On the Newtonian Revolution

"Nature and nature's laws lay hid in night;
God said **Let Newton be!** and all was light."

-- Alexander Pope,
"*Epitaph intended for Sir Isaac Newton*"

Now Available on *MasteringPhysics*

- Problem Set Q1 – Chapts 05 – 06
  - Due by 11:59 PM on Friday September 29
  - Slightly longer than normal
- Pre-Class Quiz Q1 – Chapts 07 – 08
  - Due by 10 AM on Monday October 2

Doing *MasteringPhysics Problems*

- Don't be misled by the fact that it is delivered via a computer
  - You should do each problem using paper and pen/pencil
- Of course, you should also use the "official" Problem Solving Strategy!
  - If a Figure is given, we recommend that you copy it.

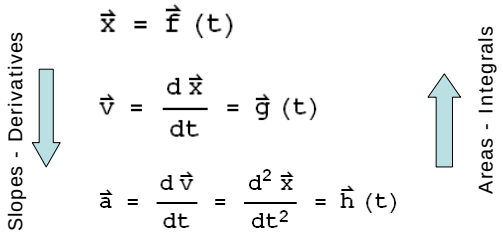
About the Labs

- Tomorrow, Tuesday September 26, is the last day when you can change your lab section with ROSI.
- After tomorrow, to change your lab section see Dr. Deyirmenjian in MP124.

Last Time

- Chapter 2
  - Uniform Motion
  - Instantaneous and Average Velocity
  - Position from Velocity
    - Introduced the Integral Sign

Slopes and Areas



Last Time - continued

- Chapter 2
  - Uniform Motion
  - Instantaneous and Average Velocity
  - Position from Velocity
    - Introduced the Integral Sign
  - Constant Acceleration
    - Free Fall

Question From Last Class

- Not answering three non-Physics questions
  - These are answered before class (Dr. Savaria) or after class (me)
- Free Fall

"How come there isn't a vector sign on a when you wrote $a = -g$? Shouldn't it be $|\vec{a}| = g$ or $a_y = -g$?"

Last Time – continued more

- Chapter 2
  - Uniform Motion
  - Instantaneous and Average Velocity
  - Position from Velocity
    - Introduced the Integral Sign
  - Constant Acceleration
    - Free Fall
    - Inclined Plane
- Chapter 3 - Vectors

Today

- Chapter 4 – Force & Motion
- Begin Chapter 5 – Dynamics I: Motion Along a Line
  - Perhaps finish it
- Perhaps begin Chapter 6 – Dynamics II: Motion in a Plane

A Force

- Is roughly a push or a pull.
- Acts on an object.
- Requires an *agent*.
- Is a vector.
- Is either:
  - A contact force.
  - A long-range force.

Figure 4.16

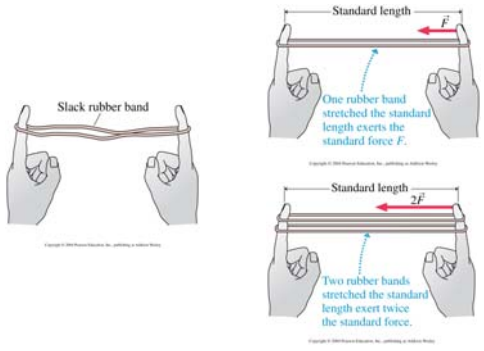


Figure 4.17

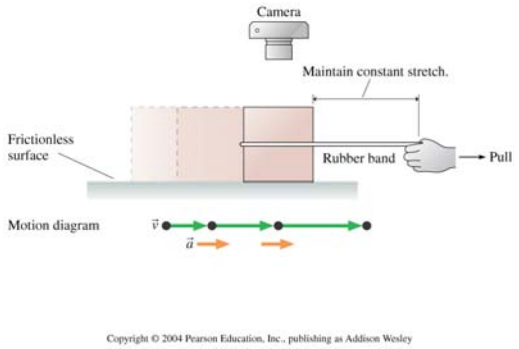


Figure 4.18

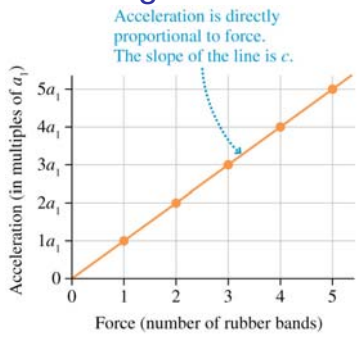
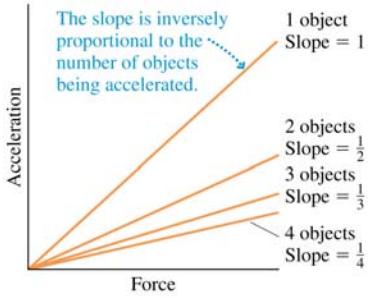


Figure 4.19



Newton's First Law

- "In the absence of external forces, an object at rest remains at rest and an object in motion continues in motion with constant velocity." (1687 AD)
- From the **Mo Ching** ("Pulse Classic"): "The cessation of motion is due to the opposing force ... If there is no opposing force ... the motion will never stop."
  - 3rd century BC? Certainly by 3rd century AD.

Newton

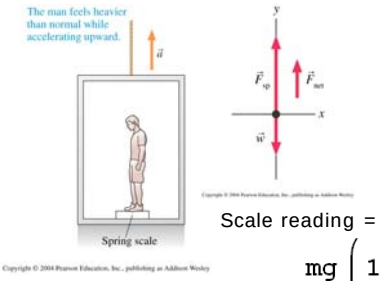
"Absolute space, in its own nature, without relation to anything external, remains always similar and immovable."

Einstein on Free Fall

"For an observer in free fall off the roof of his house, there exists for him during his fall no gravity."

This is sometimes called the Equivalence Principle

Figure 5.8



Scale reading = apparent weight:

$$mg\left(1 + \frac{a_y}{g}\right)$$