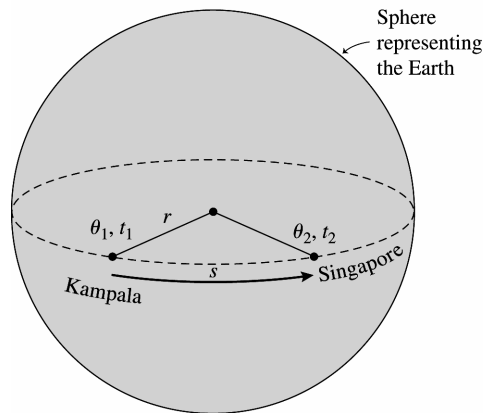


4.24. Model: The airplane is to be treated as a particle.

Visualize:

Pictorial representation



Known
 $r = 4000$ miles
 $s = 5000$ miles

Find
 $\theta_2 - \theta_1$ ω

Solve: (a) The angle you turn through is

$$\theta_2 - \theta_1 = \frac{s}{r} = \frac{5000 \text{ miles}}{4000 \text{ miles}} = 1.2500 \text{ rad} = 1.2500 \text{ rad} \times \frac{180^\circ}{\pi \text{ rad}} = 71.62^\circ$$

(b) The plane's angular velocity is

$$\omega = \frac{\theta_2 - \theta_1}{t_2 - t_1} = \frac{1.2500 \text{ rad}}{9 \text{ hr}} = 0.13889 \text{ rad/h} = 0.13889 \frac{\text{rad}}{\text{h}} \times \frac{1 \text{ h}}{3600 \text{ s}} = 3.858 \times 10^{-5} \text{ rad/s}$$

Assess: An angular displacement of approximately one-fifth of a complete rotation is reasonable because the separation between Kampala and Singapore is approximately one-fifth of the earth's circumference.