

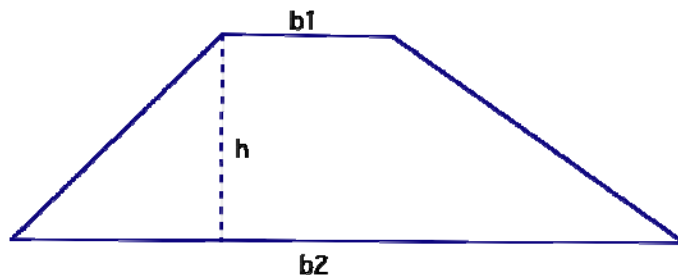
Notice the relationship between the area of a triangle and the area of a parallelogram that have the same base and height. The area of the triangle is one-half the area of the parallelogram.

In Grade 6, students will use  $A = bh$  to derive the **area formula for a trapezoid**.

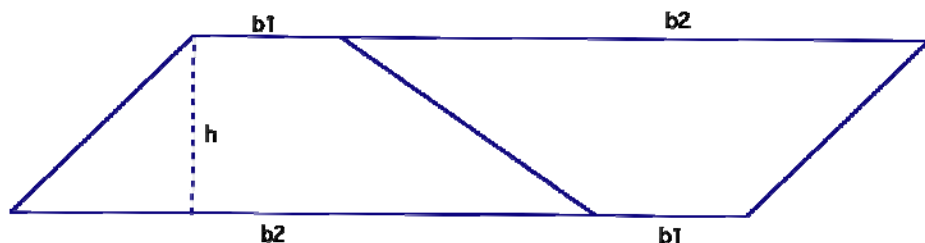
**GLE 0606.4.3 Develop and use formulas to determine the circumference and area of circles, and the area of trapezoids, and develop strategies to find the area of composite shapes.**

✓ **0606.4.14 Relate the area of a trapezoid to the area of a parallelogram.**

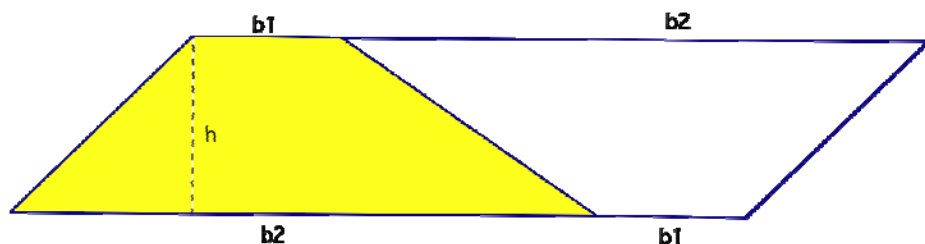
Start with a trapezoid:



Make a copy of it (for example, on patty paper) and use both trapezoids to construct a parallelogram.



Notice the parallelogram has the same height as the original trapezoid, but the base has changed. Using the area formula for a parallelogram, we would say:  $A = bh$ , where  $b = (b_1 + b_2)$  and  $h = h$ . So the area of this parallelogram is  $A = (b_1 + b_2)h$ . Notice, however, that the area of the trapezoid is one-half the area of the parallelogram, so the area of the trapezoid is:  $A = \frac{1}{2}(b_1 + b_2)h$  or  $A = \frac{(b_1 + b_2)h}{2}$



Notice the relationship between the area of a trapezoid and the area of a parallelogram that have the same height and related bases. The area of the trapezoid is one-half the area of the parallelogram.

- ✓0606.4.12 Derive the meaning of Pi using concrete models and/or appropriate technology.
- ✓0606.4.13 Understand the relationships among the radius, diameter, circumference and area of a circle, and that the ratio of the circumference to the diameter is the same as the ratio of the area to the square of the radius, and that this ratio is called Pi.

To derive Pi, students can measure the circumference and diameter of various-sized circles and calculate the ratio of circumference to diameter. Once this is established, the formula for the circumference of a circle can be derived. Students can then focus on the relationships between the radius, diameter, circumference, and area of the circle.

- ✓ **0606.4.17** Use manipulatives to discover the volume of a pyramid is one-third the volume of the related prism (the heights and base areas are equal).
- ✓ **0606.4.18** Use manipulatives to discover the volume of a cone is one-third the volume of the related cylinder (the heights and base areas are equal).
- SPI 0606.4.5** Determine the surface area and volume of prisms, pyramids and cylinders.
- SPI 0606.4.6** Given the volume of a cone/pyramid, find the volume of the related cylinder/prism or vice versa.

“See-through” geosolids work well for discovering the volume relationships in the above checks. Use rice/sand to pour the contents of one into the other.

For **SPI 0606.4.6**, students use their knowledge of the relationship to solve problems.

For example, given a cone with volume of 10 cubic centimeters, find the volume of the cylinder with the same base and height. Since the relationship between their volumes is such that the volume of a cone is one-third the volume of the related cylinder, the volume of the cylinder is 3 times the volume of the cone. This implies the volume of the cylinder must be 30 cubic centimeters. Parallel problems can be explored for rectangular pyramids and prisms.

### **Triangle Inequality Property**

- ✓ **0606.4.5** Model and use the Triangle Inequality Theorem.
- SPI 0606.4.3** Solve problems using the Triangle Inequality Theorem.

**The Triangle Inequality Property** states: The sum of the measures of any two sides of a triangle must be greater than the measure of the third side.

Using this property, students are to determine whether three side lengths could form a triangle. Many teachers use straws, spaghetti, or something similar to connect this activity to measurement. Students measure and cut different lengths and see if they can form a triangle. Students should discover the property through investigation.