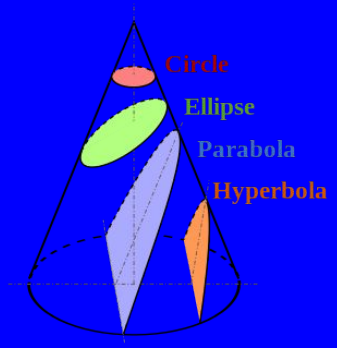


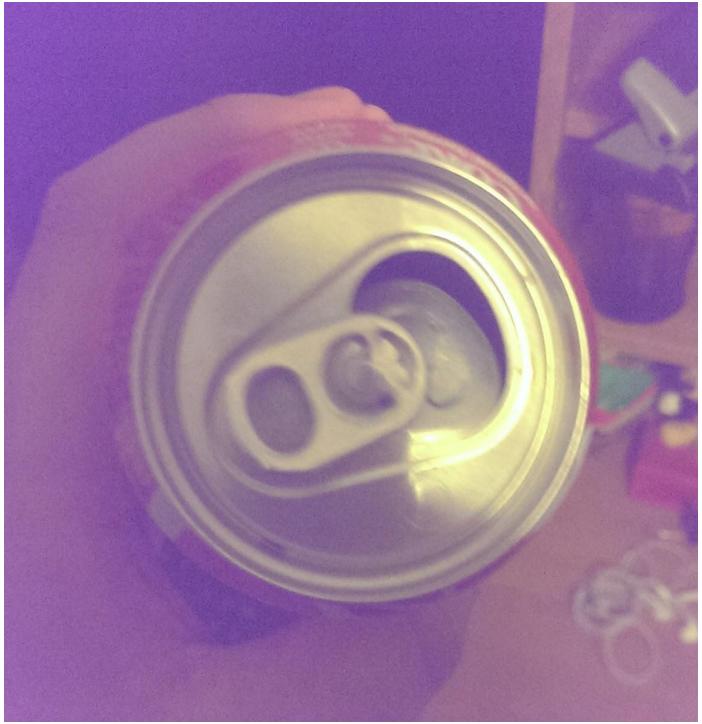

# Conics in the Real World

## BLOCK 5

Sujit

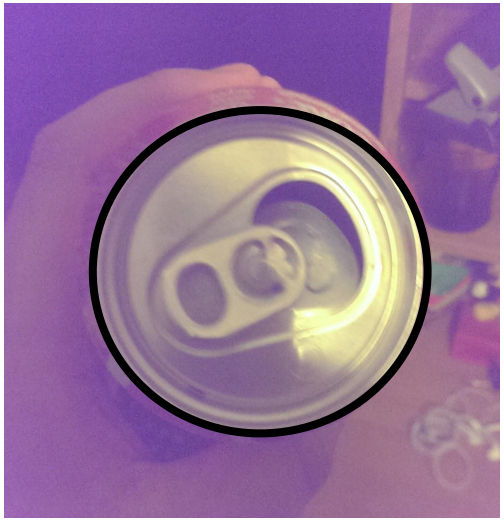
Nico

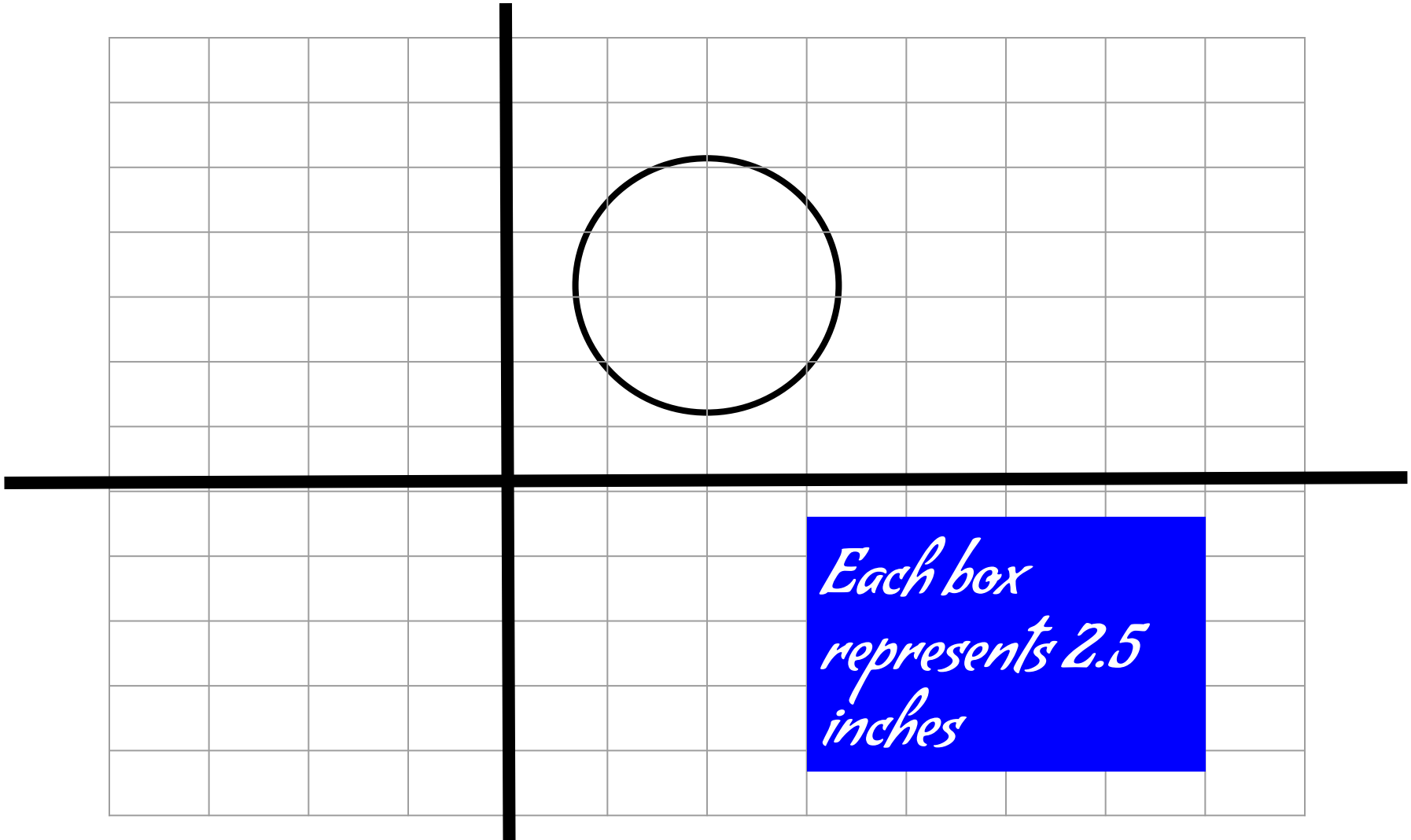
David

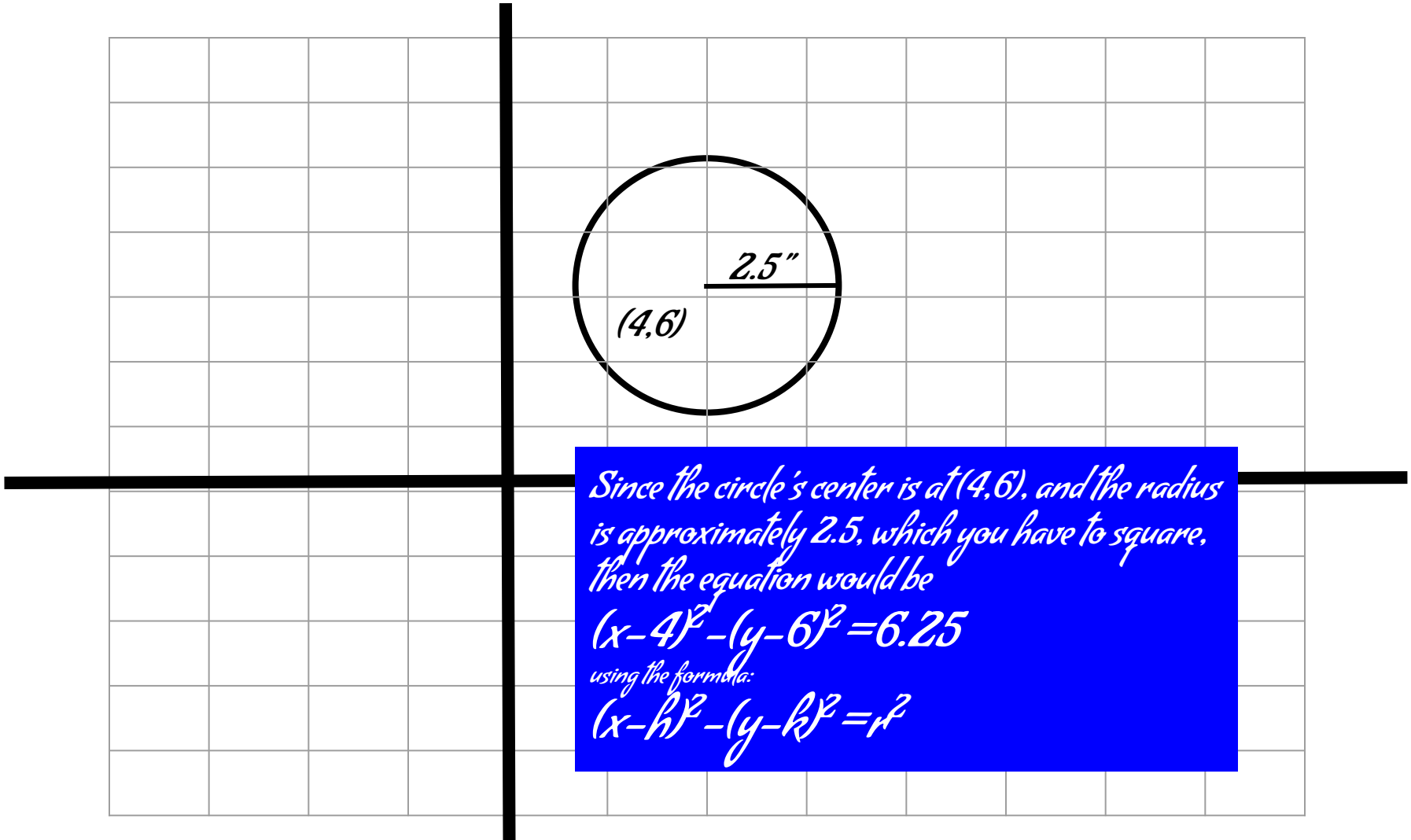


Circle

This refreshing can of Coca-Cola was taken by Sujit Anumukonda in his kitchen. It provided it with a