

# Optimization Demonstration Activity

1) Open the Optimization I Demonstration located at  
<http://demonstrations.wolfram.com/MinimizingTheSurfaceAreaOfACylinderWithAFixedVolume/>

2) First get familiar with the various options. Adjust the slider for radius. You can click on the box with a plus sign and press play to animate the demonstration.

3) Find the Surface Area if the radius is:

$$r = 2 \text{ cm} \qquad \text{SA} = \underline{\hspace{2cm}}$$

$$r = 3 \text{ cm} \qquad \text{SA} = \underline{\hspace{2cm}}$$

$$r = 4 \text{ cm} \qquad \text{SA} = \underline{\hspace{2cm}}$$

$$r = 5 \text{ cm} \qquad \text{SA} = \underline{\hspace{2cm}}$$

4) For what radius  $r$  does there appear to be a minimum surface area?

5) Why does increasing the radius  $> 3$  cm increase surface area if the height is decreasing?

6) Why does decreasing the radius  $< 3$  cm decrease surface area if the height is increasing?

7) Solve the optimization problem by hand using Calculus and verify with the demonstration. Minimize the surface area of a cylinder if the volume is fixed at 12 ounces. Find the dimensions. (16.9 oz = 500 cm<sup>3</sup>)