From: Tony DiMauro
To: My 2007 Summer 180A class
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Hello everyone

We covered a lot of ground. Mostly review---except for the vectors and trig. Do not get overwhelmed by the pace of this class. Please read the book and do the examples. You should be doing enough problems that you know the basics.

My website is critical. I have many good handwritten examples and many valuable resources. You should become very familiar with the chapter note pages.

As I said on the first day, the Quiz/Test Page is to help you think about what it is that you are doing. These are good problems and questions. To put it simply, you are learning to solve problems. There is a rigorous and fruitful method in doing so.

Diagram, Reason and Solution Method

1) **Read the Problem**. Many of these problems are quite relevant. Reread the problem. This is really important. Read it slowly. Relax. There are no tricks. The strict wording of the problem is to train you to look closely at the question.

2) **Draw a Diagram**. Visualize the problem. Your Diagram demonstrates your understanding more than you think! Can artwork sum up your mood? Do artists find patterns that resonate with your personality? Your Diagram speaks for you. They are not your dirty laundry. Imagine that someone is analyzing your diagram. What do you think they think of your representation of this problem? Be meticulous, be complete, be clear, and be artistic. If your diagram is all of this---there should be no questions asked!

3) What is given in the problem? Start to use the clues given to you. What else do you know that is not given?

4) What are you solving for? Keep returning to this. You will forget.

5) **Reason out your path to a solution**. Explain it to yourself or a group member. What were the main concepts and guideposts that will help you discover the solution to this problem? Internalize this process! You will use it again and again. *You must articulate your learning process through dialogue, diagramming and reasoning.*

6) Find and utilize appropriate equations---manipulate them. Do not use derived equations. It's like getting a birthday cake from Von's. Become one with this abstract tool. Equations have feelings, too! Play with them. Give them quality time.

7) **Plug and Shove**. This is the easy part. The calculator does the work. Monkeys can punch in numbers!

8) **Check and reflect on your answer**. How did this particular solution process relate to other solutions you have already done?

Working with a group is both expedient and rewarding. Talk to a few people and agree to meet to discuss the problems. I know it's hard to meet. I heard this before. From 15 years experience, I have learned that students who form groups are the successful students. You will soon realize how easy it is to meet. *You must articulate your learning process through dialogue, diagramming and reasoning.* A tutor is only helpful if they make you do all the work. So then, what good is a tutor?

Problem-Solving is not about how quickly one finds the solution. Problem-Solving is about the process---the journey to the solution. Mountain climbers know how to scale shear walls because they have developed a process. Surfers know the right waves and how to ride different waves because of a process.

All the problems in this book are basic. The math is basic. The process is basic. Don't psych yourself out. Everyone in this class is quite capable. There is a lot of work---but this is summer school! You should be studying 5 hours a day! I know it seems like a lot.

There is a plateau after the steep learning curve. After the first 4 chapters the concepts and the problem-solving process will become more evident. Hang in there. Utilizing Progressive Grading, I will add back future progress (better grades) to past learning (needy early grades). Everyone has the ability to get an A in my class. I look forward to your success.

Print this off. Keep it.

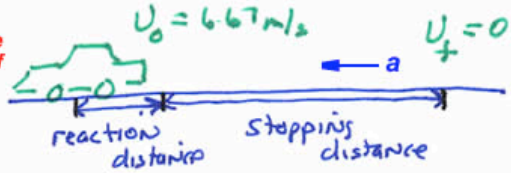
#38 Reaction time of average driver $0.70\,sec = t_R$

Autos can slow down at $12.0\,ft/s^2 = a$

a) Compute the total distance covered in coming to a stop after a signal is observed.

a) Car is traveling at $v_0 = 15.0\,mi/hr = 15.0\frac{mi}{hr}\left(\frac{1\,hr}{3600}\right)\frac{1600\,m}{mi} =$

acceleration is in the opposite direction of the velocity



$v_0 = 6.67\,m/s$

conversion to metric

$a = 12.0\frac{ft}{s^2}\frac{1m}{0.3048\,ft} = 3.66\,m/s^2$

1) Find distance traveled before brake is applied

$$d_{RT} = v_0 t_R = \left(6.66\frac{m}{s}\right)(0.70s) = 4.66m$$

2) Find distance traveled when brakes are applied.

use $v_f^2 = v_0^2 + 2ax$

since we know both → v_f final velocity, and → a because acceleration is negative

$$0 = \left(6.67\frac{m}{s}\right)^2 + 2\left(-3.66\frac{m}{s^2}\right)x$$

$$\frac{-44.49\,m^2/s^2}{-7.32\,m/s^2} = x = 6.08m$$

3) Total distance

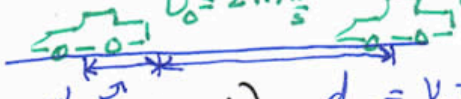
Depends on least amount of sig figs used in the problem. Only one sig fig was given for the reacton time.