scrumptious, carbonated drink, as well as a circle to be used for his One to the World math project.




Each box represents 2.5 inches

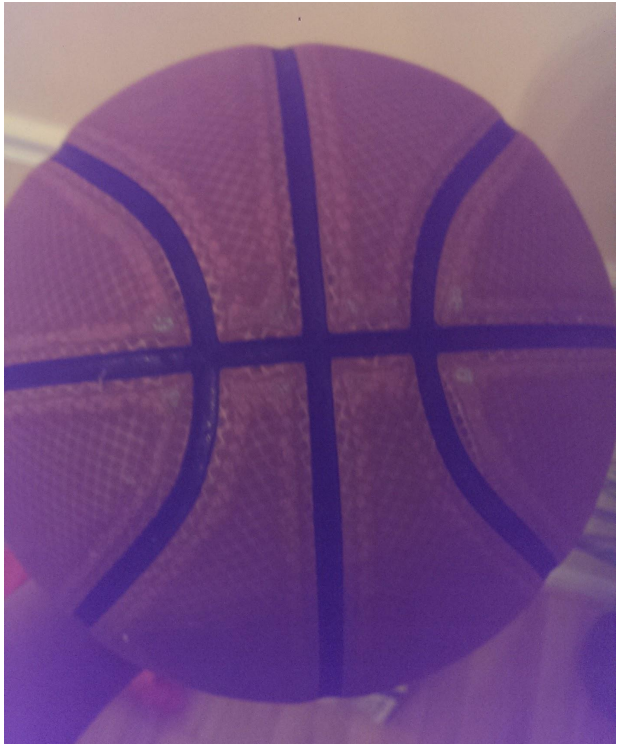



Since the circle's center is at (4,6), and the radius is approximately 2.5, which you have to square, then the equation would be

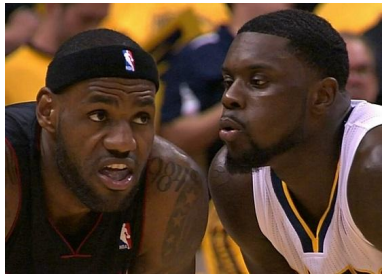
$(x-4)^2-(y-6)^2=6.25$

using the formula:

