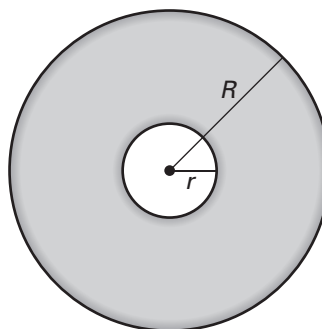


LESSON
8.7**Real-Life Application:**
When Will I Ever Use This?*For use with the lesson "Factor Special Products"***Manufacturing**

You work for a company that manufactures round metal washers. The cost to produce round metal washers is directly related to the amount of metal used. And the amount of metal used is directly related to the area of the washer, as shown in the shaded region below.

In Exercises 1–4, use the diagram at the right.

- Find the area of the large disc with radius R before the middle hole is stamped out. The area of a circle is $A = \pi r^2$ where A is the area and r is the radius of the circle.
- Find the area of the middle hole with radius r .
- Write a formula for the area of the washer that has outer radius R and a hole of radius r , using the formulas from Exercises 1 and 2. Simplify the formula by factoring out all common monomial term(s).
- You should recognize one of the factors in your formula as a “special product.” Show your formula for the area of a washer in yet another form by rewriting the “special product” in your formula as two factors.



In Exercises 5–9, use the following information.

The process of making this washer starts with a square piece of metal and makes two circular stamps. The length of the square’s side will be equal to the diameter of the washer (Diameter = twice the radius). The material outside the diameter of the washer as well as the hole from the middle becomes waste.

- Write a formula for the area of the square piece of metal that will be used to stamp out the washer.
- Create a formula for the amount of metal waste from the production of a single washer of outer radius R and inner radius r .
- Using your formula from Exercise 3, find the amount of metal used to produce a washer with an outer radius of $\frac{3}{4}$ inch and an inner radius of $\frac{1}{2}$ inch.
- Find the amount of waste in creating the same washer in Exercise 7.
- Comparing the metal wasted to the area of the initial metal square, what percent of the metal is wasted in creating one of these metal washers?