

21-P-KM-AG-004

The Earth orbits the sun at an average distance of 149.60 million km. Assume that the Earth rotates around the sun in a perfect circle and that the year is 365.256 days. Write the equation for the angular velocity $\dot{\theta}$ of Earth. Use r as radius and t as time in days.

ANSWER:

The total distance path that the Earth moves around the Sun in one year is equal to the circumference of the Earth's orbit or $2\pi r$.

Then, convert the number of days in a year to the number of seconds.

$$t \text{ days} \cdot 24 \frac{\text{hours}}{\text{day}} \cdot 60 \frac{\text{minutes}}{\text{hour}} \cdot 60 \frac{\text{seconds}}{\text{minute}} = 86,400t \text{ seconds}$$

Therefore, the speed of Earth's orbit is $\frac{2\pi}{86,400t} \frac{m}{s}$. The angular velocity of Earth is then calculated

by dividing the speed by the radius: $\frac{\frac{2\pi}{86,400t} \frac{m}{s}}{r \text{ m}} = \frac{2\pi}{86,400t} \frac{1}{s}$.