Last Lecture

Circular Motion with Gravity

Today

Conclusion of F=ma and start of Work/Energy

Important Concepts

Don’t forget centripetal acceleration.
Think carefully about all of the components of the acceleration.
Pay attention to physical constraints (for example, string tension or normal force going negative).
Work and Energy concepts can make some problems with complicated dynamics easier to solve.

Work done by a Force

Not a vector quantity (but vector concepts needed to calculate its value).
Depends on both the direction of the force and the direction of the motion.
Four ways of saying the same thing

- Force times component of motion along the force.
- Distance times the component of force along the motion.
- \[ W = \sum |F||d|\cos(\theta) \] where \( \theta \) is the angle between \( F \) and \( d \).
- \[ W = \int \vec{F} \cdot d\vec{s} \] where the “s” vector is along the path.

Important Reminders

Pset # 5 due tomorrow at 10am.
Next Mastering Physics deadline is next Monday.
Slightly modified version of the syllabus is posted.
Details of mid-term evaluation will be distributed in class tomorrow.
8.01L student advisory board cancelled due to lack of interest.

Important Concepts

Energy is never created or destroyed, only moved from one form to another or one object to another.
Kinetic energy (the energy associated with motion) is one form of energy.
Sometimes the effect of a given force on moving around energy is difficult to quantify or the effect is to move energy into or out of an object not considered part of the system.
For example, friction creates heat.
In such cases, it is often convenient to use the work done by a force and say that work is change in energy.