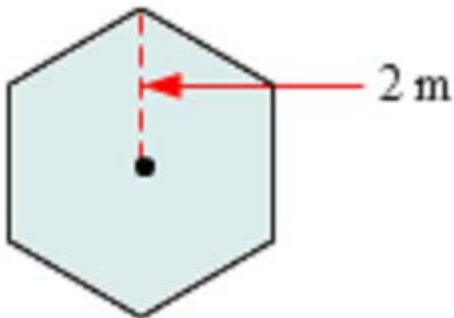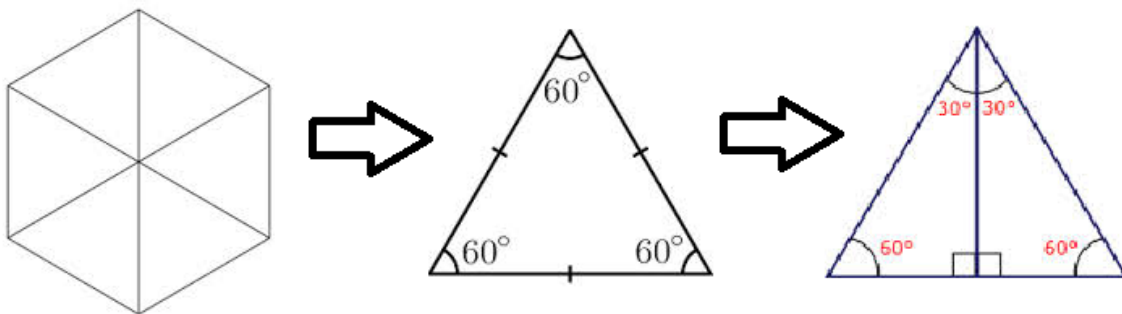# Find the Area of a Regular Polygon Given the Radius

The question asks for the area of this hexagon. This example has a radius of 2 meters.

We know the hexagon is made up of six equilateral triangles. And each equilateral triangle can be further split in half as a 30-60-90 right triangle.
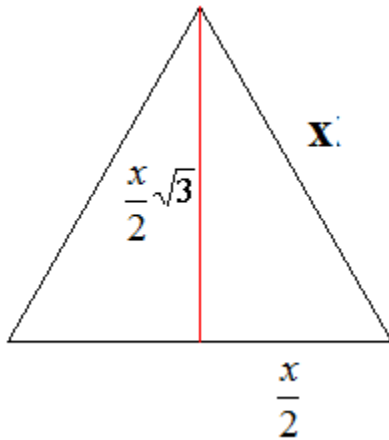

Per the formula, the area is one-half of the apothem times the perimeter.

$$Area = \frac{1}{2}(apothem)(perim)$$

We can easily calculate the perimeter because a side of each triangle is 2 meters. Therefore the perimeter is six times 2 meters or 12 meters: perimeter = 12 meters.

But we still need to calculate the apothem. Remember with 30-60-90 right triangles, the sides have a relationship. The hypotenuse is twice the length of the short side. The longer side is radical three times the short side. See these relationships in the diagram below.

The problem gives us that x = 2 meters, which means that for the longer side (which is also the apothem) we can calculate:

$$apothem = \frac{2}{2}\sqrt{3}$$

$$apothem = \sqrt{3}$$

Then we substitute the perimeter and the apothem values into the area formula and calculate:

$$Area = \frac{1}{2}(apothem)(perim)$$

$$Area = \frac{1}{2}(\sqrt{3})(12)$$

$$Area \approx 10.4$$