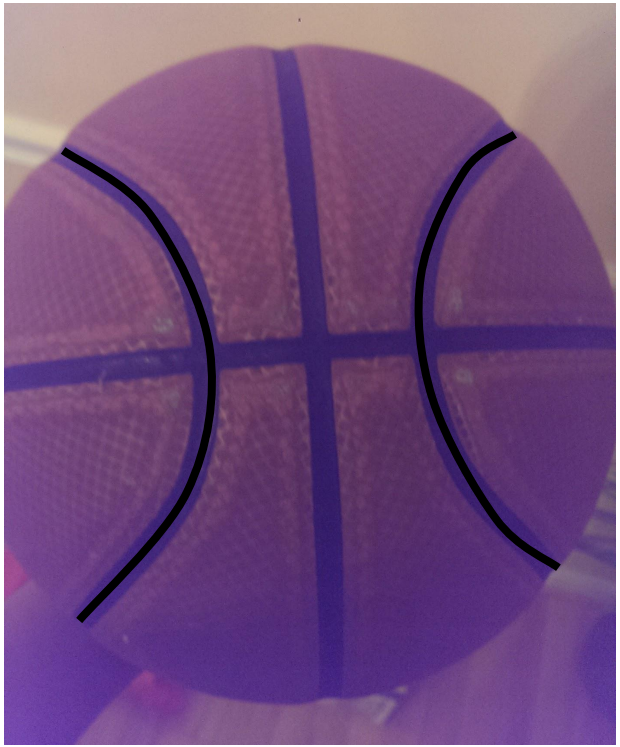
$(x-h)^2-(y-k)^2=r^2$

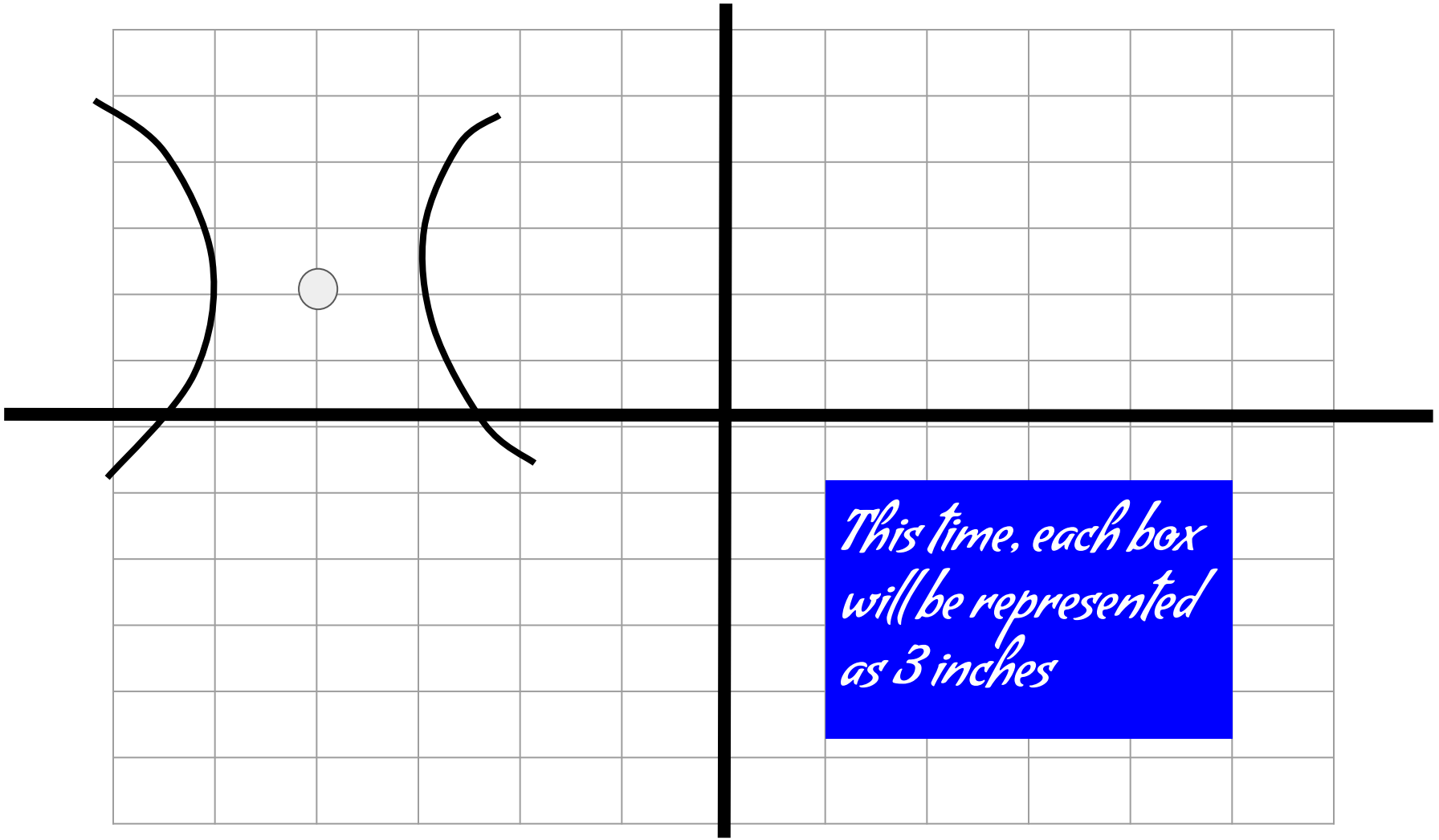


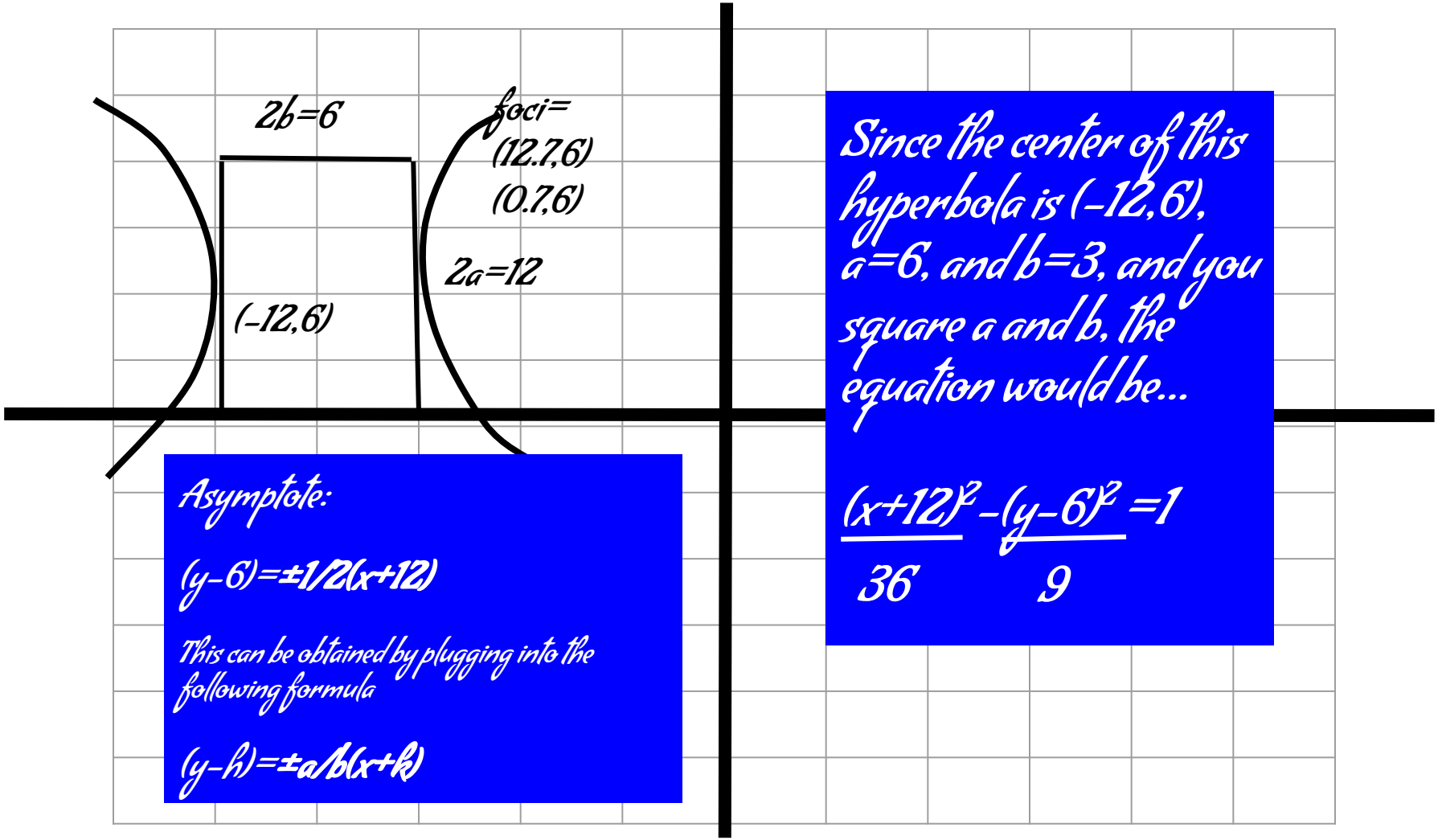
For many, ball is merely a sport. A game. But that is not the case for Sujit. For Sujit, ball is life. This amazingly handcrafted basketball's picture was taken by Sujit, in his living room, and has provided him many years of shooting practice. The stitching also happened to be the perfect shape for a hyperbola.



Hyperbola




This time, each box will be represented as 3 inches




Since the center of this hyperbola is (-12,6), a=6, and b=3, and you square a and b, the equation would be...

$$\frac{(x+12)^2}{36} - \frac{(y-6)^2}{9} = 1$$

Asymptote:

