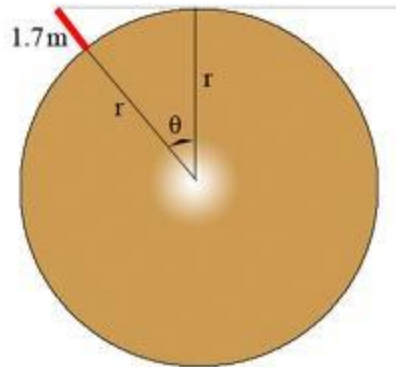


Answer on Question #50137, Physics, Mechanics | Kinematics | Dynamics

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 θ degrees in 574 secs. We can calculate θ . If the earth turns 2π 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: $r = 1950 \text{ m}$