

Reminders 9-17-07:

- Next Homework Due 9/23!!!
- Kinematics Conceptual Questions Due Wed. 9/19.
- Pick up graded papers in basket outside S-107A
- Conceptual Quiz on 9/19 Chapter 2.
- Exam 1 Mon. 9/24, Sect. 3.1,3.2,4.1,4.2, & Ch 2.
- You must know exam policy.
- Phi Theta Kappa
- Save all files onto a USB Stick/Flash Drive.
- Obtain software from desktop of computers in lab.

Dr. Harry Houptis

Objectives:

hhouptis@sierracollege.edu

- Motion at Constant Acceleration
- Examples, Examples, Examples
- Newton's Laws Revisited

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Physics 2A Old Exams
- Dominic Calabrese -

Sierra College

Home
Syllabus
Labs
P2X Syllabus
Old Exams
Web Assign

Exams

Exam 1
Exam 2
Exam 3
Exam 4
Exam 4 Another Sample
Final Exam

Note: The above sample exams were used in class periods that were 50 minutes in length.

Exam 1 Crib Sheet
Exam 2 Crib Sheet
Exam 3 Crib Sheet
Exam 4 Crib Sheet
Final Exam Crib Sheet

Worksheets (to be assigned)

[Worksheet file](#)

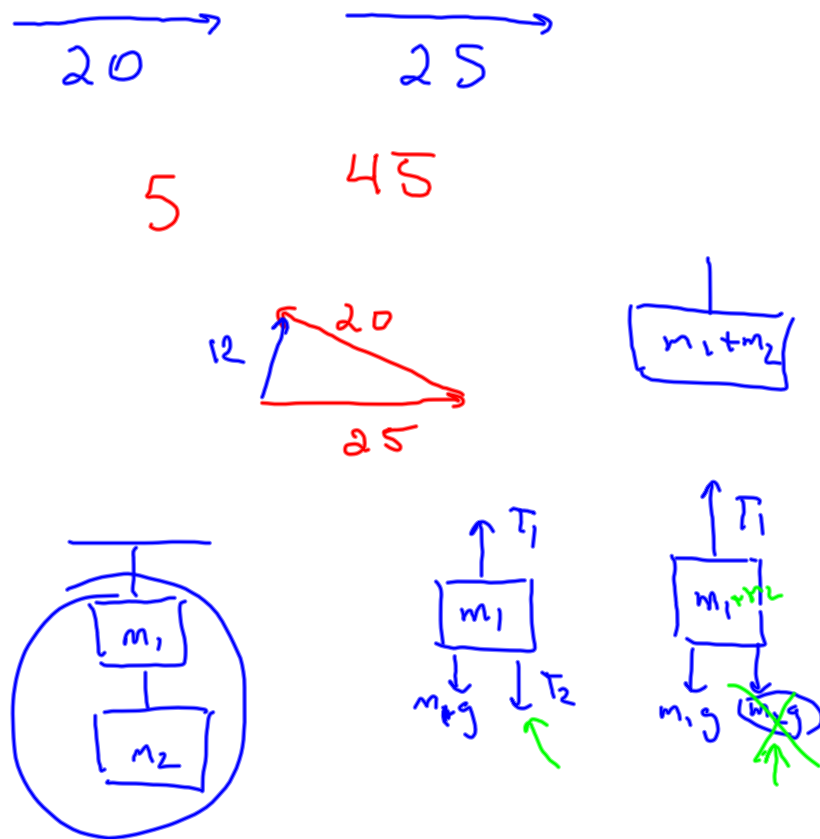
Conceptual Questions (to be assigned)

Kinematics
Force
Energy & Momentum
Circular Motion
Fluids
Torque
Heat
Thermodynamics

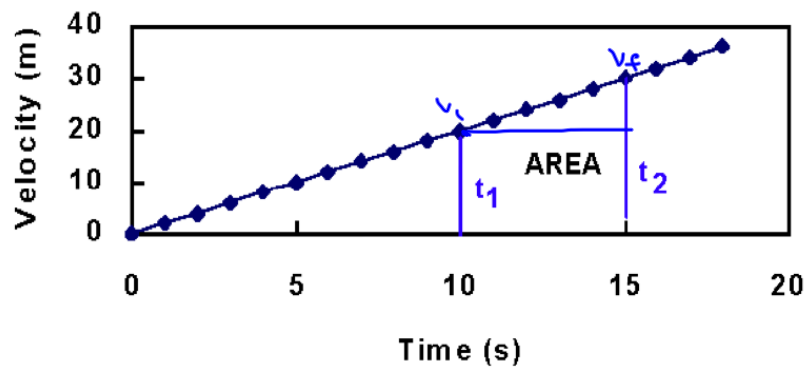
Phone: (916) 789-2960
e-mail: dcalabrese@sierracollege.edu
Office location: S-107A
Office hours: TBA, or by appointment