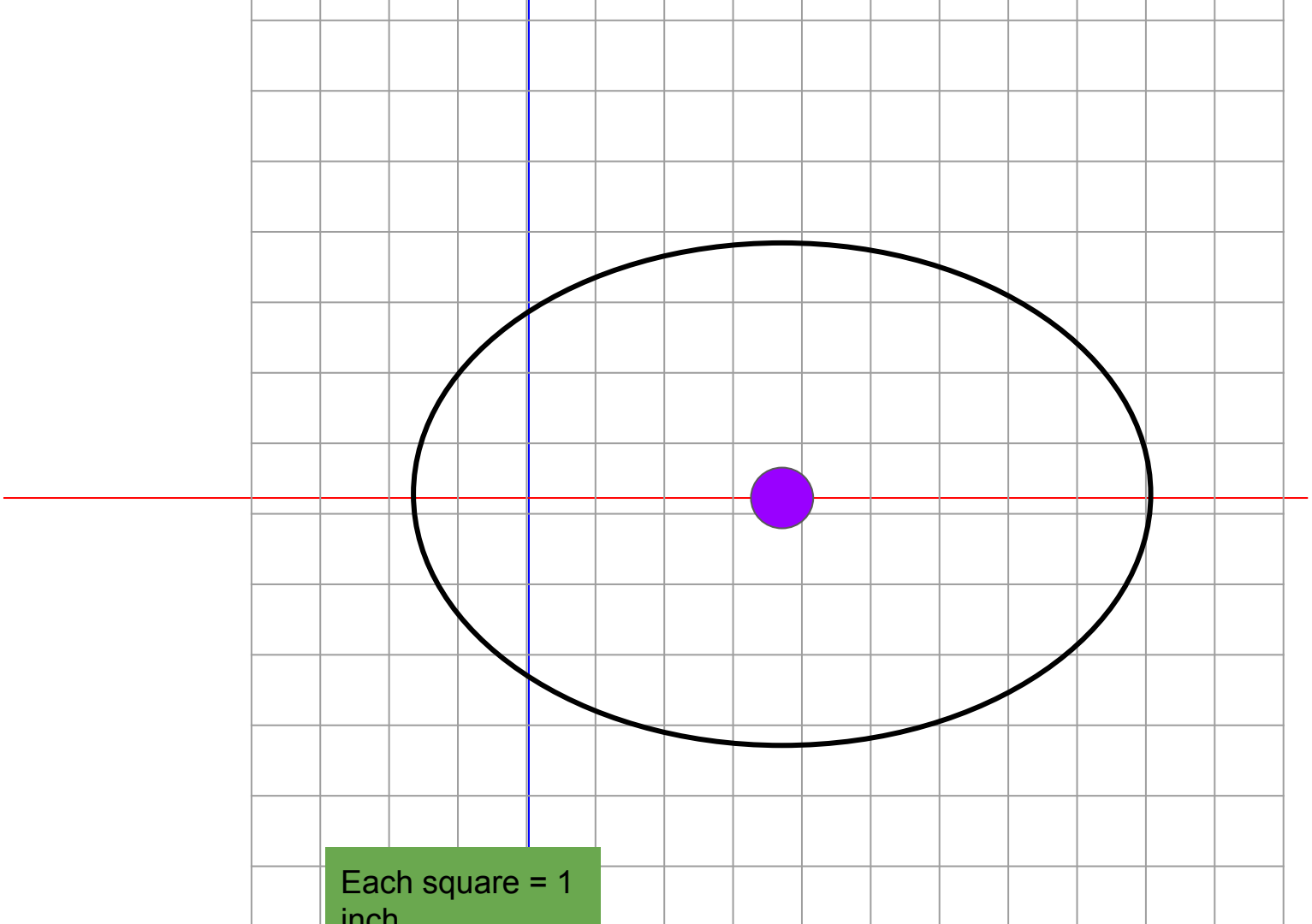
$(y-6)=\pm 1/2(x+12)$

This can be obtained by plugging into the following formula

$(y-h)=\pm a/b(x+k)$

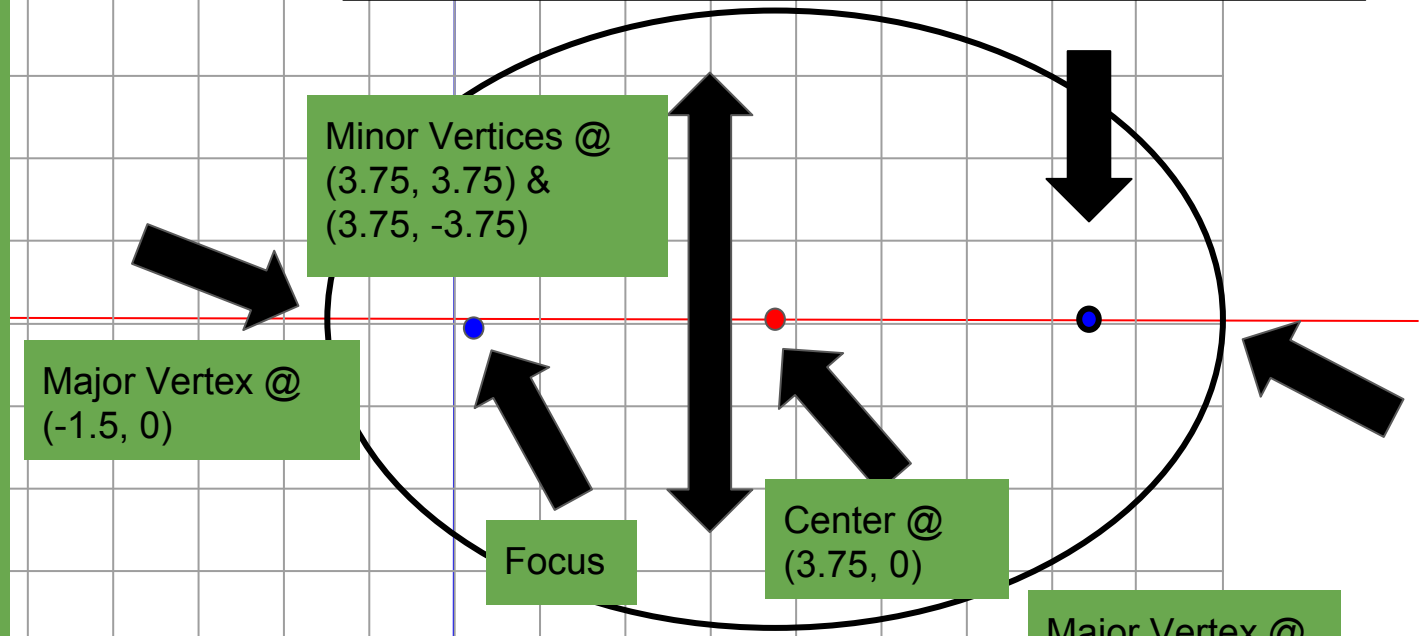
# Ellipse Lid

- Picture of a ceramic cooking pot
  - Lid is an elliptical shape, raised up from base
- Photographed by David, in house
- Dimensions:
  - 10.5in. width X 7.5in. height


Each square = 1 inch

Because the ellipse is horizontal, a goes under x. The center is at (3.75, 0), meaning h and k are