


## Introduction

Newton on his bitter rival Hooke:

“This carriage towards me is very strange & undeserved, so that I cannot forbear 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.”

## Rep. Assy: About Derivations

- Physics  $\Rightarrow$  Some Equation
  - More Physics  $\Rightarrow$  Some Other Equation
  - ... Problems usually also have this intermediate “only math” step
-  Bunch o' Math  
This Step is Not Physics!
- Yet Another Equation

Interpreting the Equation is Physics

## Rep. Assy: Organisation and Web Sites

- Course
- Overall organisation: Dr. Savaria
  - Mechanics: me
  - Waves: Dr. Harlow
  - E & M: Prof. Strong
  - Nuclear & Radiation: Prof. Key

- Lab
- Dr. Deyirmenjian
- We each maintain the web pages for our own parts of PHY138

Bookmarks or “My Favorites” can help you organise all the web pages for all your courses

## Last Time 1/2

- Springs
  - Hooke's Law:  $F_x = -kx$
  - $U = \frac{1}{2} k x^2$
- Elastic Collisions: K is conserved
- Work:  $W = \int_{r_1}^{r_2} \mathbf{F} \cdot d\mathbf{s}$
- $W_{\text{net}} = \Delta K = -\Delta U$
- Potential Energy: the potential for work to be done

## Last Time 2/2

- Conservative and Non-conservative forces
  - Potential Energy can only be defined for conservative forces
- $F_s = dW/ds = -dU/ds$
- To maximise the work for a constant force: maximise  $\Delta s$ 
  - Jumping organisms have long legs

Rep Assy: some discussion about whether these reviews are worthwhile. Most felt that they are.

## Coming Up

- Today and Wednesday:
  - Finish Chapter 11 – Work
  - Application: metabolic rates
  - Chapter 13 – Rotation of Rigid Bodies
- Next Monday: Test Review
  - The PowerPoint slides will be available via Wednesday's Class summary
- Tuesday October 31 6:10 – 7:30 PM: Test
- Next Wednesday November 1: Error Analysis
  - Me and Dr. Harlow

## Rep. Assy: Two More Things

- Please think through a question before writing it down and having Guoying bring to me
- Suggested Problems Chapter 13: 47, 53, 56, 58

## How Strong Is My Belief in Conservation of Energy?



### Basal [Resting] Metabolic Rates (BMR)

Animal	Mass (kg)	Basal Metabolic Rate (Watts)
Dove	0.16	0.97
Rat	0.26	1.45
Pigeon	0.30	1.55
Hen	2.0	4.8
Dog (female)	11	14.5
Dog (male)	16	20
Sheep	45	50
Woman	60	68
Man	70	87
Cow	400	266
Steer	680	411

## About Heat

- Previously thought to be a *fluid*: “caloric”
- Mayer (1842):
  - People in warm climates consume less oxygen, i.e. need to produce less energy
  - They have a lower Basal Metabolic Rate
  - First realisation that heat is a form of energy
- Joule (1847): a classic experiment “Mechanical Equivalent of Heat”
  - Available in the lab

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## Circulatory System

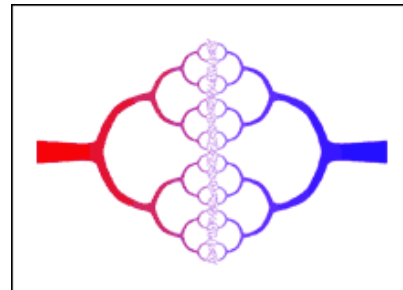
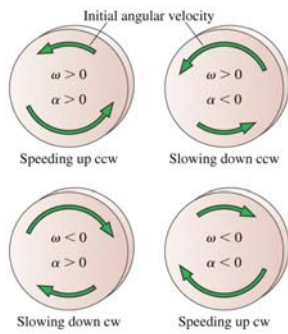
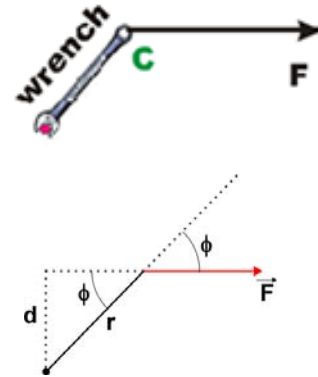


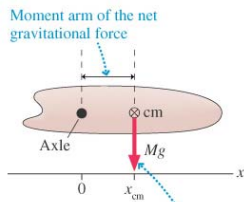
Figure 13.5



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(b)



The net torque due to gravity acts as if all the mass is concentrated at the center of mass.

Figure 13.19(b)

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