

The Problem

This problem presents a *paradox*, a situation that seems to be impossible.

The wheel at the left is made from two disks attached together. As the wheel rotates to the position shown with the dotted figure, point A makes one complete revolution. So the length AB equals the circumference of the larger disk.

However, the smaller disk has also made one revolution. So it appears that the length CD equals the circumference of the smaller disk.

Explain the paradox in this situation.



Strategies and Hints

1. From the information in the problem, what can you conclude about the circumferences of the two disks that form the wheel? Why is this impossible?
2. Assume that it takes 1 second for the wheel to make 1 revolution. Then, point A travels a distance equal to length AB in 1 second. If the smaller disk were not attached to the larger disk, would point C travel the distance AB in 1 second?
3. Is the circumference of the smaller disk equal to AB ?