

6.2 Linear and Angular Velocity

LT35: I can find angular and linear velocity.

Angular Displacement, or angle of rotation, describes a circular object that rotates counterclockwise about its center.

We can calculate this by multiplying our number of revolutions by 2π

Ex. - Angular displacement, in radians, of 8.7 revolutions

$$8.7 \times 2\pi \approx 54.66 \text{ radians}$$

Angular velocity - Ratio of change in the central angle to time.

$$\begin{array}{l} \uparrow \\ \omega \text{ (omega)} \\ \omega = \frac{\theta}{t} \end{array}$$

Ex. 5.8 revolutions completed in 9 seconds.
What is the angular velocity?

$$\begin{array}{l} \omega = \frac{11.6\pi}{9} \quad \theta = 5.8 \times 2\pi \\ \approx 4.05 \text{ rad/sec} \end{array}$$

Linear Velocity - When an object moves along a circle (Angular velocity (x) radius).

$$v = r \frac{\theta}{t}$$

Ex. - A point rotating with angular velocity of 31π radians per sec., 15 cm from center.

$$\begin{array}{l} v = 15 \cdot 31\pi \\ \approx 1460.84 \text{ cm/s} \end{array}$$