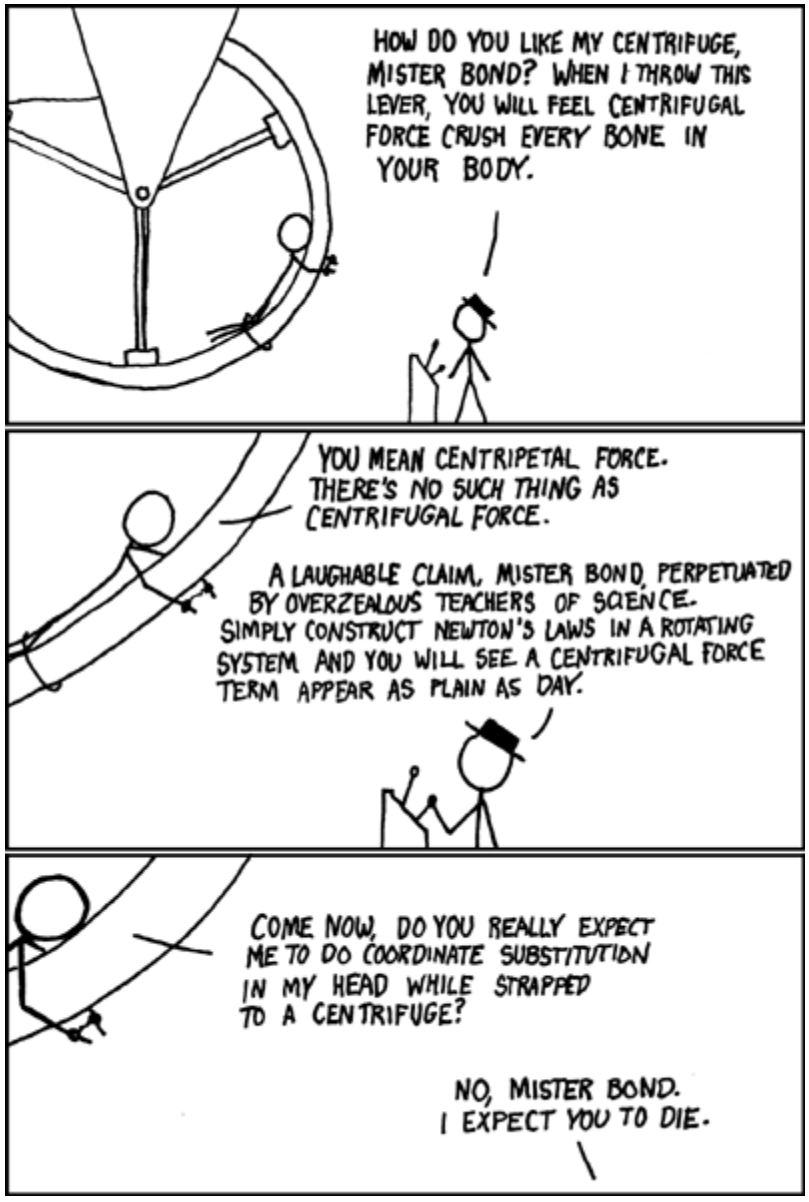
Circular Motion



Principles for Success

- **Treat everyone with respect.**
- **Learn by doing and questioning.**
- **Everything should make sense.**

Meet Your Group

- Introduce yourself!
- With your group, discuss
  - What does it mean to interact professionally?
  - Come up with an example of someone interacting unprofessionally in class
  - Who gets to decide if something is unprofessional?
  - What can you do if someone does something unprofessional?

Meet Your Group

- What does it mean to interact professionally?
  - Respect others
    - Ideas
    - Background – don't pre-judge
    - Sensitivities
  - Keep discussions focused on the task
  - Understand the impact of your actions
- Examples of unprofessional behavior
  - Distracting zoom backgrounds and filters
  - Off-topic discussion in zoom chat
  - Not respecting others' ideas
  - Not following the Guidelines for Conduct
- Who gets to decide if something is unprofessional?
  - We collectively get to decide what is unprofessional
  - How unprofessional something is can depend on things like context and frequency
  - Keep in mind the difference between **intentions** and **impact**
- What can you do if someone does something unprofessional?
  - Let them know (if you're comfortable)
  - Let an instructor, TA, or LA know
  - Submit a bias incident report with the university
    - https://diversity.oregonstate.edu/bias-incident-response

