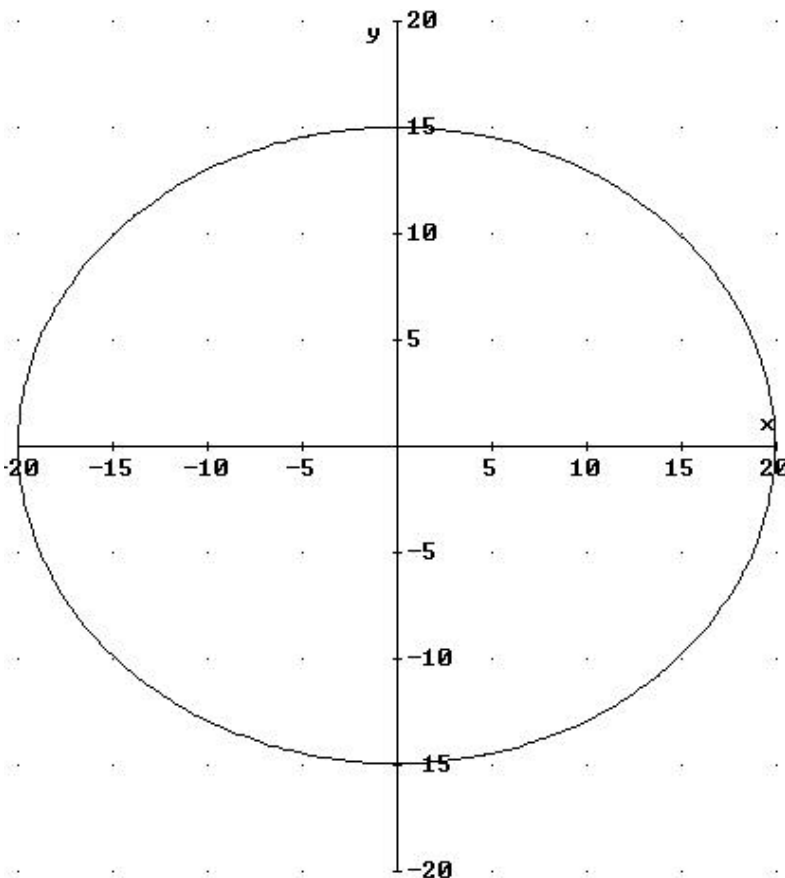




April 2000

Activity 3: The Blue Room in the White House Solutions

1. Architects use right angles because it is easier to fit rooms next to each other (adjacent walls minimize lost space).
2. For angles less than 90 degrees, there will be lost space in the corners. For angles greater than 90 degrees, there will be fewer rooms, and the rooms with shared walls will have narrow corners. Not all angles tessellate, so angles may not allow rooms to cover the entire floor plan.
3. Graph of the Blue Room ellipse.



4. Major Axis: Approximately 40 feet (or exactly $39\text{ ft } \frac{3}{4}\text{in}$)
Minor Axis: Approximately 30 feet (or exactly $29\text{ ft } 4\frac{3}{4}\text{in}$)

5. Since half the major axis is 20, $a = 20$ and since half the minor axis is 15, $b = 15$. The equation for the ellipse tracing the Blue Room is:

$$\frac{x^2}{20^2} + \frac{y^2}{15^2} = 1$$

or

$$\frac{x^2}{400} + \frac{y^2}{225} = 1$$

6. Since $a = 20$ and $b = 15$, and $a^2 = b^2 + c^2$
 $400 = 225 + c^2$

$$c = \sqrt{175} \approx 13.2$$

The coordinates of the foci are $(-13.2, 0)$ and $(13.2, 0)$.

7.

$$e = \frac{c}{a}$$

$$e = \frac{\sqrt{175}}{40} \approx \frac{13.2}{40} = 0.33$$