Dynamics Review - Units and Conversions

ME3050 - Dynamics Modeling and Controls

May 29, 2020

Topic 2 - Units and Conversions

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- Standard Units
- Unit Conversions
- Frequency and Circular Frequency
- Famous Example - Units Matter !!!

Standard Units

Quantity	Unit(SI)	Symbol(SI)	Unit(US)	Symbol(US)
time	second	(s)	second	(sec)
length	meter	(m)	foot	(ft)
force	newton	(N)	pound	(lb)
mass	kilogram	(kg)	slug	(?)
energy	joule	(J)	foot-pound	(ft-lb)
power	watt	(W)	?	(ft-lb/sec)
temp.	degrees	$^\circ C$, $^\circ K$	degrees	$^\circ F$, $^\circ R$

When possible work in the *base* units. SI is preferred but engineers must know both systems.

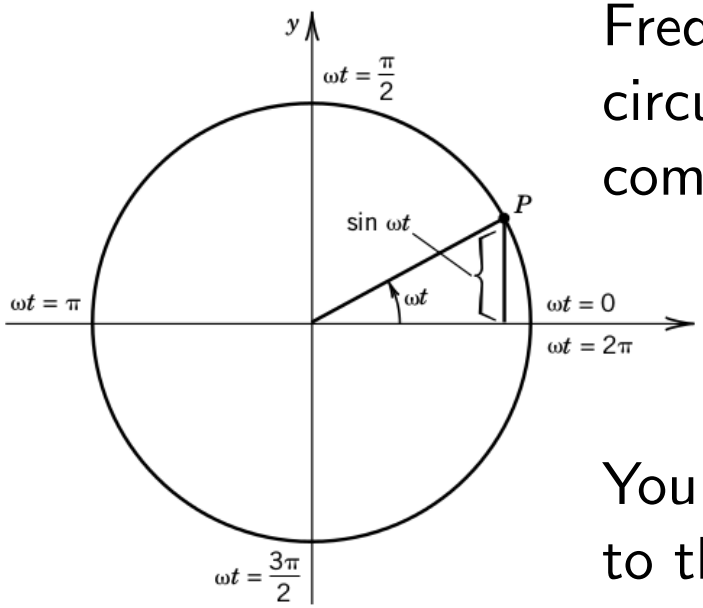
Unit Conversions

If you are unsure about the units, WRITE THEM OUT!
I prefer to write them out as fractions and cancel.

Example: Find exactly how many seconds are in 3 days.

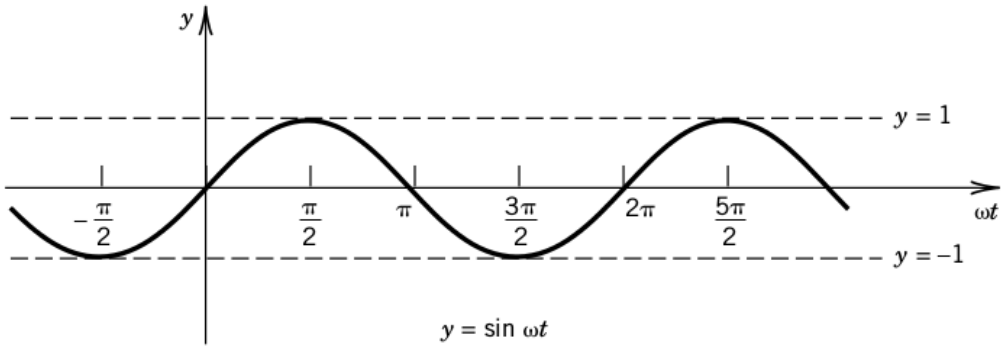
3 Days =

Frequency and Circular Frequency

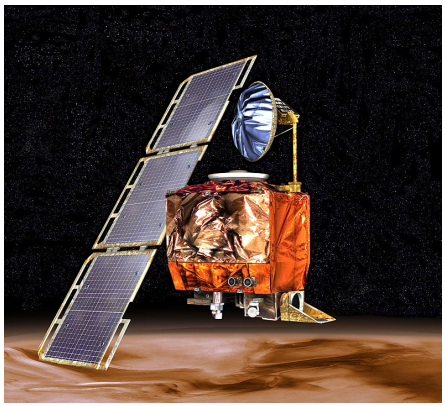


Frequency (Hz) and circular-frequency ($\frac{rad}{s}$) are both commonly used.

You can easily convert from one to the other.



Famous Example - Units Matter !!!



The Mars Climate Orbiter (formerly the Mars Surveyor '98 Orbiter) was a 638-kilogram (1,407 lb)[1] robotic space probe launched by NASA on December 11, 1998 to study the Martian climate, Martian atmosphere, and surface changes and to act as the communications relay in the Mars Surveyor '98 program for Mars Polar Lander. Full Story and Images: Wikipedia