Exercise 32

Estimate the average speed with which the hair on your head grows. Give your answer in both m/s and μm/hour. Briefly describe how you arrived at this estimate.

Solution

When I go to the barber shop every 6 months, I ask for about 2 inches of hair to be cut off. The average speed is the distance over the time.

$$\frac{2 \text{ inches}}{6 \text{ months}}$$

Convert it to meters per second by using conversion factors.

$$\frac{2 \text{ in}}{6 \text{ mo}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ mo}}{30 \text{ days}} \times \frac{1 \text{ day}}{24 \text{ h}} \times \frac{1 \text{ h}}{60 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ s}} \approx 3 \times 10^{-9} \; \frac{\text{m}}{\text{s}}$$

Convert it to micrometers per hour by using conversion factors.

$$\frac{2 \text{ in}}{6 \text{ mo}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{10^6 \; \mu\text{m}}{1 \text{ m}} \times \frac{1 \text{ mo}}{30 \text{ days}} \times \frac{1 \text{ day}}{24 \text{ h}} \approx 12 \; \frac{\mu\text{m}}{\text{h}}$$