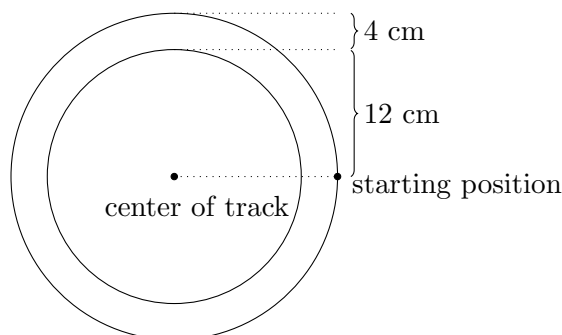**6**. [8 points] Gretchken has made a circular running track to test the metabolism of ants and termites receiving doses of Chemical Y. The track has an inner radius of 12 cm, and a thickness of 4 cm as depicted below. **Please leave your answers in exact form for all parts of this problem.**

a. [4 points] First, an ant runs counterclockwise following the *outer* edge of the track. If the ant runs at a constant speed of 4.8 cm/second, what is the total angular distance (in radians) that it covers in 5 minutes?

Solution: The ant travels a total distance of $4.8 \cdot 5 \cdot 60 = 1440$ cm. The radius of the circle along which it travels is $4 + 12 = 16$ cm. The total angular distance (in radians) that it covers is thus
$$\frac{1440}{r} = \frac{1440}{16} = 90.$$

The ant covers _____90_____ radians in 5 minutes.

b. [4 points] Next, a termite run counterclockwise following the *inner* edge of the track for a total angular distance of $\frac{27\pi}{5}$ radians. How many times does it pass its starting position? What is the additional angular distance that it covers on its last, incomplete lap?

Solution:
$$\frac{27\pi}{5} = 4\pi + \frac{7\pi}{5} = 2 \cdot 2\pi + \frac{7\pi}{5}$$

The termite passes the starting point _____2_____ times.

It covers _____$\dfrac{7\pi}{5}$_____ radians after
passing the starting point for the last time.