given, leaving a and b. The width is 2a, so by adding 1.5 + 9 = 10.5 and dividing by 2, we find a = 5.25. For b, 2b is the height, and 3.75 + 3.75 = 7.5, which is then divided by 2 to give b = 3.75. Then a and b are squared to give 27.5625 and 14.0625, respectively.

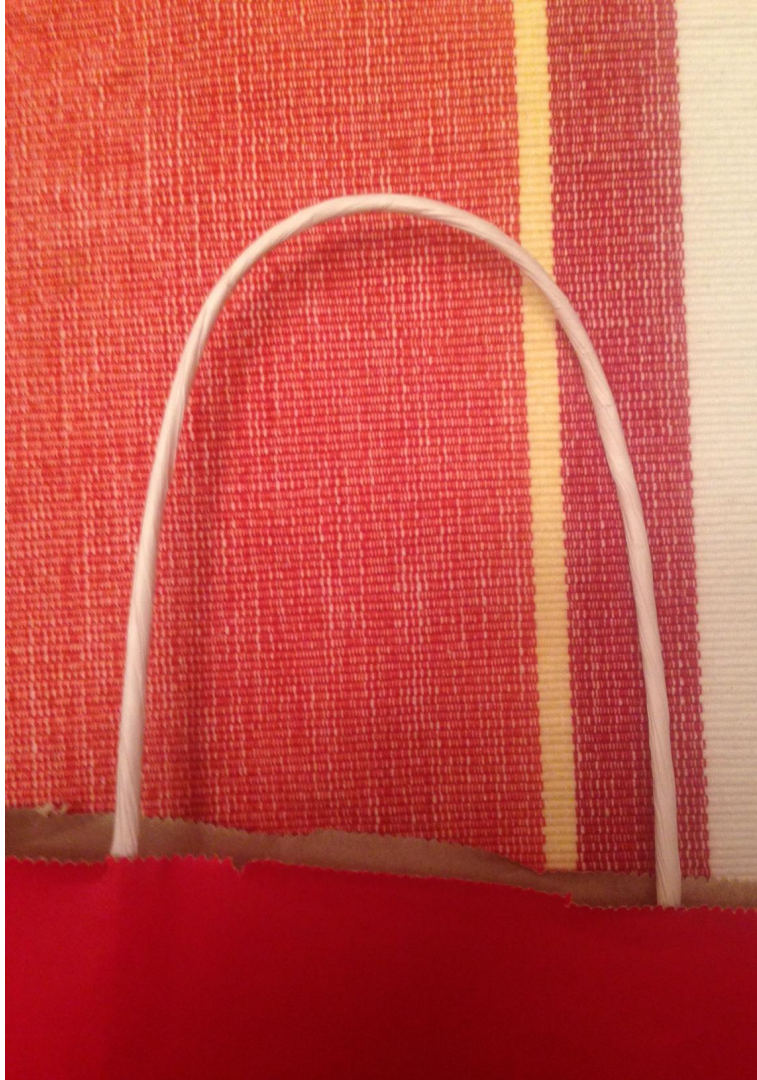
For the foci, $a^2-b^2=c^2$. 27.5625-14.0625 = 13.5. By square rooting this, we get c to be about 3.67. We add/subtract this from the x component of the center to get the foci. (.008,0) & (7.42)

