Review for Test #1

- Responsible for:
  - Chapters 1 (1.1-1.12) and 2 (2.1-2.5)
  - Notes from class
  - Problems worked in class
  - Homework assignments
- Test format: 4 problems (15 points each)
  - 1 problem (30 points)
  - 1 set of conceptual questions (10 points)
  - Time: 75 minutes
- Test materials: Pencil, eraser, and non-programmable calculator; No formulae sheet or paper (provided); closed textbook and notes

Rules for the Test

- Try to spread out in the class, one empty seat if possible between you
- No talking during test, except to proctor or instructor
- Put name and 811 number on test (first page)
- Bring Student ID
- All electronics turned **off** (phones, tablets, computers, etc.), except simple calculator
- Proctor is watching!

Material Covered

- Chapter 1: Introduction

- units, significant figures, dimensions, estimates
- vector addition, components, magnitudes, unit vector
- 1D kinematics, displacement, velocity, acceleration
- acceleration due to gravity
- momentum
- integration methods, graphical interpretations
- relativistic momentum

- Chapter 2: Momentum principle

- general forces and impulse
- Newtons 1st and 2nd laws
- free-body diagrams
- impulse-momentum theorem
- 2D kinematics (projectile motion)

Example Problem (intermediate)

A ball is thrown straight upward and rises to a maximum height of 16 m above its launch point. At which height above its launch point has the speed of the ball decreased to one-half of its initial value?

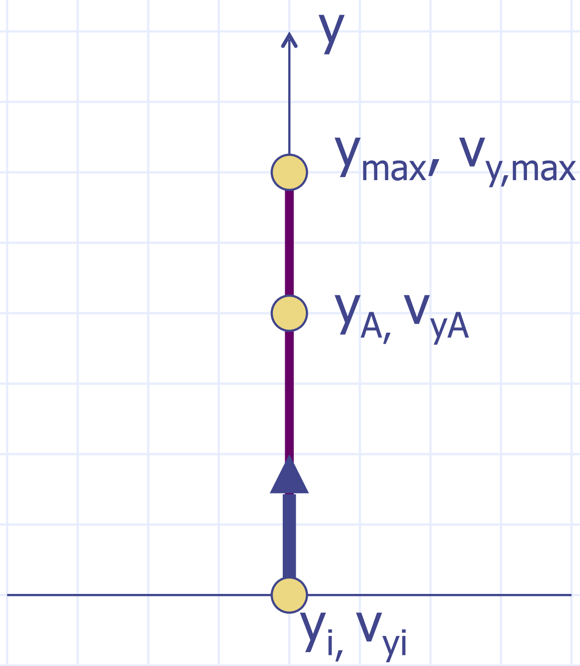
<u>Solution:</u>

Given: $y_{max} = 16$ m

Infer: $v_{y,max} = 0$, $y_i = 0$

Find: y_A when $v_{yA} = v_{yi}/2$

Also, need v_{yi}



To maximum height (drop y subscript in v):

$v^2_{max} = v^2_i - 2g(y_{max} - y_i)$

Solve for v_i

$v^2_i = v^2_{max} + 2g(y_{max} - y_i) = 2gy_{max}$

To intermediate point:

$v^2_A = v^2_i - 2g(y_A - y_i)$

Solve for y_A

$y_A = (v^2_i - v^2_A)/(2g) = [v^2_i - (v_i/2)^2]/(2g)$

$= v_i^2(1-1/4)/(2g) = v_i^2\,(3/4)/(2g) = 3v_i^2/(8g)$

$= 3(2gy_{max})/(8g) = 3y_{max}/4 = 3(16m)/4 = \boxed{12\text{ m}}$