Introduction

Newton on his bitter rival Hooke:

"This carriage towards me is very strange & undeserved, so that I cannot forbeare in stating that point of justice to tell you further … he should rather have excused himself by reason of his inability. For tis plain by his words he knew not how to go about it."

Syllabus Change

- Drop §13.8 – *Rolling Motion*
- Include the *Angular Velocity Vector* sub-section of §13.9.
  - The rest of this section continues to be dropped
- Mechanics Home Page and Syllabus pdf have been updated

Coming Up

- This week: finish Chapt. 11 *Work* and discuss Chapt. 13 *Rotation of a Rigid Body*
- Monday October 31: review for the test
  - The pdf of the PowerPoint will be released this Wednesday
- Tuesday November 1, 6 – 7:30PM: Test
- Wednesday November 2: Dr. Harlow & I will discuss a laboratory topic: *Error Analysis*
- Monday November 7: Waves Section with Dr. Harlow begins

Test #1

- Reminder: if you have a conflict with Tuesday November 1, 6:00 – 7:30 PM today is the last day to see Dr. Savaria or Ms. Seeley in MP129
- Format set:
  - 8 Multiple-Choice questions worth 8 marks each
  - 1 Long Answer with 6 Parts (36 marks total)

Last Time 1/2

- Work $W = \int_{s_1}^{s_2} \vec{F} \cdot d\vec{s}$
  - Dot Product
- $W_{net} = \Delta K$ always
- Springs
  - $F_s = -ks$
  - $U_s = \frac{1}{2} ks^2$

Last Time 2/2

- Conservative Forces (gravity, springs):
  - W independent of path
  - Potential for work to be done: potential energy U
  - $W = -\Delta U$
  - $E_{mech} = K + U$ conserved
  - $F_x = -dU/dx$
- Non-Conservative Forces (friction):
  - W depends on path
  - U can not be defined
- Isolated System: E_{tot} always conserved
  - Heat is a form of energy (Mayer, 1842): observed the color of blood of people in Europe and Indonesia

How Strong Is My Belief in Conservation of Energy?

Today

- Power
- Basal Metabolism
- Rotational Kinematics
- Centre of Mass
- Torque

Metabolism

- Basal (Resting) Metabolic Rate (bmr)
- Body radiates energy at a rate: dE/dt
- At equilibrium: bmr = dE/dt
- Surface area A: dE/dt = kA
- Dimensional analysis for mass m: bmr = c $m^{2/3}$
- Experimentally: bmr = c $m^{3/4}$

Figure 13.18