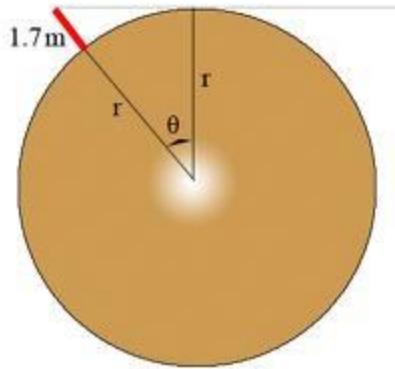


## Answer on Question #50137, Physics, Mechanics | Kinematics | Dynamics

Suppose that, while lying on the beach near the equator watching the sun set over a calm ocean, you start a stop watch just as the top of the sun disappears. You then stand, elevating your eyes by a height  $H=1.70\text{m}$ , and stop the watch when the top of the sun again disappears. If the elapsed time is  $t=574\text{s}$ , what is the radius of the earth?

**Solution:**



As you see, the earth rotated  $\theta$  degrees in 574 secs. We can calculate  $\theta$ . If the earth turns  $2\pi$  degrees in 86400 seconds (24 hours), how much does it turn in 574 s? This gives

$$\theta = \frac{574}{86400} * 2\pi = 0.04174 \text{ rad}$$

There's a right triangle.

$$\cos \theta = \frac{r}{r + 1.7}$$
$$\frac{r}{r + 1.7} = \cos(0.04174) \approx 0.999129013$$

$$r = \frac{1.7 * \cos \theta}{1 - \cos \theta} = \frac{1.7 * 0.999129013}{1 - 0.999129013} = 1950 \text{ m}$$

**Answer:**  $r = 1950 \text{ m}$