1. Requirements, etc.

Requirements, etc.

- Homework ~ every other week
- Mid-term exam (perhaps 2) + Final (multiple choice & problems)
- Ongoing small group projects
- Prof. Goldstein
- Office hours - (tentative) Tues. 3:00-4:00 or by arrangement
- Discussion sections (optional)
  - Tues.&Thurs. 4:30-5:20

5/31/2006 Physics 6 - Spring 06 - G.R. Goldstein 1

2. Logisitics today

Logistics today

- Sign in every day
  - 3 unexcused absences allowed
- Homework 1 due next Tues.
  - See Assignments
- Handouts - books on reserve
  - See Course Documents for estimation notes & Classical Motion notes

5/31/2006 Physics 6 - Spring 06 - G.R. Goldstein 2

3. Lecture 2: Requirements, Projects, Early Relativity: Slide 3...

More logistics

Class Projects

The class will be divided into ~10 groups of 5 to 7 students each. Each group should have one student who is familiar with MS Excel. Each group will be assigned a data collecting and analyzing project that will continue through the semester.

Some of these projects involve physical phenomena. Others are connected to human behavior. The data is available from news media &/or websites.

5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 3

4. Projects

Projects

1. Stock market - Dow-Jones - Are there any patterns? (Movie "Pi")
2. Stock Market - Foreign (Japan, or Britain or other)
3. Oil prices - international & local (gas stations?)
4. Natural gas prices - international & local
5. TV Weather predictions and actual measurements - How good are 1 day & 2 day predictions of temperatures?
6. TV Weather predictions and actual measurements - How good are 3 day & 4 day predictions of temperatures?

5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 4

5. More Projects

More Projects

7. Weather - predicted & actual precipitation
8. Solar Energy &/or UV amount - local or beyond?
9. Tides - time and height of high and low tide in our area -
   What is the pattern? Construct a model.
10. Earthquakes - regions and magnitudes (of 5.25 or more)

5/10/2006 Physics 6 - G. Goldstein - Spr. 02Physics 6 - Spring 06 - G.R. Goldstein 5

6. Project presentations

Project presentations

- Data will be entered on group spreadsheet daily or once a week by each group. Group will try various means of display. Attempts will be made to find systematic behavior of data. Once a week or so a copy of excel file should be placed into instructor's Dropbox. Various displays will be posted on class website.
- Near mid-semester a summary of results should be prepared by each group. Short presentation to class will be scheduled over remaining weeks for each group.

5/31/2006 Physics 6 - Spring 06 - G.R. Goldstein 6

7. Organizing each group

Organizing each group

- At least one Excel savvy person enters data
- Group writes an explanation of how data was selected
- Use Communications for groups
  - Group Pages →roster, discussions, collaborations, email
- Dropbox to Prof. Goldstein every 1 or 2 weeks
  - Graphs and explanations - keep to minimum
- Present to class - cycle through groups

5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 7

8. Estimations

Estimations

We continue with some estimations "Fermi problems".

Check the website for Notes on Estimation

Scale and order of magnitude are very important

- For orders of magnitude see website: http://microcosm.web.cern.ch/microcosm/P10/english/

5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 8

9. Where did relativity come from?

Where did relativity come from?

- Think about rolling a ball
  - Has speed, say 20 ft/sec
  - Run after it at 15 ft/sec
  - Ball recedes from runner 5 ft/sec
- Run as fast as ball - it stands still for runner
- True for any moving objects and waves
  - Water waves
    - (waving on water -surfers ride waves)
  - Sound waves
    - (waving in air pressure - supersonic planes)
  - What about light (waves)?
    - What is waving? Ether?
    - **Can anyone run as fast?**

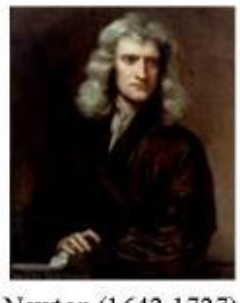
5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 9

(c) 2006, Gary R. Goldstein, Ph.D.