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$$\text{Rectangle} = v_i(t_2 - t_1)$$

$$\text{Triangle} = \frac{1}{2}(t_2 - t_1)(v_f - v_i)$$

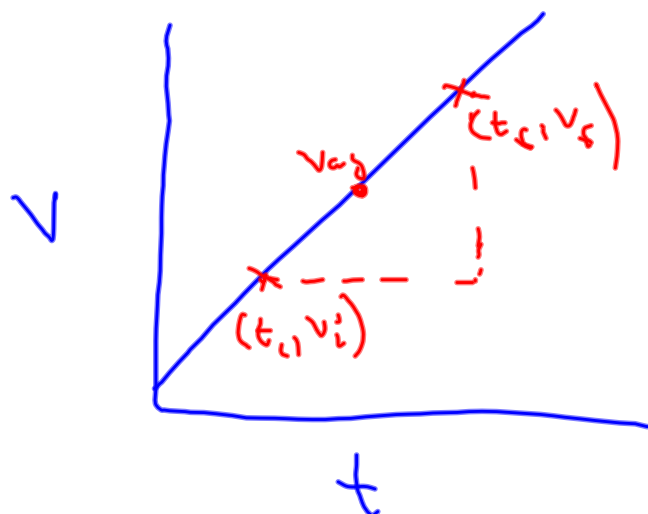
$$\Delta x = v_i \Delta t + \frac{1}{2} \Delta t (v_f - v_i)$$

$$= v_i \Delta t + \frac{1}{2} \Delta t (a \Delta t)$$

$$= \boxed{v_i \Delta t + \frac{1}{2} a (\Delta t)^2} \quad \text{X X X}$$

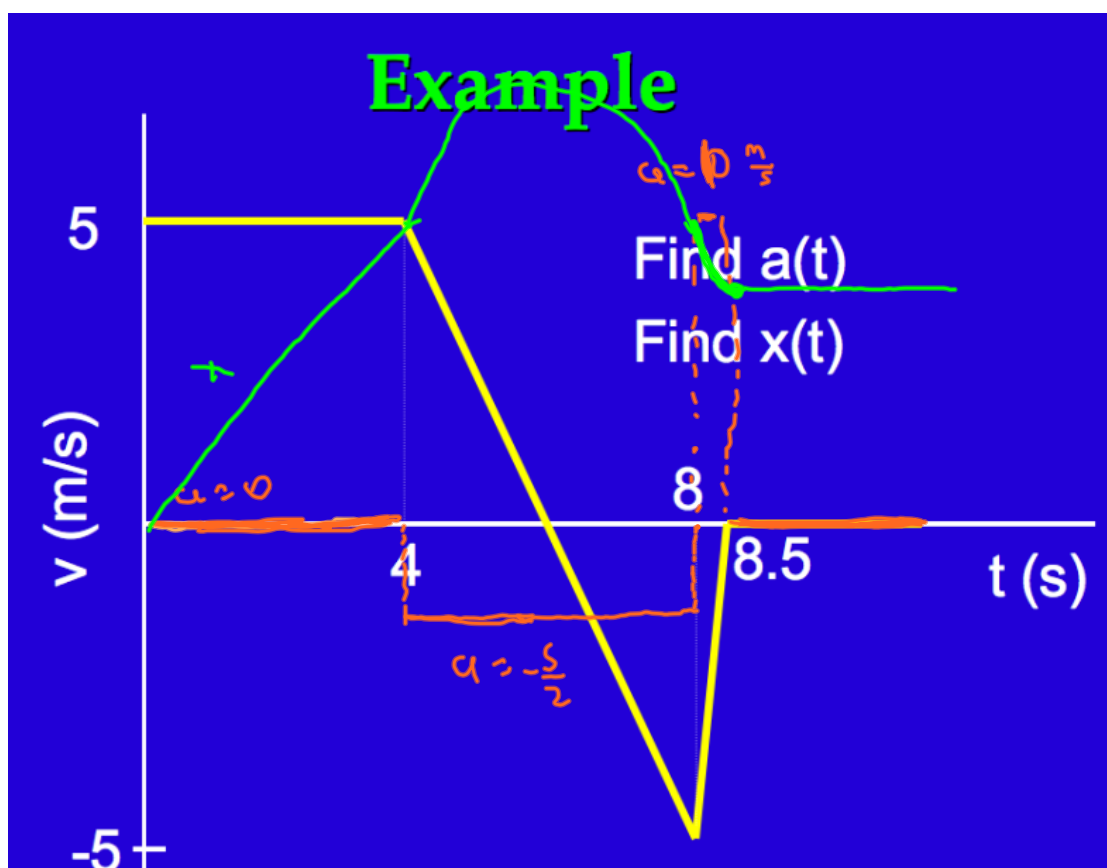
let $t_i = 0$ so that

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$$v_{avg} = \frac{v_i + v_f}{2} = \frac{\Delta x}{\Delta t}$$

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Example

- An object is dropped from a 67 m high building. Ignore air friction.