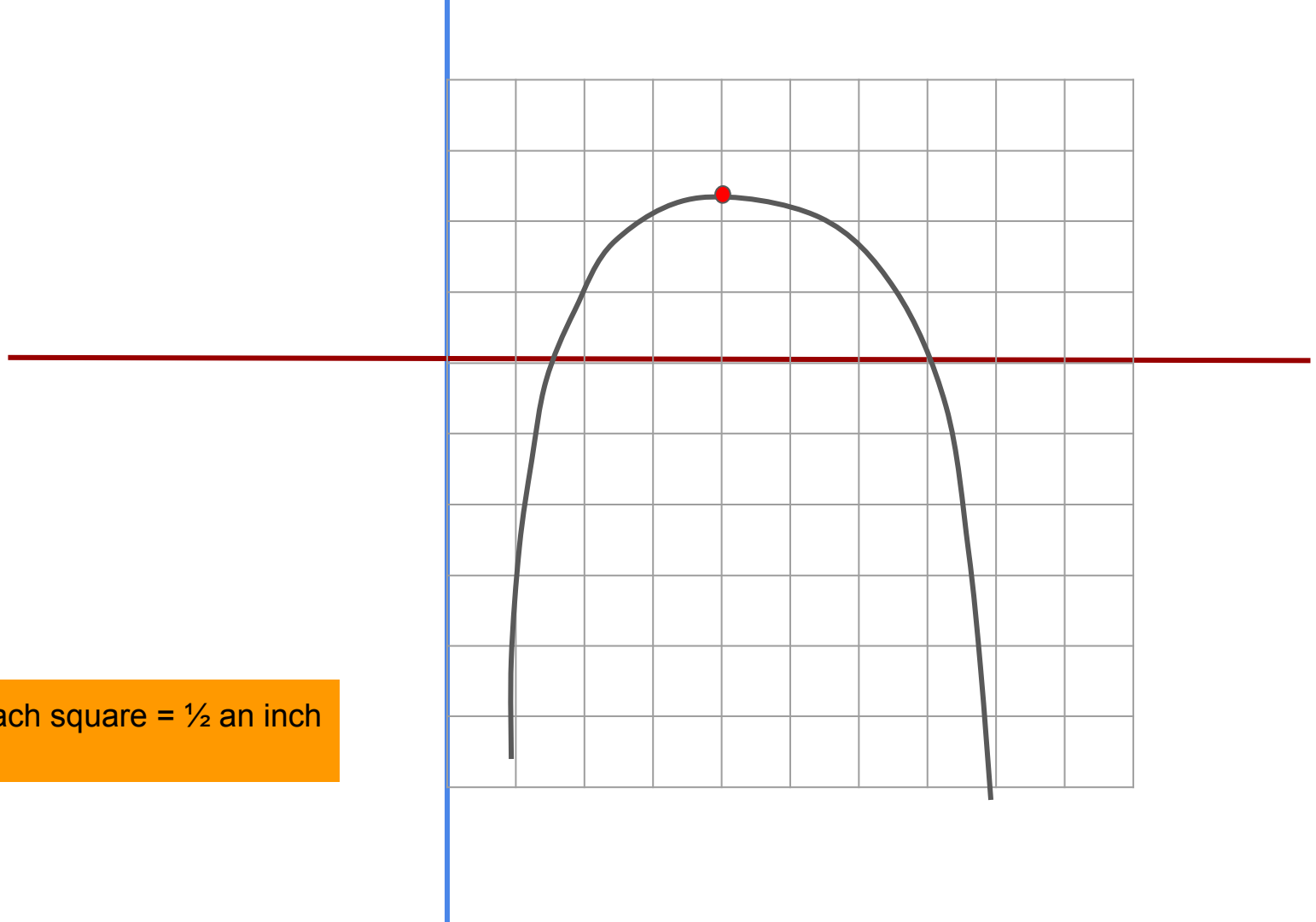



$$\frac{(x - 3.75)^2}{27.5625} + \frac{y^2}{14.0625} = 1$$

# Parabola Handle

- Picture of a gift bag handle
  - Creates a parabola
- Photographed by David, in house
- Dimensions:
  - 4.25in. height, 3.5in. width at bottom





Each square = ½ an inch

Because this parabola is opening vertically, it follows $4a\,(y-k) = (x-h)^2$
The vertex is at (2, 1.125), giving h and k. Using points (2, 1.125) and (3.5, 0), we can find a, [ $4a(0 - 1.125) = (3.5 - 2)^2$, which gives $4a\,(-1.125) = (2.25)$, by multiplying -1.125 to 4a, we get $-4.5a = 2.25$, and then dividing -4.5, $a = -.5$.
Multiplying this by 4 gives us -2.
This gives us all the variables to find the equation:

$-2\,(y-1.125) = (x-2)^2$

To find the focus, we use (h, k+a). Since we have h, k, and a, we plug in the values to get:

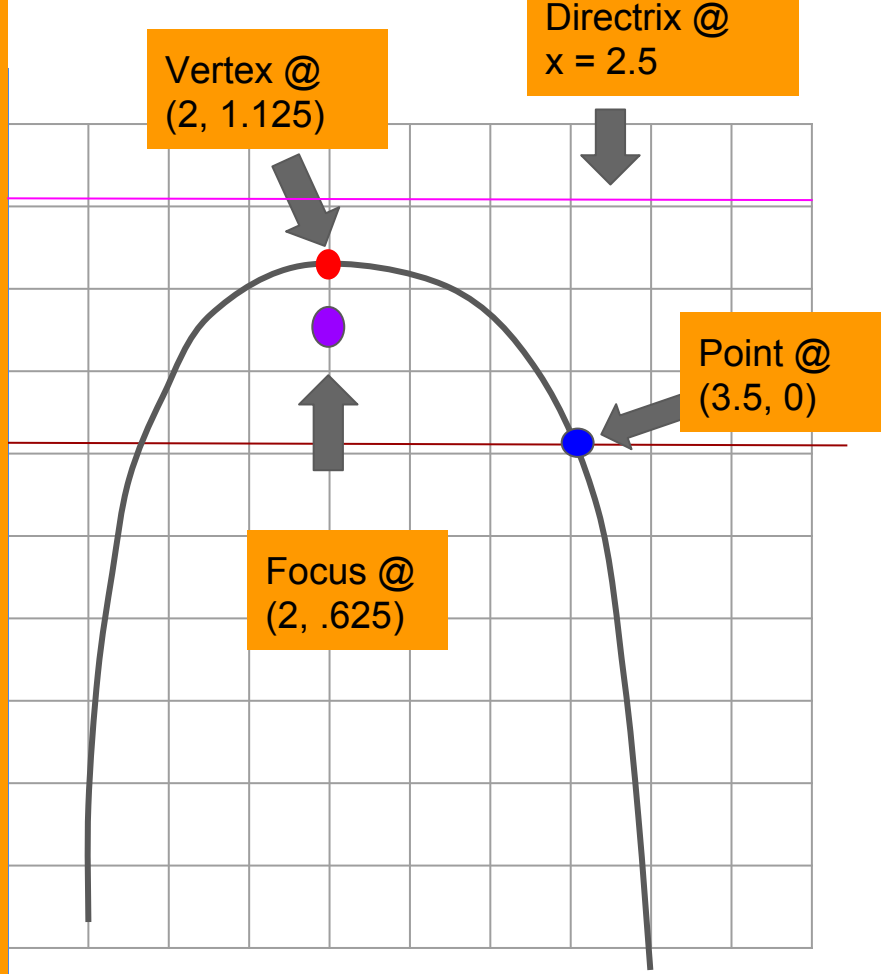
(2, 1.125 -.5) ->

(2, .625) = Focus

To find the directrix, we use x = h - a. We have h and a, so by using the values, we get:

