

## Volume of a Pyramid

In this activity, we will use Cabri 3D to find the formula for the volume of a pyramid. You will need four files, which you will find in the course conference. Copy those to your own computer before you start the activity.

### Volume of a Prism

**Definition:** A *prism* is a 3D solid with two congruent polygon bases, connected by parallel line segments.

1. Open the file “Triangular Prism”. Learn how to:
  - a. Look at the figure from different places (press **ctrl** while dragging)
  - b. Move parts of the figure (not all parts can be moved, press **fn** and click to see the ones that move)
  - c. Select objects (click once on them)
2. To measure distances, areas, and volumes click on the last tool menu, and select the appropriate tool. Then select the objects you want to measure.
  - a. Measure the area of the base triangles, verifying they are the same.
  - b. Measure the height of the prism (which is the shortest distance between the planes of the two base triangles. Hint: use the line perpendicular to the planes.)
  - c. Measure the volume of the prism.
3. Check that for a prism,  $\text{area of base} \cdot \text{height} = \text{volume}$ .
4. When you move one of the yellow points, the volume either changes, or stays the same. Explain.

### Volume of a Pyramid

**Definition:** A *pyramid* is a 3D solid with a polygon base, whose vertices are connected by line segments to a single point called the *apex*.

5. Open the file “Pyramid”.
6. When you move one of the yellow points, the volume either changes, or stays the same. Explain.
7. Guess at a formula for the volume of a pyramid. You may use the measuring tools.
8. Open the file “Pyramids in Prism”.
9. Explain why the red and blue pyramids have equal volume.
10. Explain why the red and green pyramids have equal volume.
11. Explain why it follows that the volume of the pyramid is one-third the volume of the prism.
12. Use the file “Non-Triangular” to explain why this formula holds for non-triangular pyramids.