Exploring Cavalieri's Principle
Student Activity

Name
Class

## Problem 1 - Oblique Cylinder

Start the Cabri Jr. application by pressing APPS and selecting CabriJr. Open the file CYL1 by pressing Y for [F1], selecting Open..., and selecting the CYL1 file.

In CYL1, you are given a cylinder with a certain radius and height. Move point $A$ and answer the following questions. To grab a point press ALPHA. Press it again to let go, or press CLEAR.

1. What do you notice about the dimensions of the cylinder when you move point $A$ ? Record the measurements of the dimensions that do not change when $A$ is moved.
2. Using the formulas for the area of a circle and volume of a cylinder, show your work to explain how you could calculate the area and volume of the oblique cylinder.
3. How does the angle of the slant of the cylinder affect the volume of the cylinder?

## Problem 2 - Triangular Pyramid

Open the Cabri Jr. file CAV1. In CAV1, you are given a triangular pyramid and two parallel cross sections. Move point $A$ and answer the following questions.
4. What do you notice about the cross-sectional areas of the triangles when you move point $A$ ?
$\qquad$
5. What do you notice about the volume when you move point $A$ ?
6. Your observations should be leading you to understand Cavalieri's Principle. This principle relates the height, cross-sectional area, and volume of two figures (such as two cylinders). Make a conjecture as to what Cavalieri's Principle is.
7. A construction worker is setting up cylindrical barrels along the interstate. The diameter of each barrel is 3 feet and the height is 4 feet. What volume of sand would be needed to fill a single barrel? Show your formula and work.
8. If the barrel from Question 7 is hit by a car and leaves the barrel slanted at a $45^{\circ}$ angle (without deforming the barrel at all), how will the height of the sand in the barrel compare?
9. The Great Pyramid of Giza has a height of 146.5 meters and a square base of 230.4 meters. What is the volume of this pyramid? Show your formula and work.
10. If vertical height of that pyramid were doubled, how would volume compare?

