

**Problem: Calculate the tangential velocity of Canon City as it speeds through space.**

$$\theta := 38 \cdot \text{deg} + \frac{26}{60} \cdot \text{deg} + \frac{48}{3600} \cdot \text{deg}$$

$$\theta = 0.671 \cdot \text{rad} \quad \theta = 38.447 \cdot \text{deg}$$

For Earth:  $\omega := \frac{2 \cdot \pi \cdot \text{rad}}{\text{day}}$  or

$$\omega = 7.272 \times 10^{-5} \frac{1}{\text{s}}$$

$$\omega = 0.262 \cdot \frac{1}{\text{hr}}$$

$$R := 6371000 \cdot \text{m}$$

From triangle ABC:

$$\cos(\theta) = \frac{r}{R} \quad r := R \cdot \cos(\theta)$$

$$r = 4.99 \times 10^6 \text{ m}$$

We know:

$$v := r \cdot \omega$$

$$v = 362.86 \frac{\text{m}}{\text{s}}$$

or

$$v = 1.306 \times 10^3 \cdot \frac{\text{km}}{\text{hr}}$$

$$v = 811.695 \cdot \frac{\text{mi}}{\text{hr}}$$

