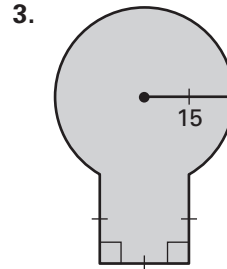
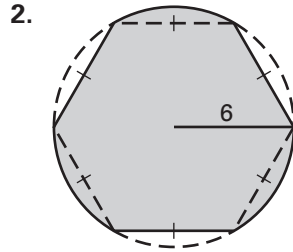
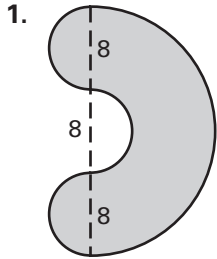


Challenge: Skills and Applications

For use with pages 683–689

In Exercises 1–3, the region is bounded by line segments and circular arcs. Find the perimeter of the region. (Leave your answer in terms of π .)

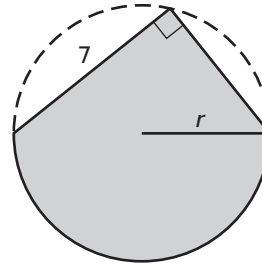
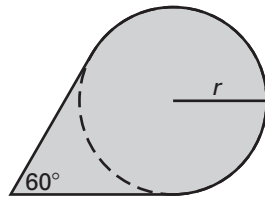
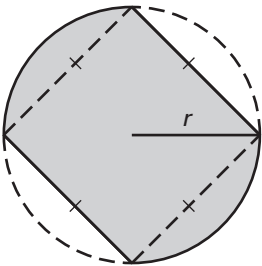


In Exercises 4–6, the region is bounded by line segments and circular arcs. Find the radius r of the circle. (Use the π key on a calculator, then round decimal answers to two decimal places.)

4. Perimeter = 12

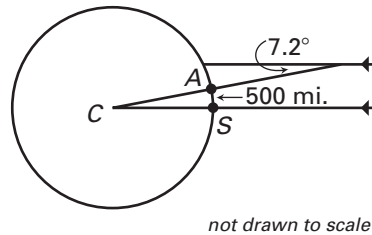
5. Perimeter = 32

6. Perimeter = 25



7. The Greek mathematician and astronomer Eratosthenes lived in the third century B.C. He is known for creating the “sieve of Eratosthenes,” a method for finding prime numbers, and also for one of the most accurate early estimates of the radius of Earth.

Eratosthenes observed that at noon on the day of the summer solstice, the sun was shining directly down a deep well in Syene (S), indicating that the sun was directly overhead. At the same time in Alexandria (A), 500 miles due north of Syene, the sun was shining at an angle of 7.2° , as determined by measuring a shadow and using trigonometry.



- The sun’s rays are parallel, and C represents the center of Earth. Find $m\angle ACS$. How do you know your answer is correct?
- Find the circumference of Earth using Eratosthenes’ measurements. Then find the radius.
- The actual radius of Earth is about 3960 miles. How accurate was Eratosthenes’ estimate?