot, not an insect, but the basic steps are the same.





Here's how I might answer the three questions that must be submitted along with your screen snip(s).

1. What does my robot do?
   My butterfly is designed to fly around and help pollinate flowers.

2. How does my robot do this?
   It uses its wings to fly around searching for flowers. The antenna detect the flowers and pick up the pollen to take to the next flower.

3. What shapes did I use for each part?
   I used an ellipse for the body, a circle for the head, a hyperbola for the wings, and a parabola for the antenna.

That's it!! Something this simple can get you 100% for this project. ☺