Physics 171  
Spring Quarter 1983  
July 1, 1983  
George Williams  

FIRST MIDTERM  

Ave ~ 15-16

Name: 

Discussion Instructor (CIRCLE ONE): Arnold Liu Schoenborn  
Discussion Section 

All numbers to 3 significant figures! 

The instant the traffic light turns green, an automobile starts with a constant acceleration $a_x$ of 6.0 ft/s$^2$. At the same instant a truck, traveling with a constant speed of 30 ft/s, overtakes and passes the automobile.

(a) How far beyond the starting point will the automobile overtake the truck?

(b) How fast will the car be traveling at that instant?

$\begin{align*}
    x_a &= \frac{1}{2}a_x t^2 \\
    x_t &= vt \\
    x_a &= x_t + x \\
\end{align*}$

\[ t = \sqrt{\frac{2x}{a_x}} \]

\[ \frac{x}{v} = \sqrt{\frac{2x}{a_x}} \]

\[ \frac{x^2}{v^2} - \frac{2x}{a_x} \]

\[ x = \frac{2v^2}{a_x} = \frac{1300 \text{ ft}}{3.0 \times 10^2 \text{ ft}} = 3.0 \times 10^2 \text{ ft} \]

\[ v = \sqrt{\frac{2a}{a_x}} = \frac{60 \text{ ft/s}}{5} \]

\[ v = 12 \text{ ft/s} \]