Activity 1-1 – Uniform Circular Motion

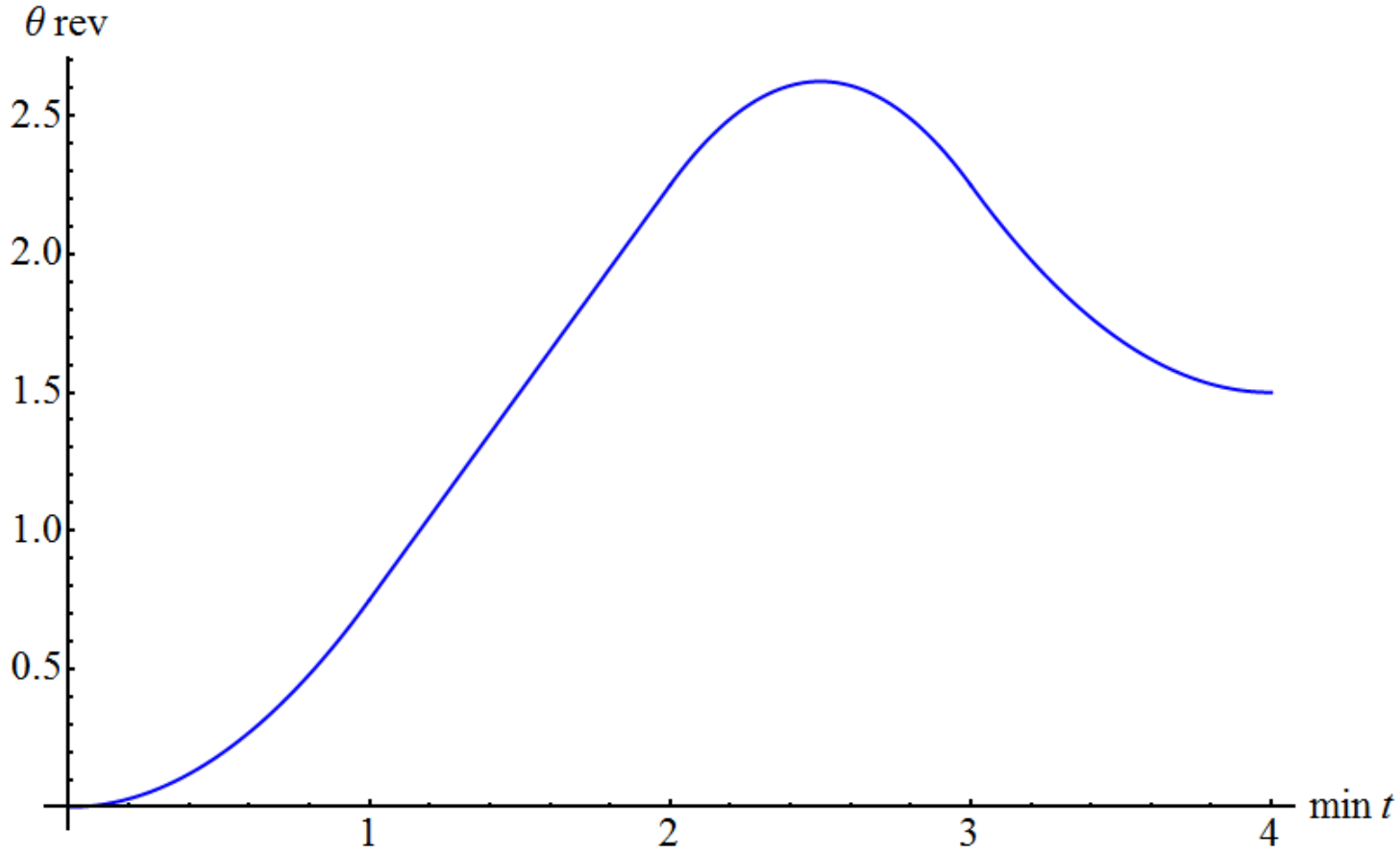
- An object that is moving with **uniform circular motion** follows a path that is circular while moving with a speed that is constant. Draw a motion diagram for such an object that includes at least five different points. Recall that your motion diagram should include, at each point: a representation of the object, a position vector, a velocity vector, and an acceleration vector.
- Make a table with six columns
  - In the first (left-most) column, make a list of the following physical quantities of a particle moving around a circle at constant speed: (translational) position, (translational) velocity, (translational) acceleration, mass, net force, (translational) kinetic energy, and (translational) momentum.
  - In the second column indicate if the quantity is a scalar or a vector.
  - In the third column indicate if the quantity is constant or not constant.
  - In the fourth column write the units for the quantity.
  - In the fifth column write a symbolic definition of the quantity.
  - In the sixth column, if the quantity is a vector, then write what is known about its direction.

Activity 1-2 – The Coin on the Disc

- A small coin (mass m) is placed on the edge of a disc of radius R that is rotating so that the speed of the coin is a constant v. The coefficient of static friction between the coin and the disc is μ_s.
  - **Understand and Plan:** Draw a free-body diagram for the coin.
  - **Solve the Problem:** Find the force of static friction on the coin.
  - **Make Sense of Your Solution:** Use special-case analysis to decide whether or not your answer makes sense.

