Wednesday, February 18
Block 1.7862

Moving on to dynamics

Low technology version

Goal

With the materials at your table, devise three ways to measure forces.

Conservation of Momentum

- On your paper write down a few ideas about how you begin the study of momentum
- Look at the seven methods described on the page rank order them form most useful (1) to least useful (7) as a way to begin the study of momentum.

Beginnings of studying momentum

- 5.8 (a) State Newton's 3rd 1-7
- 2.5 (b) Lab interactions observations 1-5
- 1.7 (c) Remind of everyday experiences 1-6
- 5 (d) Define momentum & conservation 1-7
- 3 (e) Student predict; you demonstrate 2-6
- 4 (f) Define momentum; lab observe interactions 2-6
- 5 (g) Define momentum & conservation; lab verify 2-7

Learning Cycle

- Based on cognitive psychology
  - Beginning with Jean Piaget's Model of Intellectual Development
  - Four stages of Development
  - Three stages require concrete experiences
- New topics require concrete experience for a start
  - Do you read the instruction manual before using a new toy?
- Adapted to teaching and learning in the 1960s
- Shown to be valuable at all levels of education in 1970s
  - Including University physics

Karplus Learning Cycle

- Exploration
  - Students complete experiments that encourage them to observe phenomena & relationships.
- Concept Introduction
  - A physical principle in introduced that unifies and explains the observations.
    - Instructor led discussion
- Concept Application
  - In lab setting students apply the newly introduced concept to experiments.
  - Leads to observations that cannot be explained & next learning cycle

Research

- Works with students at all levels of education
- For each concept requires more time than lecturing
- Understanding is higher for concepts that are covered.
- Does not hurt the brighter students.
- Improves understanding for a broad spectrum of students' abilities.

Many variations