



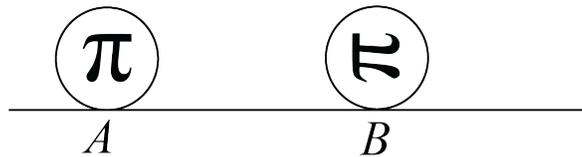
Problem of the Week

Problem C and Solution

Pi Day is Rolling Along

Problem

A coin has the image of π on one side and is being rolled along a horizontal surface. It starts at position A , with the π symbol oriented correctly. The coin then rolls until it reaches position B , which is 9 cm to the right of A . If the image of π is now rotated 90° counterclockwise for the first time, then what is the radius of the coin? Round your answer to 1 decimal. What orientation will the image of π be in after it has rolled a total of 174 cm?



Solution

At position B , the coin has rotated 90° counterclockwise for the first time. Thus, it must have gone through $\frac{3}{4}$ of a full rotation. Since the distance from A to B is 9 cm and the coin has gone through $\frac{3}{4}$ of a full rotation, a full rotation would move the coin 12 cm along the line from position A .

A full rotation is also completed by travelling one measure of the circumference of the coin.

Therefore, the circumference of the coin is equal to 12 cm.

We also know that $C = 2 \times \pi \times r$, where C is the circumference of a circle and r is its radius.

Thus, $12 = 2 \times \pi \times r$. Solving, we have $r = \frac{12}{2\pi} = \frac{6}{\pi} \approx 1.9$ cm.

Since the coin completes a full rotation every 12 cm, after it coin has rolled 174 cm along the line, it would have completed $\frac{174}{12} = 14.5$ revolutions.

This means the coin has completed 14 full revolutions and one-half of a revolution. Thus, the image of π will be upside down.