Question #74462, Physics / Mechanics | Relativity

While her kid brother is on a wooden horse at the edge of a merry-go-round, Sheila rides her bicycle parallel to its edge. The wooden horses have a tangential speed of 6 m/s. Sheila rides at 4 m/s. The radius of the merry-go-round is 8 m.. At what time intervals does Sheila encounter her brother, if she rides in the direction of rotation of the merry-go-round?

Solution

The angular speed is calculated as follows.

$$\omega = \frac{V}{r} ;$$

The angular speed of Sheila is $\omega = \frac{4}{8} = 0.5 \, \text{rad/s}$

The angular speed of her brother is $\omega = \frac{6}{8} = 0.75 \, \text{rad/s}$

The relative angular speed is 0.75 – 0.5 = 0.25 rad/s

The time interval is calculated as follows.

$$t = \frac{2\pi}{0.25} = 8\pi \, \text{s} \approx 25.1 \text{ s}$$

Answer: 25.1 s