Physics Review

We interrupt this ST technology-stuff for a little physics review.

1. a) What is the work performed by a horse pulling a carriage with an 8 N force over a 2 km distance?

   W = F*d

   = 8 N *2000m = 16 000 J

b) What two assumptions regarding applied force and friction did you make in solving the above problem?

We're assuming that the force of 8N is in the same direction as the motion of the carriage. And we are also assuming there's no friction.

2. A large book is placed on a table used for drawing. The table is tilted at 60.0 ^{o} and the book's weight is 45N. What is the effective force that causes the book to slide down the table. First draw what is being described.

$F_{effective} = mg\sin\theta$

But mg = weight = 45N

$F_{effective} = 45\ N \sin 60 = 39\ N$

3. After the prom at the Vaudreuil Castle, which is not really a castle, Joe refuses to drive fast. He doesn't want to crash because he enjoys kissing his girl friend and solving physics problems. To convince his friends to be cautious, he urges them to calculate the ratio of kinetic energy of his 2000 kg vehicle moving at 120 km/h versus his vehicle moving at 80 km/h.

a) Calculate that ratio.

$$\frac{E_1}{E_2} = \frac{0.5\,mv_1^2}{0.5\,mv_2^2} = \frac{v_1^2}{v_2^2} = \frac{\left(120\,\frac{km}{h}\right)^2}{\left(80\,\frac{km}{h}\right)^2} * \frac{\left(1000\,\frac{m}{3600s}\right)^2}{\left(1000\,\frac{m}{3600s}\right)^2} = \frac{(120\ )^2}{(80\ )^2}$$

$$= 2.25\ or\ \frac{9}{4}$$

b) In case of a collision, how much more force of impact will his car have at 120 km/h compared to 80 km/h?

Since work is energy, which = F*d, over the same distance it will have about 2.25 times the collision force. When the same breaking force is applied to the faster car, it will need 2.25 times more distance to come to a stop!