In Class Activity Plan
Week 14: Angular Motion & Simple Harmonic Motion

25 min **Whiteboard – Satellite Centripetal Ranking (Word, Pdf)**
PURPOSE: Practice modeling centripetal acceleration situation.
Lots of options here probably want to give one as homework:

20 min **Board Meeting**
PURPOSE: Build consensus around modeling centripetal acceleration situation.
Goals:

- Centripetal force is just the net force towards the center
- Need to attend to the radius of the circular path

Additional resources which could be used:
Ferris Wheel Centripetal Force (Word, Pdf)
Centripetal Force Ranking (Word, Pdf)
Circular Motion Problems (Word, Pdf)

20 min **Whiteboard - Ladybug revolution part 1**
PURPOSE: Investigate rotational motion, introduce rotational analogs to translational kinematics
Direct students to PhET simulation – Ladybug Revolution (http://phet.colorado.edu/en/simulation/rotation)
Give students 10 minutes to explore.
Summarize what you have learned on whiteboard.

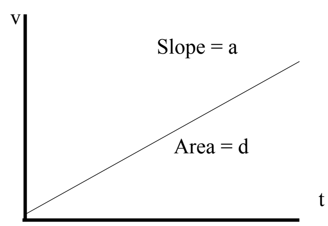
10 min **Board Meeting**
PURPOSE: Share what was learned from investigation of simulation

20 min **Whiteboard - Ladybug Revolution part 2**
PURPOSE: Develop models for constant rotational motion from graphs of rotational motion.
Directions: Return to the Ladybug Revolution simulation
Use the second tab which shows graphs, use radians.
Answer: What have you learned? What rules can you make? What questions do you have? On whiteboard.

20 min **Board Meeting**
PURPOSE: Reach consensus about equations that describe constant angular acceleration motion.
1. Review the kinematic representations in the basic 1-d constant acceleration model
    a) Equations

$d = \Delta pos$
$v = \Delta pos/\Delta t$
$a = \Delta v/\Delta t$
$d = v_0 + ½at^2$
$v_f = v_0 + at$

b) Velocity-time graph



2. When does this model apply?
   Answer: when we have straight line motion
3. What is the motion of the wheel?
   Answer: not moving linearly, but moving by rotating
4. Create a table of angular variables by analogy

$d = \Delta pos$	$\theta = \Delta angle$
$v = \Delta pos/\Delta t$	$\omega = \Delta angle/\Delta t$
$a = \Delta v/\Delta t$	$\alpha = \Delta\omega/\Delta t$
$d = v_0 + ½at^2$	$\theta = \omega t + ½\ \alpha\ t$
$v_f = v_0 + at$	$\omega_f = \omega_0 + at$

5. How are we able to go between the two versions?
   a) $d = r\ \theta$
   b) $v = r\ \omega$
   c) $a = r\ \alpha$

6. Now we can add on the rest of the relationships:

m	$I = \sum m_i r_i$
$p = mv$	$L = I\omega$
$F_{net} = m\ a$	$\tau = I\alpha$
$E_{klinear} = ½\ m\ v^2$	$E_{krot} = ½\ I\ \omega^2$

25 min **Whiteboard- Helicopter Quantitative Problem (Word, Pdf)**
PURPOSE: Model situation with constant angular acceleration

20 min **Board Meeting**
PURPOSE: Build consensus about modeling constant angular acceleration

Homework - Ranking of Theta vs t graph (Word, Pdf) and Rotational Speed Ranking (Word, Pdf)