x = 2 - -.5 ->

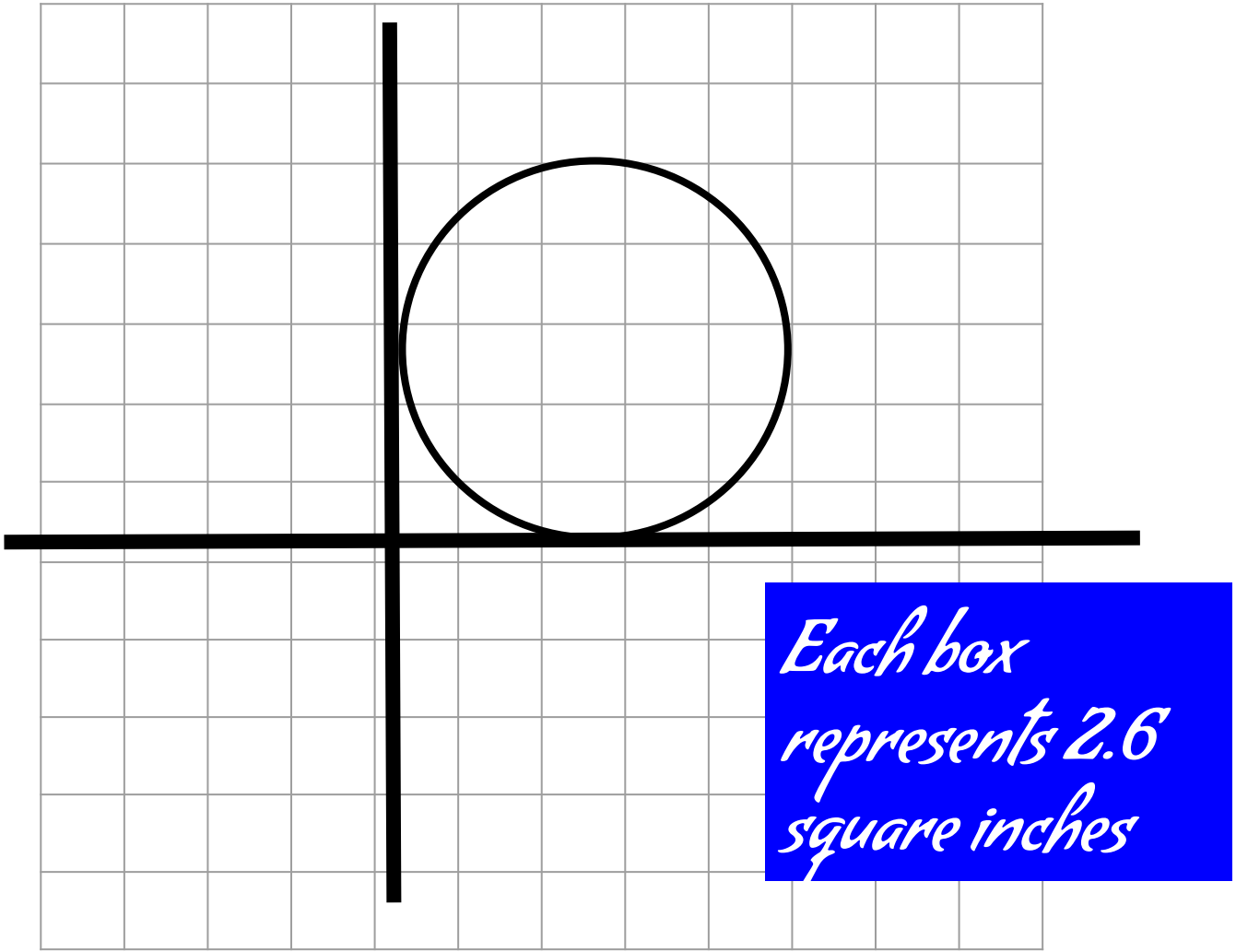
x = 2.5

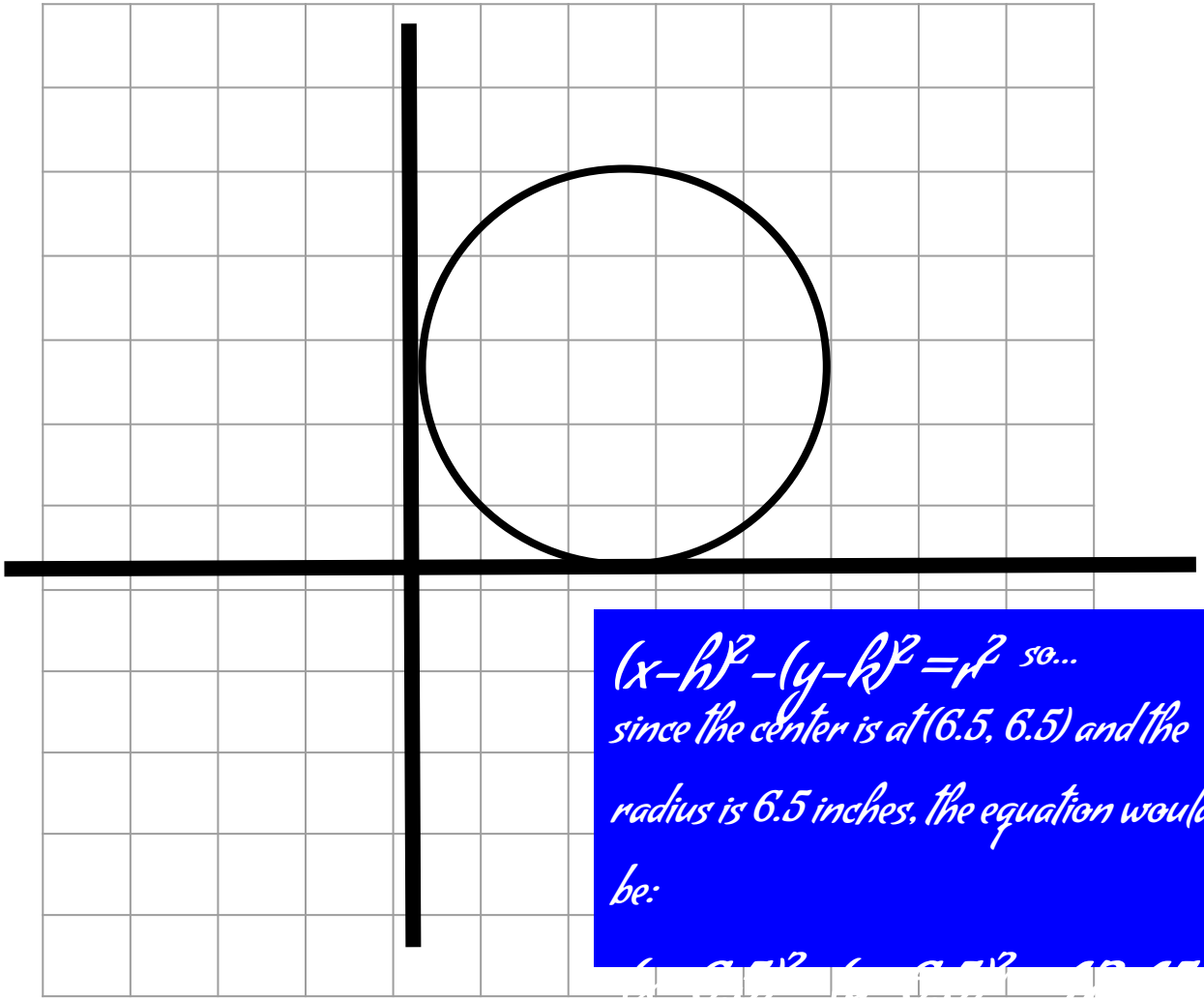


# Circle

- Clock in Cramer's room
- Taken by Nico in math class
- 13 in. diameter


12
1
2
3
4
5
6
7
8
9
10
11


Each box
represents 2.6
square inches

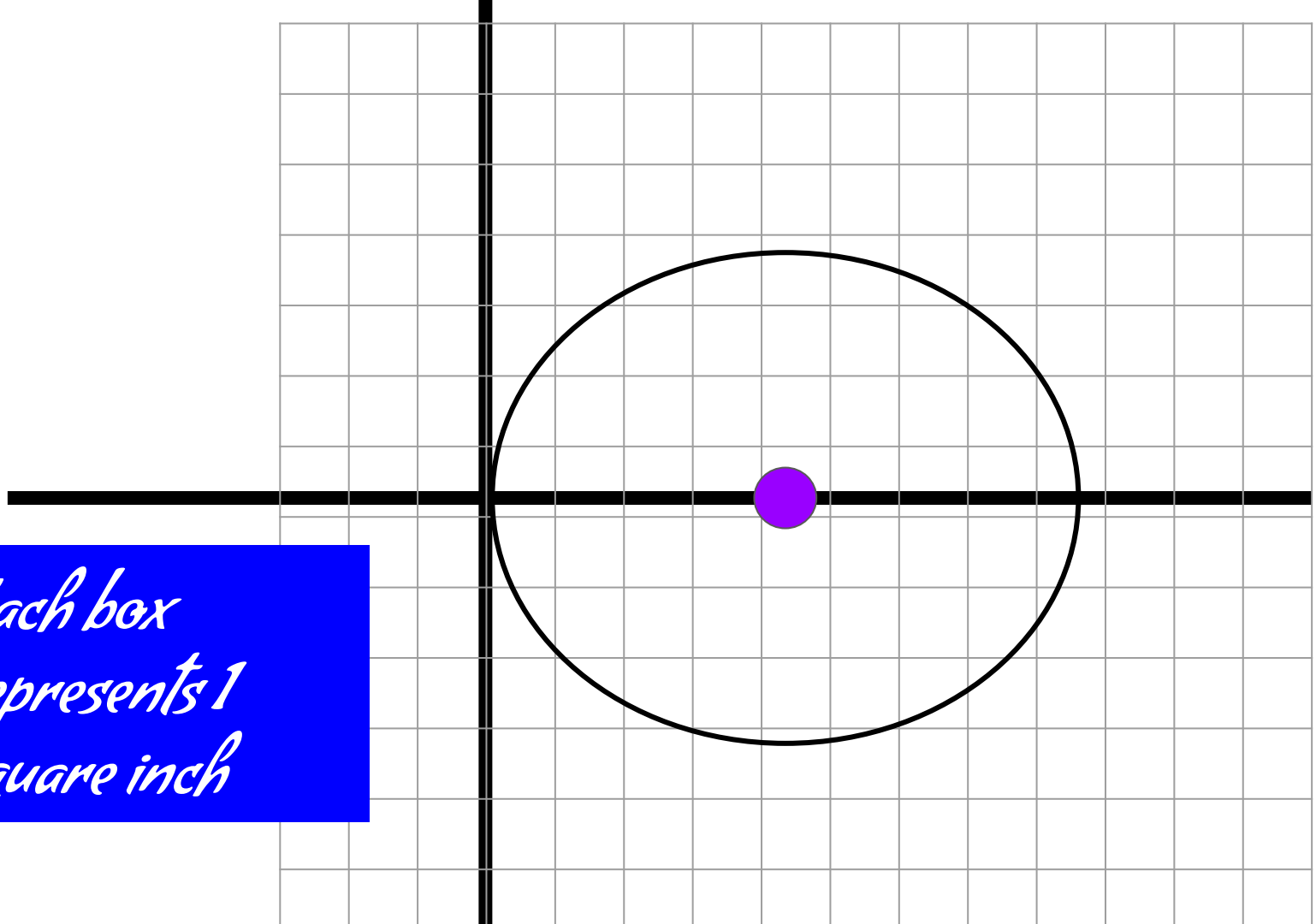


$(x-h)^2-(y-k)^2=r^2$ so...
since the center is at (6.5, 6.5) and the radius is 6.5 inches, the equation would be:

# Ellipse

- Hat Nico got at Busch Gardens
- Picture taken by Nico at home
- 8.5in x 7in

Here is the top of the hat


Each box represents 1 square inch

Horizontal ellipse so standard equation is:

$((x-h)^2/a^2)+((y-k)^2/b^2)=1$

Width $=2a=8.5$ so $a=4.25$

Height $=2b=7$ so $b=3.5$

Center at $(4.25, 0)$

$a^2=18.06$ and $b^2=12.2$

Focus $=c$ and $a^2-b^2=c^2$ so

$c=\sqrt{(18.06-12.2)}=2.42$

Add and sub c to center

Plugging all this into the standard equation stated above, we get:

$$\frac{(x-4.25)^2}{18.06}+\frac{y^2}{12.2}=1$$