# Pre-Algebra
Surface Area by Decomposition

Sometimes the student is asked to calculate the surface are of a prism that does not quite fit into one of the categories for which an easy formula exists. In this case, the answer may be to decompose the prism into its component shapes, and then calculate the areas of the components. Note: this process also works with cylinders and pyramids.

Decomposition of a Prism

To calculate the surface area of a prism, decompose it and look at each of the prism's faces individually.

Example: Calculate the surface area of the triangular prism at right.

To do this, first notice that we need the value of the hypotenuse of the base. Use the Pythagorean Theorem or Pythagorean Triples to determine the missing value is **10**. Then, decompose the figure into its various faces:
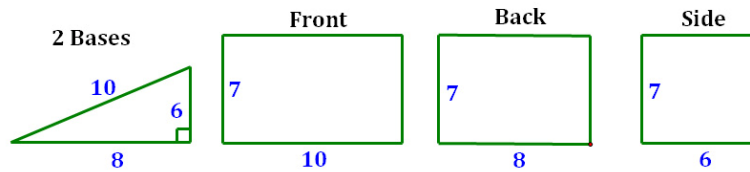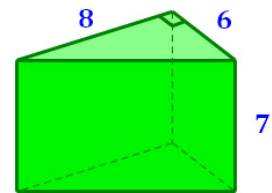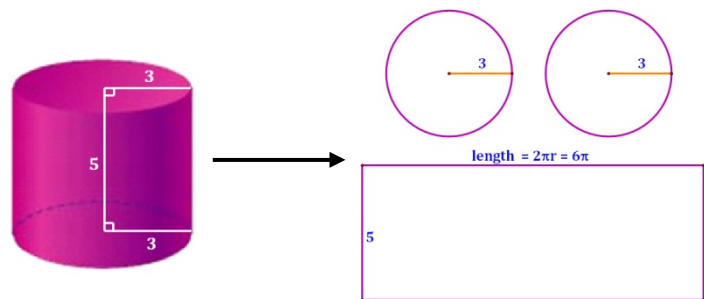
The surface area, then, is calculated as:

$$SA = (2\ Bases) + (Front) + (Back) + (Side)$$

$$SA = 2 \cdot \left(\frac{1}{2} \cdot 6 \cdot 8\right) + (10 \cdot 7) + (8 \cdot 7) + (6 \cdot 7) = 216$$

Decomposition of a Cone

The cylinder at right is decomposed into two circles (the bases) and a rectangle (the lateral face).

The surface area, then, is calculated as:

$$SA = (2\ tops) + (lateral\ face)$$

$$SA = 2 \cdot (\pi \cdot 3^2) + (6\pi \cdot 5) = 48\pi \sim 150.80$$