

## PHY138Y1Y: Physics for the Life Sciences I

"[The universe] is written in that great book which ever lies before our eyes. [But] we cannot understand it if we do not first learn the language and grasp the symbols in which it is written. This book is written in the mathematical language, and the symbols are triangles, circles, and other geometrical figures, without whose help it is humanly impossible to comprehend a single word of it."

-- Galileo

## If you have not already done so ...

- Pick up a PHY138 information sheet
    - Just outside MP129
      - McLennan Labs, North Wing, 1<sup>st</sup> Floor
  - Buy:
    - The textbook
    - Student Workbook
    - *MasteringPhysics* Access Kit
    - An **i>clicker** Clicker
    - Lab Manual
- } Available as a "shrink wrapped" package
- Available separately  
Do not buy used

## Tutorials & Labs

- Tutorials begin next week on Wed., Thurs, or Fri.
  - More information on this next class.
- Effective **immediately** if you want to change your tutorial see Ms. Seeley or Dr. Savaria, MP129.
- Labs begin in October.
- You may change your **lab** section with ROSI until I announce otherwise.

## About *MasteringPhysics* 1

- To enable your account you need information from:
  - A *new* Access Kit
  - "Notes on *MasteringPhysics* Software for PHY138Y" available from the course home page
    - Also available from the PHY138 Mechanics page

## About *MasteringPhysics* 2

- You may begin work on an assignment as soon as it is released
  - Currently released:
    - The Pre-Class Quiz due by 10AM Monday September 18
    - The Problem Set due by 11:59PM Friday September 22
- There is no time limit for how long you may take to complete as assignment
  - Pre-Class Quizzes should take a few minutes
  - Problem Sets should take ~45 minutes to an hour or so

## About *MasteringPhysics* 3

- A non-credit assignment: *Introduction to MasteringPhysics*
  - We strongly recommend that you go through this!
- In previous years, PHY138 students overwhelming rated this software as "useful" or "very useful" for their learning

## About the Pre-Class Quizzes and Problem Sets

- They will help you to learn Physics
- Your knowledge of Physics is demonstrated on Tests and the Final Exam
- If you do not do the Problem Sets and Pre-Class Quizzes *yourself*, you will not learn nearly as much Physics
  - Then, you will not do as well in the course.
- Questions from *MasteringPhysics*, perhaps slightly modified, will appear on every test!

## Review: Doing Well at University

- Time Management
- Take responsibility for yourself
- Study groups
- Don't ignore problems

## Review: Learning Physics

- Concepts first, then applying them to problems
  - Memorising formulas is not a good learning strategy
- Each concept builds on previous ones
  - They take some time to assimilate

## First Quarter of PHY138

- Mechanics
  - The study of the effects of energy and forces on the motion of physical objects
  - We will study those areas with applications to the life sciences or that will be needed in later quarters
- Review of Grade 12, proceeding to a deeper description

## Assumptions of Classical Physics

- The world is mechanistic, a “clockwork”
- It is describable by *Laws*
- The Laws are mathematical

Is the universe *really* like this?

Probably not, but the assumptions are remarkably effective!

## Physics' Description of the Universe

- Mathematics as a *language*.
- Everyday words with precise definitions.

Energy

New Age folks: “Thought is a form of energy.”

Chinese Medicine: *Chi* or *Qi*  
Often translated as “internal energy.”

氣

## Operational Definition

Concepts are defined in terms of a particular procedure or operation performed by the investigator.

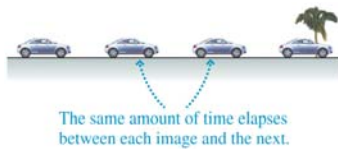
- Intelligence
  - The result on the Stanford-Binet IQ test.
- Second
  - 9,122,631,770 periods of radiation emitted by a particular transition of Cesium-133.

### Figure 1.2



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### Figure 1.3



The same amount of time elapses between each image and the next.

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Which car is going faster, A or B? Assume there are equal intervals of time between the frames of both movies.



Which car is going faster, A or B? Assume there are equal intervals of time between the frames of both movies.



**B is going faster**

## Forming a Model



Which car is going faster, A or B? Assume there are equal intervals of time between the frames of both movies.



Three motion diagrams are shown. Which is a dust particle settling to the floor at constant speed, which is a ball dropped from the roof of a building, and which is a descending rocket slowing to make a soft landing on Mars?

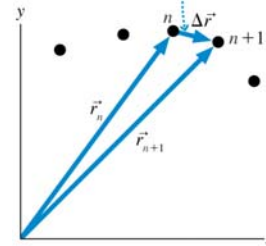
- |         |         |         |  |
|---------|---------|---------|--|
| (a) 1 ● | (b) 1 ● | (c) 1 ● | A. (a) is dust, (b) is ball, (c) is rocket |
| 2 ●     | 2 ●     | 2 ●     | B. (a) is ball, (b) is dust, (c) is rocket |
| 3 ●     | 3 ●     | 3 ●     | C. (a) is rocket, (b) is dust, (c) is ball |
| 4 ●     | 4 ●     | 4 ●     | D. (a) is rocket, (b) is ball, (c) is dust |
| 5 ●     | 5 ●     | 5 ●     | E. (a) is ball, (b) is rocket, (c) is dust |
| 6 ●     | 6 ●     | 6 ●     |  |

Three motion diagrams are shown. Which is a dust particle settling to the floor at constant speed, which is a ball dropped from the roof of a building, and which is a descending rocket slowing to make a soft landing on Mars?

- |         |         |         |   |
|---------|---------|---------|---|
| (a) 1 ● | (b) 1 ● | (c) 1 ● | A. (a) is dust, (b) is ball, (c) is rocket        |
| 2 ●     | 2 ●     | 2 ●     | <b>B. (a) is ball, (b) is dust, (c) is rocket</b> |
| 3 ●     | 3 ●     | 3 ●     | C. (a) is rocket, (b) is dust, (c) is ball        |
| 4 ●     | 4 ●     | 4 ●     | D. (a) is rocket, (b) is ball, (c) is dust        |
| 5 ●     | 5 ●     | 5 ●     | E. (a) is ball, (b) is rocket, (c) is dust        |
| 6 ●     | 6 ●     | 6 ●     |   |

Figure 1.10

The object's displacement between frame  $n$  and frame  $n+1$ .



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