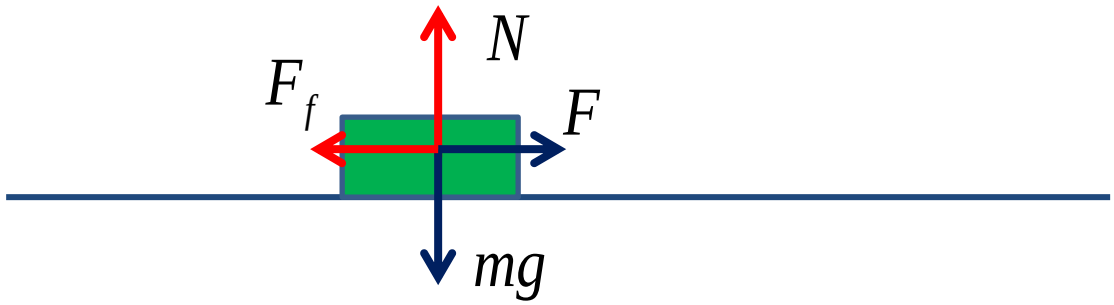
Friction Force



- **STATIC FRICTION** Imagine that you try to move a block on a floor by pushing it with force F. The block does not move because of static friction with the floor. That force oppose motion, and will be equal to F to make sure that the block is at rest. However it cannot be bigger than certain maximum value:

$$F_f^{(static)} < \mu_s N$$

Here *N* is the Reaction Force, and μ_s is called static friction coefficient (normally, μ_s <1).

- **KINETIC FRICTION** Once the block starts moving, the friction force will stay nearly constant, and equal to

$$F_f^{(kinetic)} = \mu_k N$$

Here μ_k is called kinetic friction coefficient, which is slightly less than the static one.

Homework

Let the coefficient of kinetic friction between car tires and the road surface be $\mu=0.3$ (typical for a wet road). When the car moves at speed v= 30 m/s, the driver suddenly applies breaks. Find the time it takes for the car to stop.

To solve the problem, follow these steps:

a) Assume car's mass is m. Construct free body diagram. Is this a case of static or kinetic friction?
b) Using the free body diagram, find the car's acceleration (it is negative).
c) Knowing the acceleration and initial speed, find the time needed to stop.