

Odell and Kershaw run for 30 minutes on a circular track. Odell runs clockwise at 250 m/min and uses the inner lane with a radius of 50 meters. Kershaw runs counterclockwise at 300 m/min and uses the outer lane with a radius of 60 meters, starting on the same radial line as Odell. How many times after the start do they pass each other?

- (A) 29 (B) 42 (C) 45 (D) 47 (E) 50

2006 AMC 10 A, Problem #15—
“What is Kershaw’s and Odell’s rates?”

Solution (D) Since Odell’s rate is $\frac{5}{6}$ that of Kershaw, but Kershaw’s lap distance is $\frac{6}{5}$ that of Odell, they each run a lap in the same time. Hence they pass twice each time they circle the track. Odell runs

$$(30 \text{ min}) \left(250 \frac{\text{m}}{\text{min}} \right) \left(\frac{1 \text{ laps}}{100\pi \text{ m}} \right) = \frac{75}{\pi} \text{ laps} \approx 23.87 \text{ laps},$$

as does Kershaw. Because $23.5 < 23.87 < 24$, they pass each other $2(23.5) = 47$ times.

Difficulty: Hard

NCTM Standard: Measurement Standard: apply appropriate techniques, tools, and formulas to determine measurements

Mathworld.com Classification: Algebra > Vector Algebra > Speed