Reminders 07-14-09:

- Turn in Problems 59 and 60 Chapter 2 Wed.
- 3rd Webassign due Wed. 11:59PM
- *Exam 1 Chapters 1-3 Wednesday July 15.*
- *Print Out Sample Exams From Our Website*

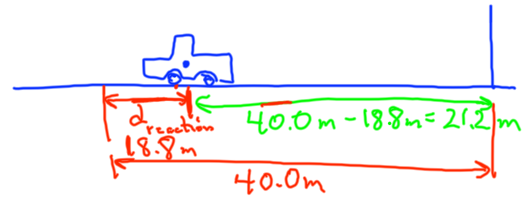
(focus on problems 1-4 Exam 1 F01; problems 1,3,&4 Exam 2 F01; problem 1-6 Exam 1 S00; problems 1,3, & 4 Exam 2 S00.

- Answers to Standardized Test p.85
  C,B,A,A,C,C,D,B,D; 14.4m/s²

Objectives:

- Vectors Addition
- Forces
- Newton's Laws

7b



$$d_{reaction} = \left(90\frac{km}{hr}\right)\left(\frac{1000m}{km}\right)\left(\frac{1hr}{3600s}\right)(.75s)$$

$= 18.75m = 18.8m$

Car must go from $25.0\frac{m}{s}$ (90.0 km/hr) to zero in 21.2 m with acc. $-10.0\ m/s^2$.

How fast will car be traveling in 21.2 m?

$$V_f = \sqrt{\left(25.0\frac{m}{s}\right)^2 + 2\left(-10.0\frac{m}{s^2}\right)(21.2m)}$$

$= 14.1 m/s$. This means that car hits barrier. It is above maximum speed required to avoid barrier.

Car must travel

$$\Delta X = 40.0m = V_i(.75s) + \Delta X_{slowing}$$

distance traveled while slowing down

$$\Delta X_{slowing} = 40.0m - V_i(.75s)$$

where 0.75 s = reaction time

$$\Delta x = V_i t_{reaction} + \Delta x_{slowing}$$

what is $\Delta x_{slowing\ down}$

$$\Delta x_{slowing} = V_i t + \frac{1}{2} a t^2$$

$$= (V_i) t + \frac{1}{2}\left(-10.0 \frac{m}{s^2}\right) t^2$$

$$\Delta x = (V_i) t_{reaction} + V_i t - 5.00 t^2$$

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

$$0 - V_i^2 = 2 a \Delta x_{slowing}$$

$$V_i^2 = -2 a \Delta x_{slowing}$$

$$= -2 a (\Delta x - V_i t_{reaction})$$

$$V_i^2 = -2 a \Delta x + 2 a V_i t_{reaction}$$

$$= -2\left(-10.0 \frac{m}{s^2}\right)(40.0 m) + 2\left(-10.0 \frac{m}{s}\right) V_i \cdot .75$$

$$V_i^2 = 800 \frac{m^2}{s^2} + -15.0 \frac{m}{s} V_i$$

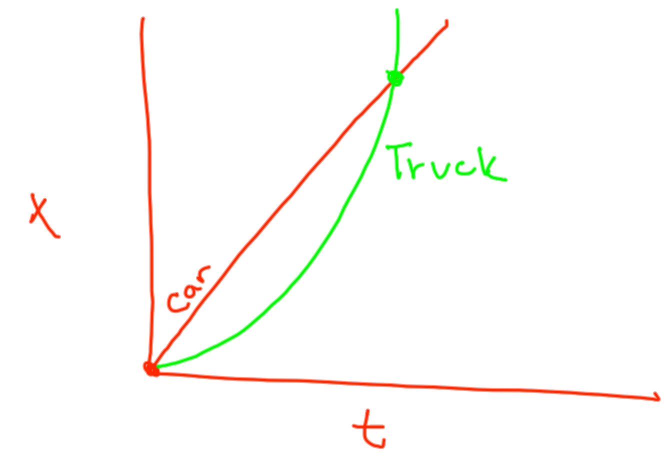
$$V_i^2 + 15.0 \frac{m}{s} - 800 \frac{m^2}{s^2} = 0$$

