- Uniform circular motion - example
- Forces
- Newton's 1st and 2nd Laws

PHYS 210
General Physics I

$F_{Drag} \propto v$

Uniform Circular Motion

- Uniform = constant speed
- Circular = non-constant acceleration!
- The centripetal acceleration is
  - $a_c = v^2/r$, where r = radius of circular path
  - a_c is constant in magnitude, not direction
  - At any instant in time, the (constant speed) velocity vector is …

tangent to the circular path!

Constant angular acceleration

MISSING QUANTITY

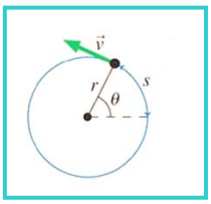
$\omega = \omega_o + \alpha\,\Delta t$	θ, θ_o
$\theta = \theta_o + \omega_o \Delta t + \frac{1}{2}\alpha\,\Delta t^2$	ω
$\omega^2 = \omega_o^2 + 2\alpha(\theta - \theta_o)$	Δt
$\theta = \theta_o + \frac{1}{2}(\omega + \omega_o)\Delta t$	α
$\theta = \theta_o + \omega\,\Delta t - \frac{1}{2}\alpha\,\Delta t^2$	ω_o

Equations for const. angular acceleration

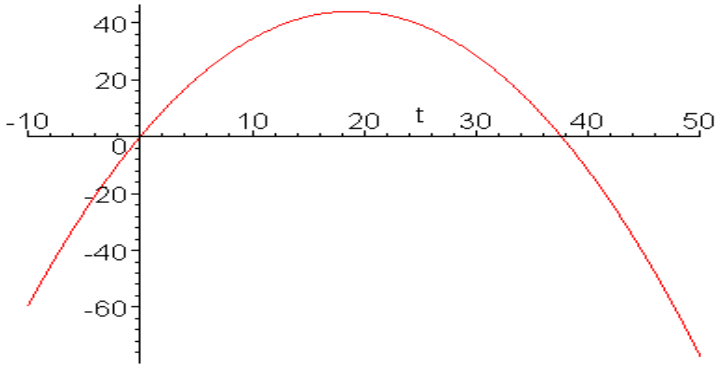
$$\omega_f = \omega_i + \alpha\,\Delta t$$

$$\theta_f = \theta_i + \omega_i \Delta t + \frac{1}{2}\alpha\,\Delta t^2$$

$$\omega_f^2 = \omega_i^2 + 2\alpha(\theta_f - \theta_i)$$



EX: **At t = 0, a flywheel has an angular velocity of 4.7 rad/s, a constant angular acceleration of -0.25 rad/s^2, and a reference line at $\theta_o = 0$. (a) Through what max angle will the reference line turn in the positive direction? What are the (b) first and (c) second times the ref line will be at $\theta = \theta_{max}$?**



FORCES

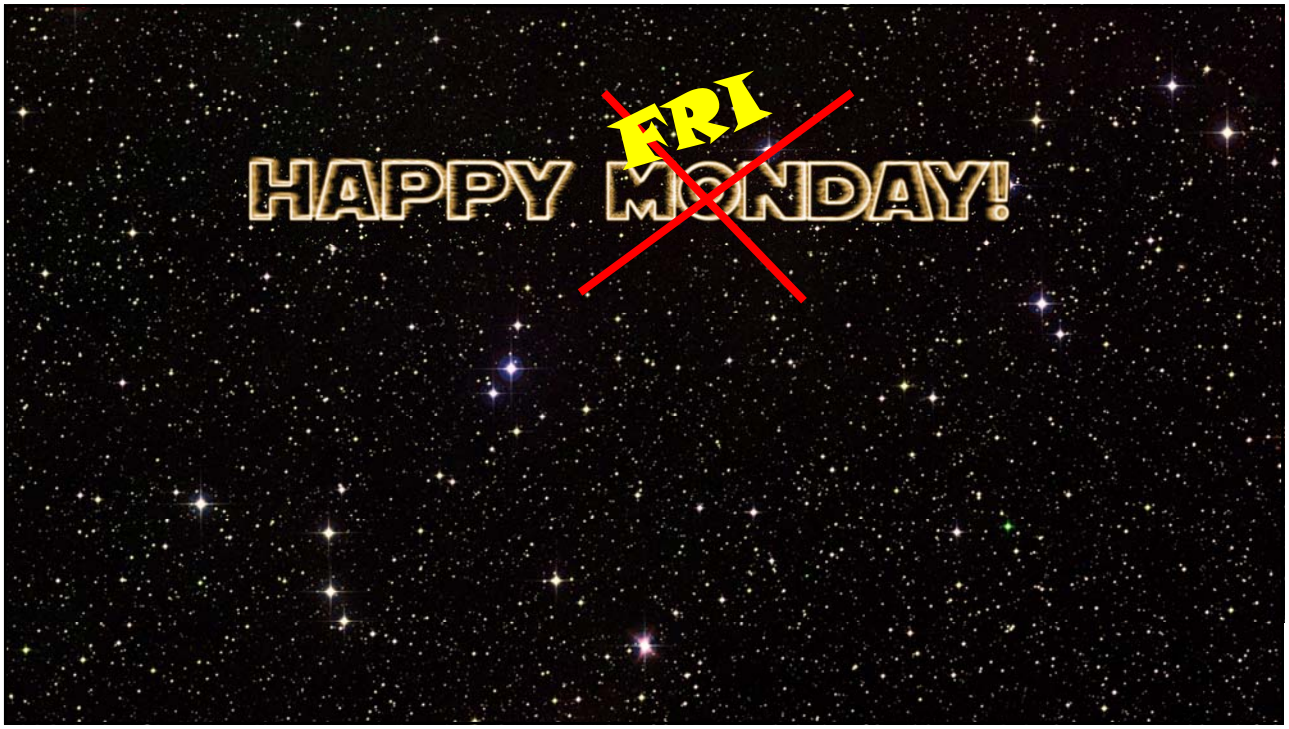
Newton's Laws of Motion

Know these by heart!

1. If $\vec{F}_{NET} = 0$, then $\vec{v} = \text{constant}$
   - ❖ Mass is a measure of inertia
2. $\vec{F}_{NET} = m\vec{a}$

> The "net force" is the sum total of ALL forces!

3. $\vec{F}_{12} = -\vec{F}_{21}$


HAPPY MONDAY!
FRI