PROBLEM:

When watching old TV movies, all of us have seen the phenomenon where a wagon wheel appears to move backwards. The same illusion can also be seen in automobile commercials, when the car's hubcaps have a spoked pattern. Both of these are due to the 30 frames/sec sampling used in transmitting TV images.

In the figure to the right, an eight-spoked wheel is shown. Assume that the diameter of this wheel is two feet, which is almost exactly the tire diameter of a typical automobile. In addition, assume that the wheel is rotating CCW, so that if attached to a car, the car would be traveling to the left *at a constant speed.* However, when seen on TV the spoke pattern of the car wheel appears to stand still. How fast is the car traveling (in miles per hour)? Derive a general equation that will make it easy to give all possible answers.