Chapters 14-15 Test description

The Chapter 14-15 Test will be on Wednesday May 19 at 6:30-7:45pm. Please read the instructions for tests carefully so you are well prepared.

A "sample test" will be posted in Files->Tests on Canvas. The sample test does NOT necessarily include all of the material you need to know; it is for practice taking a test in a test setting. Anything covered in the homeworks, lectures, or in-class activities is fair game. The test will consist of a mixture of calculation problems (like "standard problems") and conceptual problems.

This test covers moment of inertia integrals (section 9.6), the assigned sections of chapters 14-15 and the associated homeworks and classkicks.

You should know:

- How to use conceptual ideas to compare moments of inertia.
- How to complete moment of inertia integration problems.
- How to describe simple harmonic motion mathematically.
- How to describe a wave graphically and mathematically, including understanding wavefunctions, snapshot graphs, and history graphs.
- The relationships between wave speed, the properties of the medium, frequency, wave number, and related quantities.
- The ideas underlying the formation of standing waves.
- The creation of standing waves on a string fixed on both ends and the relationships that determine the frequencies of the standing waves.

You should also know the material from the previous tests:

- The meanings of the metric prefixes n, μ, m, c, k, and M.
- The definitions and relationships between position, displacement, distance, velocity, speed, and acceleration in 1D.
- How to calculate instantaneous and average velocities off an x vs. t graph and accelerations off a v vs. t graph.
- How x vs. t and v vs. t graphs correspond to actual motion, and what graphs of constant acceleration and constant velocity motion look like.
- How to solve 1D kinematics problems, including using calculus techniques and problems with multiple objects and/or time intervals.
- How to add and subtract vectors graphically.
- How to find the components of vectors.
- How to use vector components to find the magnitude and direction of vectors.
- How to solve 2D kinematics problems including, but not restricted to, projectile motion.
- Radial and tangential acceleration, and how they affect objects in motion.
- The concepts related to describing circular motion

- Newton's 3 laws of motion and how they apply to various situations. You must know which law is which.
- How to draw a free body diagram.
- How to solve Newton's second law problems including:
    - Problems involving friction.
    - Problems involving tension.
    - Problems involving multiple interacting objects.
    - Problems involving taking vector components.
    - Problems involving using tilted coordinate aces.
    - Problems involving circular motion.

- The meaning of apparent weight.
- The shortcuts for calculating work and when to apply them.
- How to apply the work-energy theorem.
- How to find the power in various situations.
- How energy is transformed and transferred, and the role work plays in this.
- How potential energy is defined when a conservative force is present.
- How to solve conservation of energy problems.
- How impulse and momentum are related.
- How to solve 1D conservation of momentum problems including collisions and explosions.
- The relationships between energy, momentum, work, and impulse.
- MEMORIZE: how to do cross products using the right-hand rule and the a*b*sin(theta) form.
- MEMORIZE: how to use the right hand rules.
- How to find the torque acting on an object when a force is applied about an axis of rotation.
- How to solve static equilibrium problems.
- How to find angular acceleration from torque and moment of inertia.
- How to use conservation of angular momentum.
- How to consider rotation in three dimensions using vectors for torque, angular velocity, angular acceleration, and angular momentum.