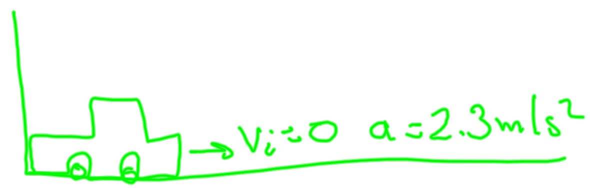
$$V_i = \frac{-15.0 \frac{m}{s} \pm \sqrt{225 \frac{m^2}{s^2} - 4(-800)(1)}}{2}$$

$$V_i = \frac{-15.0 \frac{m}{s} + \sqrt{3425 \frac{m^2}{s^2}}}{2}$$

$$V_i = 21.8 \, m/s$$

$$V_i = \left(21.8 \frac{m}{s}\right)\left(\frac{1 \, km}{1000 \, m}\right)\left(\frac{3600 s}{1 hr}\right) = 78.5 \frac{km}{hr}$$





want to know when

$X_{car} = X_{truck}$.

$X_{car} = V_{i,car} t = (14 \, m/s) t$

$X_{truck} = \frac{1}{2} a_{truck} t^2 = \frac{1}{2} \left(2.3 \frac{m}{s^2}\right) t^2$

$\left(14 \frac{m}{s}\right) t = \left(1.15 \frac{m}{s^2}\right) t^2$

divide by t

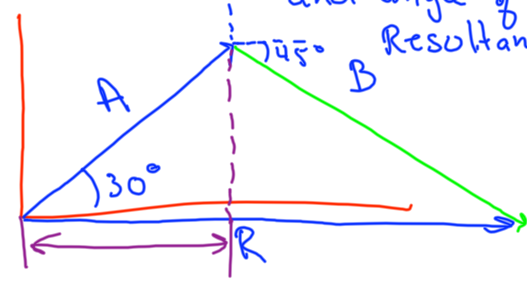
$14 = 1.15 t$

$t = \frac{14 \, m/s}{1.15 \frac{m}{s^2}} = 12.2 s$

$X_{car} = \left(14 \frac{m}{s}\right)(12.2 s) = 170 m$

- A vector is 60.0 units long and directed 30.0 degrees above the x-axis. A second vector is 80.0 units long and directed 45.0 degrees below the x-axis. Determine the magnitude and direction of the resultant vector.

Make sure you define your scale. Indicate length and angle of Resultant.



$A_x = 60.0 \cos 30.0° = 52.0$

$A_y = 60.0 \sin 30.0 = 30.0$

$B_x = 80.0 \cos 45° = 56.6$ units

$B_y = -80.0 \sin 45° = -56.6$ units

	x	y
A	52.0	30.0
B	56.6	-56.6
R	108.6	-26.6

$R = \sqrt{R_x^2 + R_y^2}$

$= \sqrt{(108.6)^2 + (-26.6)^2}$

$= 111.0$ units

$\theta = \tan^{-1} \frac{-26.6}{108.6} = -13.5°$

13.5° below x-axis

Let's add the following three vectors. Sketch the vectors.
Vector A: 30.0m/s at 36.9^{O} West of South
Vector B: 60.0m/s at 66.4^{O} North of West
Vector C: 90.0m/s at 45.5^{O} East of North

1st step: find the x-component of A:______________________

find the x-component of B:_______________________

find the x-component of C:___________________________

2nd step: find the y-component of A:_______________________

find the y-component of B:________________________

find the y-component of C:_________________________

3rd step:
Sum the x-components:_______________________

Sum the y-components:_______________________

4th step: Use Pythagorean Theorem to find magnitude of resultant

Magnitude:____
____

5th step: Calculate direction of resultant vector using

Angle:____

The length of vector **A** is 250 units and the length of vector **B** is 350 units. If these two vectors are added together, what is the maximum possible length of their sum? Please illustrate your response with a drawing.

What is the minimum possible length of their sum? Please illustrate your response with a drawing.