

### Question #33515, Trigonometry

How fast is a bicyclist traveling in miles per hour if his tires are 27 inches in diameter and his angular speed is  $5\pi$  radians per second;

**Solution.** If his angular speed  $\omega$  is  $5\pi$  radians per second, then the linear speed equals

$$v = \omega R = 5\pi R,$$

where  $R$  is the radius of his tires. Since the diameter is 27 inches and 1inch=2.54cm, we have

$$R = \frac{27}{2} \cdot 2.54 = 34.29\text{cm}.$$

So,  $v = 5\pi \cdot 34.29 = 171.25\pi \frac{\text{cm}}{\text{sec}} \approx 538.353 \frac{\text{cm}}{\text{sec}}$ . Then  $v = 538.353 \cdot 3600 = 1938070.8$  cm per hour and since 1mile=160934.4cm, we obtain

$$v = 1938070.8 \div 160934.4 \approx 12.04 \text{ miles per hour}.$$

**Answer.** 12.04 miles per hour.