$d_T = d_{RT} + d_{BT} = 4.66m + 6.08m = 10.7m$

(reaction time, brake time)

$= 10m$

b) Car is traveling at



$v_0 = 55\,mi/hr\left(\frac{1\,hr}{3600}\right)\frac{1600\,m}{mi} = 24.4\,m/s$

1) $d_{RT} = v_0 t_R = 24.4\frac{m}{s}(0.70s) = 17.1m$

Wow, the reaction time at 55mi/hr is 17 meters! That's before the brake was applied!

2) $0 = v_0^2 + 2ax = (24.4\,m/s)^2 - 2(3.66\,m/s^2)x$

Depends on least amount of sig figs used in the problem. Only one sig fig was given for the reacton time.

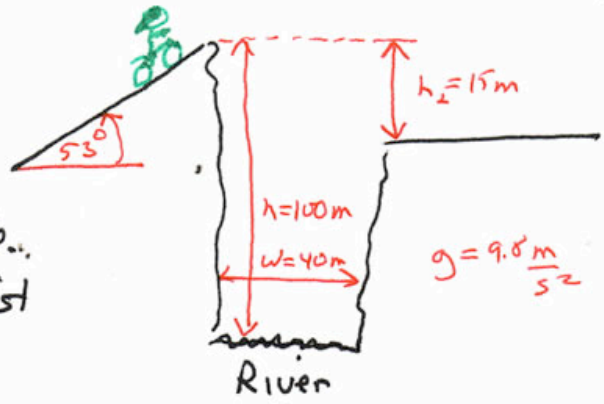
$\frac{595\,(m/s)^2}{7.32\,m/s^2} = 81.3m$

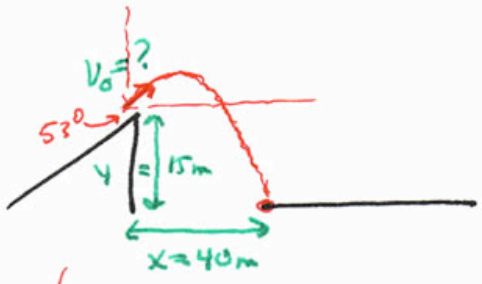
$d_T = 81.3m + 24.4\,m/s$

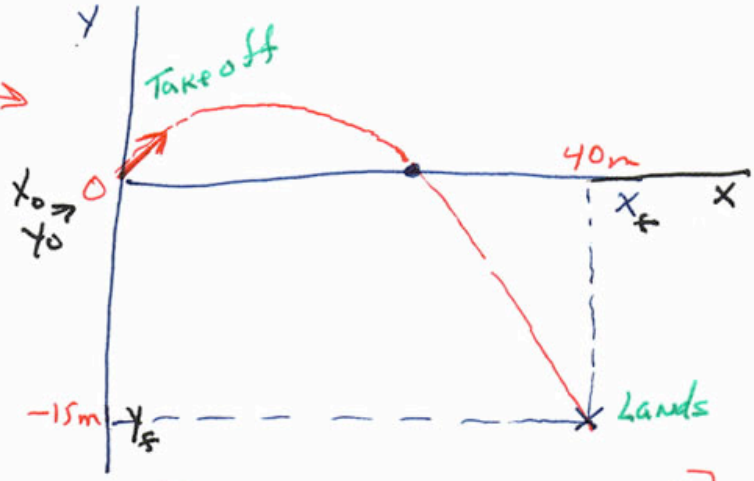
$d_T = 106m$ $= 100m$

Chapter 3 #65

This crazy person wants to jump over the river on her motorcycle... How fast must she be going to just clear the Missouri River.







Before I even try to solve the problem. Sort it up.

① $v_f^2 = v_0^2 + 2ax$

② $v_f = v_0 + at$

③ $x = x_0 + v_0 t + \frac{1}{2} a t^2$

- motion equations

y-dir ② $y_f = y_0 + v_{0y} t + \frac{1}{2} g t^2$

x-dir ④ $x_f - x_0 = v_{0x} t$

* the time she takes to go across is equal to the time to go down

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① I can't solve ③ or ④ because I do not have enough info. So, I will solve ④ for $t = \frac{x}{v_{0x}}$ and substitute it into ③. this way I can eliminate a variable. Cool ☺

$t_x = t_y$

x-dir $t_x = \frac{x}{v_{0x}} = \frac{x}{v_0 \cos 53°}$

y-dir $y - y_0 = v_0 t_y - \frac{1}{2} g t_y^2$

$y - y_0 = v_0 \left(\frac{x}{v_0 \cos 53°}\right) - \frac{1}{2} g \frac{x^2}{(v_0 \cos 53°)^2}$

$-15 = v_0 \sin 53 \frac{40}{v_0 \cos 53} - \frac{1}{2} 9.8 \frac{40^2}{(v_0 \cos 53)^2}$

$-15 = \tan 53°(40) - \frac{4.9(1600)}{(v_0 \cos 53)^2}$

solve for v_0

$v_0 = 17.8 m/s \approx 40 \frac{mi}{hr}$

b) in the river!