- How long will it take to get to the ground?
- What will the average velocity be from the top of the building to the bottom?



$$\begin{aligned}
 v_i &= 0 \\
 a &= -9.80 \frac{\text{m}}{\text{s}^2} \\
 \Delta y &= -67 \text{ m} \\
 \Delta y &= \frac{1}{2} a t^2 \\
 t &= \sqrt{\frac{2 \Delta y}{a}} = \sqrt{\frac{2(-67 \text{ m})}{(-9.80 \frac{\text{m}}{\text{s}^2})}} \\
 &= 3.7 \text{ s}
 \end{aligned}$$

$$V_{\text{avg}} = \frac{\Delta y}{\Delta t} = \frac{-67 \text{ m}}{3.7 \text{ s}} = -18.1 \frac{\text{m}}{\text{s}}$$

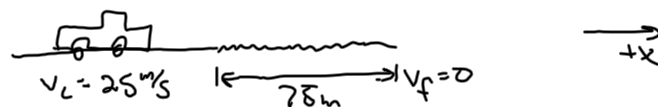
$$V_f = at = (-9.80 \frac{\text{m}}{\text{s}^2})(3.7 \text{ s}) = -36.3 \frac{\text{m}}{\text{s}}$$

$$V_f = \sqrt{2a \Delta y} = \sqrt{2(-9.80 \frac{\text{m}}{\text{s}^2})(-67 \text{ m})} = -36.3 \frac{\text{m}}{\text{s}}$$

$$V_f = 2V_{\text{avg}} = -36.3 \frac{\text{m}}{\text{s}}$$

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- An object is traveling at the rate of 25 m/s. It reaches a surface that slows it down. It comes to a complete stop after traveling 75 m.
 - What is the acceleration of the object?
 - How long does it take to come to a complete stop?
- Discuss alternative ways to solve the problem.



$$V_f^2 - V_i^2 = 2a \Delta x$$

$$a = \frac{V_f^2 - V_i^2}{2 \Delta x} = \frac{0 - (25 \frac{\text{m}}{\text{s}})^2}{2(75 \text{ m})} = -4.2 \frac{\text{m}}{\text{s}^2}$$

$$V_f = V_i + at$$

$$\frac{V_f - V_i}{a} = t$$

$$\frac{0 - 25 \frac{\text{m}}{\text{s}}}{-4.2 \frac{\text{m}}{\text{s}^2}} = 6.0 \text{ s}$$

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A motorist drives along a straight road at a constant speed of 9.00 m/s. When she is 22.0 m in front of a parked motorcycle police officer, the officer starts to accelerate at 2.00 m/s² to overtake her. Assuming the officer maintains this acceleration, determine the total displacement of the officer as he overtakes her.



$$x_{\text{police}} = x_{\text{car}}$$

$$x_{\text{police}} = \frac{1}{2} a t^2 \quad x_{\text{car}} = v_{\text{car}} t + 22$$

$$\frac{1}{2} a t^2 = v t + 22$$

$$t^2 = (9.0 \text{ m/s}) t + 22$$

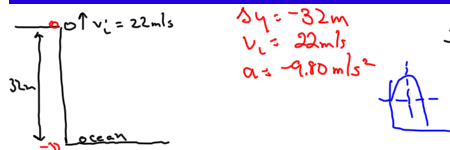
$$t^2 - 9t - 22 = 0$$

$$(t - 11)(t + 2) = 0 \quad t = 11$$

$$\Delta x = \frac{1}{2} (2.0) (11)^2 = 121 \text{ m}$$

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- A rock is thrown upward from a cliff. The initial velocity of the rock is 22 m/s. The cliff is 32 m above the surface of the ocean.
- What is the *velocity* of the rock when it is 32 m above the ground while it's on the way down? Do you actually need to do a calculation? -22 m/s
- What are the acceleration and velocity of the rock at its highest point? $a = -9.80 \text{ m/s}^2$, $v_{\text{top}} = 0$
- What is the *speed* of the rock when it hits the water?
- How long does the rock take to hit the water?
- Discuss alternative methods to solve the latter 2 questions.



$$v_f = 33.3 \text{ m/s}$$

$$v_f^2 - v_i^2 = 2 a \Delta y$$

$$v_f = \sqrt{v_i^2 + 2 a \Delta y} = \sqrt{(22)^2 + 2(-9.80)(32)} = 33.3 \text{ m/s}$$

$$v_f = v_i + a t \quad t = \frac{v_f - v_i}{a} = \frac{(33.3 - 22)}{-9.80} = 5.65 \text{ s}$$

$$\Delta y = v_i t + \frac{1}{2} a t^2$$

$$-32 \text{ m} = (22 \text{ m/s}) t + \frac{1}{2} (-9.80 \text{ m/s}^2) t^2$$

$$4.9 t^2 - 22 t - 32 = 0$$

$$t = \frac{22 \pm \sqrt{(22)^2 - 4(4.9)(-32)}}{2(4.9)}$$

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