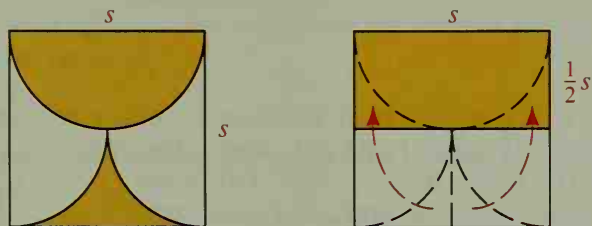


An unfamiliar figure can sometimes be divided into pieces that can be rearranged to form a familiar figure whose area is easier to calculate. This method is called *dissection*.

**Example** Find the area of the “goblet” that is constructed in a square by drawing one semicircle and two quarter circles, as shown in the diagram at the left below.

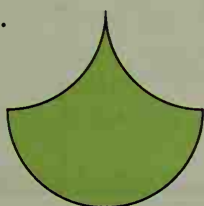


**Solution** Divide the bottom of the goblet into halves and rotate them upward as shown in the diagram at the right above. Thus the shaded area is  $\frac{1}{2}s^2$ .

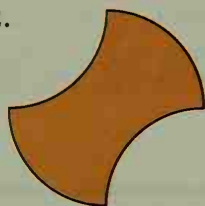
## Exercises

Each figure below is drawn with arcs of radius 4. Use rotations to find the area of each.

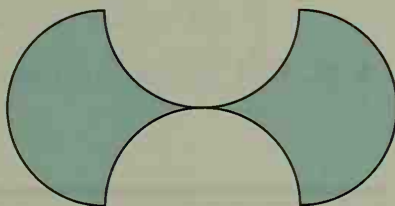
1.



2.



3.



4. The figure shows a series of squares inscribed within each other. Transformation  $T$ , which maps region I to region II is achieved by performing a rotation followed by a dilation.

- Give the number of degrees in the rotation and the scale factor of the dilation.
- What is the image of region I by the transformation  $T^2$  ( $T$  performed twice)? by the transformation  $T^3$ ?
- Give the areas of regions I, II, III, IV and V.

