Physics 111 Session 9

Work

1) You just got a new fridge delivered, but they didn't install it for you. You have to push it across your frictionless kitchen floor with a force of 50 N for 3 m to where it will live out its life. What is the work you put into the fridge?

2) Your fridge from question 1 broke, and you had your kitchen tiles redone. The new tiles have friction. The coefficient of kinetic friction between your new, new fridge and your new kitchen floor is 0.32. If the fridge weighs 200 kg, and you push with a force of 700 N over the same 3 m, how much work do you put in to the fridge this time?

3) You are moving into a new house, and you have to load your fridge into a moving truck, so it has to go up 0.7 m. If it still weighs 200 kg, and you lift it with constant velocity, how much work does it take to lift into the truck?

4) You are out walking your dog when it sits down and refuses to move. You are forced to drag your dog along the frictionless field 500 m home. If you drag the leash at an angle of 35 degrees above the horizontal with a force of 20 N, what is the work you have to do to get your dog home?

Energy

5) Once you're at home, your dog from question 4 is still refusing to get up. You decide to pick him up to give him a hug. If he weighs 20 kg, and you pick him up to a height of 1.3 m, what is:
   a) His gravitational potential energy?
   b) The work you had to do to get him there?

6) How much more energy does a 2000 kg car have that's going 10 m/s, vs when it's going 5 m/s? Why do you think school zones have reduced speed limits?

7) How much work do the breaks do on a 2000 kg car that goes from 10 m/s to 5 m/s?

8) A man that weighs 100 kg goes up a flight of stairs to a height of 7.00 m in 4.30 seconds.
   a) How much work does the man exert?
   b) How much power does the man use?