Work and Kinetic Energy

2nd Newton's Law can be rewritten as:

$$m\Delta v = F\Delta t$$

$$mv\Delta v = F(v\Delta t)$$

One can show that the left-hand-side is a change in Kinetic energy, $K = \frac{mv^2}{2}$

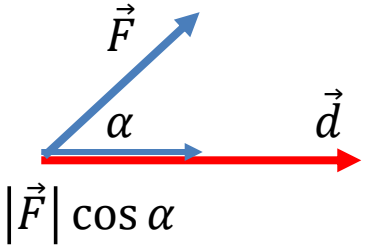
The right hand side (Force times Displacement) is called work, $W = F\Delta x$

This leads to a very important result:

$$\Delta K = W$$

A more general definition of work when Force and Displacement are given as vectors $\vec{F}$ and $\vec{d}$ (in 2D or 3D case):

$$W = \left|\vec{F}\right|\left|\vec{d}\right|\cos\alpha$$



Homework

Problem 1.

The car moves at speed v when suddenly the driver applies breaks. Find the distance the car will travel before coming to a complete stop, if the friction coefficient is μ.
Use the Kinetic Energy theorem ($\Delta K=W$) to solve this problem.

Problem 2

An object of mass *m=1kg* is placed on a horizontal plane with coefficientof kinetic friction $\mu=0.5$. It is moved along the triangular trajectory A->B->C->A (see Figure), and returns to the initial point A. Find the work done *by friction*, if AB=40 cm and AC=30 cm. Remember that friction force is directed opposite to the direction of motion.