

Angular Velocity

Angular Velocity is the speed at which an object rotates. Angular velocity is usually represented as the number of revolutions per minute.

Example (Angular Velocity of a CD player)

Suppose a CD player spins at a rate of 480 revolutions per minute. Through how many degrees will a point on the edge of the CD move in 2 sec?

- Number of revolutions per second: $480 \frac{\text{rev}}{\text{min}} \cdot \frac{1 \text{ min}}{60 \text{ s}} = \frac{480}{60} = 8 \frac{\text{rev}}{\text{s}}$
- In 2 seconds, 16 revolutions.
- $16 \cdot 360^\circ = 5760^\circ$

Answer The point on the edge will revolve 5760° in 2 sec.

Does it matter how far the point is from the edge?

Notes

Traditions ...

Traditionally, portions of a degree were represented using minutes and seconds.

One **minute** is written as $1' = \frac{1}{60}^\circ$

One **second** is written as $1'' = \frac{1'}{60} = \frac{1}{3600}^\circ$ (Note: there are $60 \times 60 = 3600$ seconds in an hour)

Therefore $12^\circ 42' 38''$ represents 12 degrees, 42 minutes, 38 seconds.

Notes

Adding and Subtracting DegMinSec

To add or subtract, treat the degrees, minutes, and seconds separately.

$$\begin{array}{r} 52^\circ \ 41' \ 12'' \\ + \ 13^\circ \ 29' \ 25'' \\ \hline 65^\circ \ 70' \ 37'' \end{array}$$

- Since $70' = 1^\circ 10'$ the final answer is $66^\circ 10' 37''$

$$\begin{array}{r} 52^\circ \ 41' \ 12'' \\ - \ 13^\circ \ 29' \ 25'' \\ \hline \end{array}$$

needs to be rewritten

$$\begin{array}{r} 52^\circ \ 40' \ 72'' \\ - \ 13^\circ \ 29' \ 25'' \\ \hline 39^\circ \ 11' \ 47'' \end{array}$$

Notes

Converting Between Decimal Degrees and Degrees, Minutes, Seconds

$$\begin{aligned}34^{\circ}51'12'' &= 34^{\circ} + \frac{51}{60} + \frac{12}{3600} \\ &= 34^{\circ} + 0.85^{\circ} + 0.003^{\circ} \\ &= 34.853^{\circ}\end{aligned}$$

$$\begin{aligned}72.541^{\circ} &= 72^{\circ} + 0.541(60') \\ &= 72^{\circ} + 32.46' \\ &= 72^{\circ} + 32' + 0.46(60'') \\ &= 72^{\circ} + 32' + 27.6'' \\ &= 72^{\circ}32'27.6''\end{aligned}$$

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