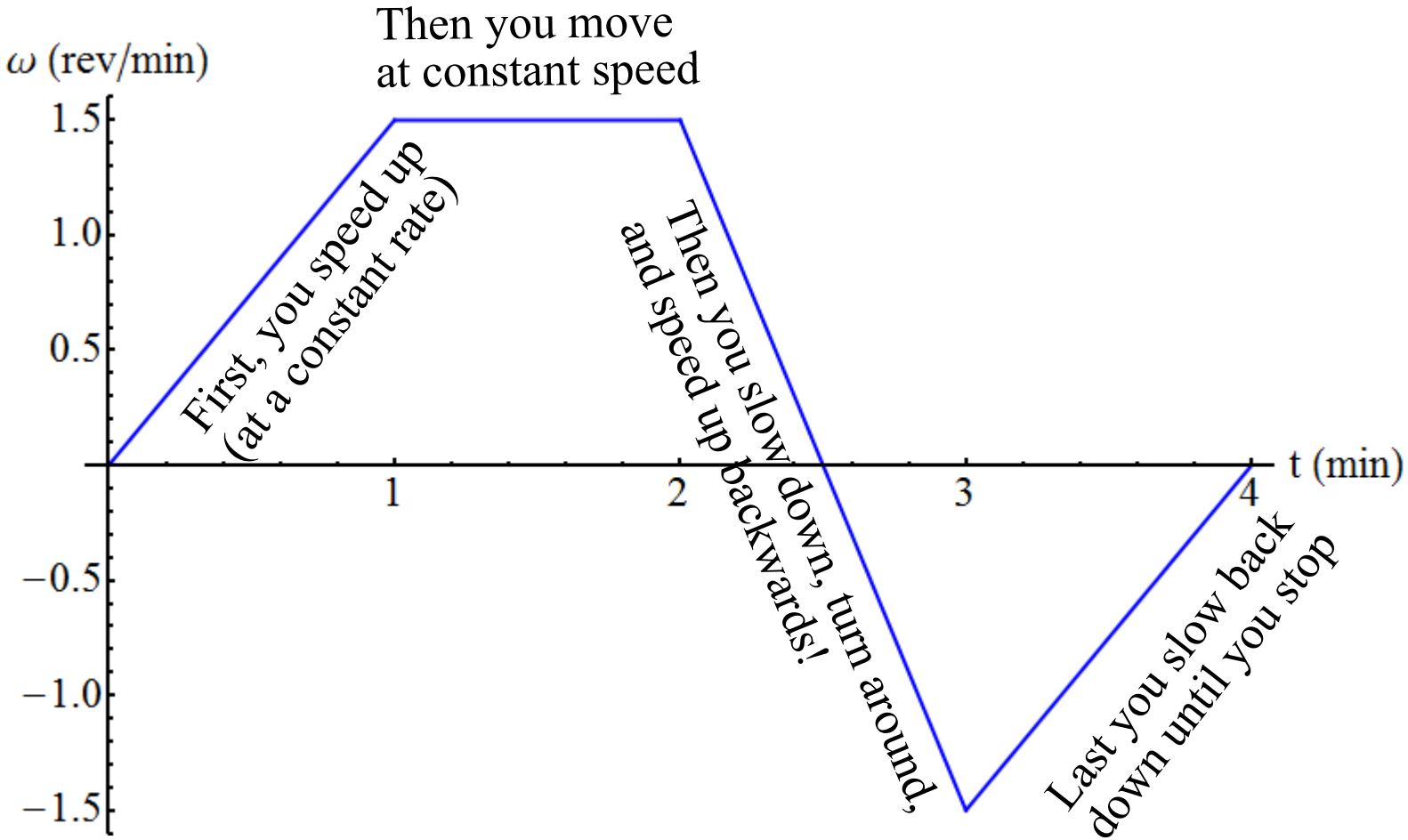
Activity 1-3 – The Merry-Go-Round

- You are riding a merry-go-round with a wild reputation. Below is your angular position *vs.* time.
- Describe your experience on the merry-go-round using words, equations, and graphs.



$$\vec{\omega} = \frac{d\vec{\theta}}{dt}$$

Note that you don't step off where you started!



Activity 1-4 – Swing in a Circle

- A ball on a string (mass *m*) is swung so that it moves in a vertical circle of radius *r*. The speed *v* of the ball is the same at the top of the circle and at the bottom of the circle.
  A. Draw free-body diagrams for the ball at the top and bottom.
  B. At the top, is the magnitude of the tension *greater than, less than,* or *equal to* the magnitude of the gravitational force on the ball? Explain your reasoning.
  C. At the bottom, is the magnitude of the tension *greater than, less than,* or *equal to* the magnitude of the gravitational force on the ball? Explain your reasoning.
  D. Find an expression for the tension in the string at the bottom.