10. On the shoulders of giants

On the shoulders of giants

Galileo (1564-1642)



Newton (1642-1727)

Maxwell (1831-1879)

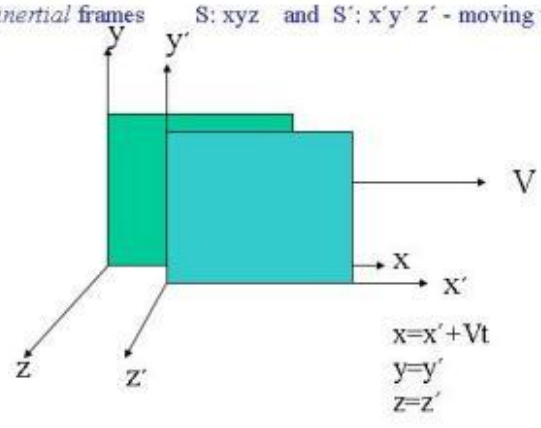
5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 10

(c) 2006, Gary R. Goldstein, Ph.D.

11. Moving train and platform

Moving train and platform

- Establish Coordinate system (to quantify motion) with clock
  or Reference Frame
- Two *inertial* frames S: xyz and S′: x′y′ z′ - moving train



5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 11

12. Relativity of motion

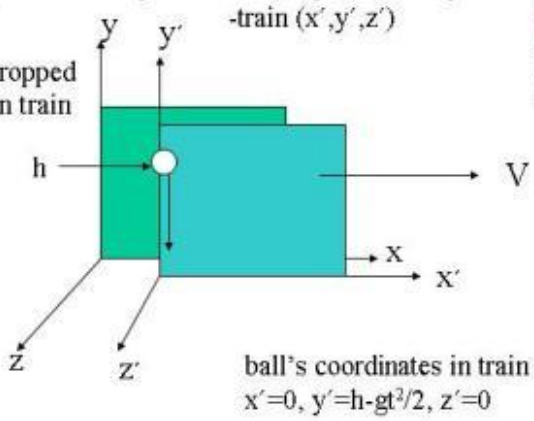
Relativity of motion

Consider a ball dropped in a moving train. What happens?

Set up coordinate systems -station platform (x,y,z)
-train (x′,y′,z′)

transformation
x=x′+Vt
y=y′
z=z′

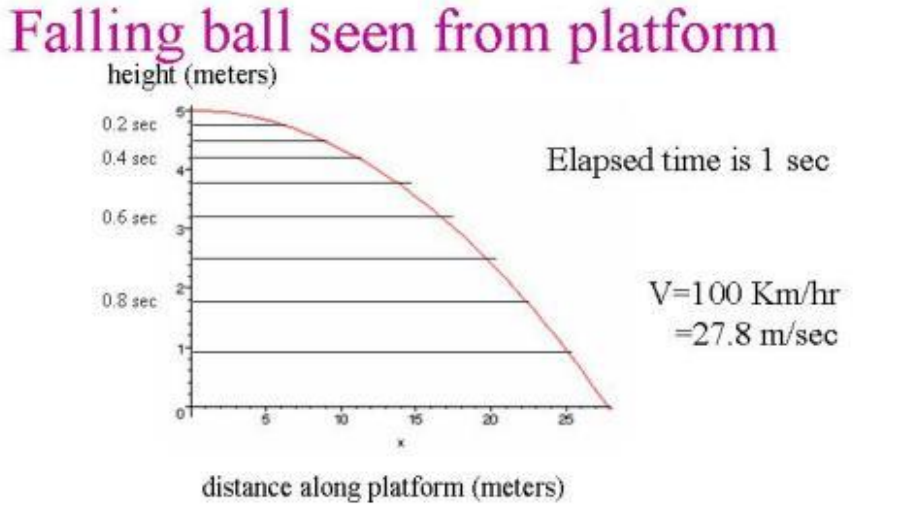
ball is dropped from h in train



ball's coordinates in train frame of reference
$x'=0,\ y'=h-gt^2/2,\ z'=0$

5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 12

13. Falling ball seen from platform



5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 13

14. Review of Classical Motion

Review of Classical Motion

- Idealize - isolated particle motion.
- Description must be quantitative. Specify measurable quantities - position and time.
- Coordinates & units - reference origin.
- Change of position or displacement vs. time is motion.
- Rate of change of displacement is speed or velocity.

5/10/2006 Physics 6 - G. Goldstein - Spr.02Physics 6 - Spring 06 - G.R. Goldstein 14