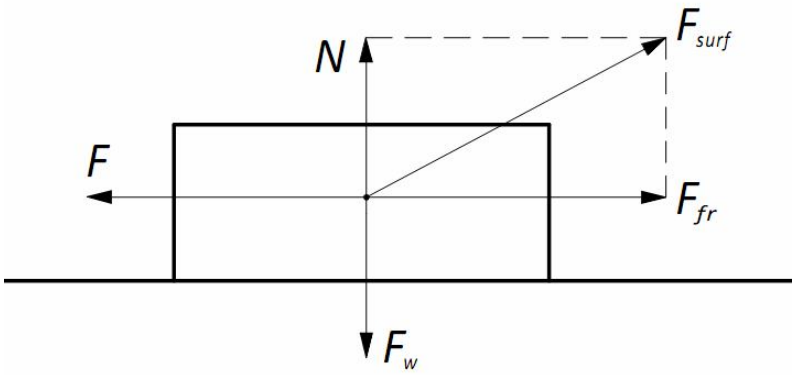
A body of mass m is kept on a rough horizontal surface of friction coefficient μ. A force is applied horizontally but the body is not moving. The net force F by the surface on the body will be?

Solution: As you can see on the picture below, the body is affected to such forces as weight force F_w, force of friction F_{fr}, support reaction normal force N and outer horizontal force F. The body isn't moving, then all these forces are in equilibrium, according to the third Newton's law. They can be expressed through next equations: $F_{fr} = F$, $N = F_w = m \cdot g$, where m is the mass of the body, g = 9.81 m/s^2 - standard gravity.

As you see, the surface exerts two forces on the body: force of friction F_{fr}, and the support reaction normal force N. The resultant force will be a vector sum of these two forces, and magnitude of the net force is: $F_{surf} = \sqrt{N^2 + F_{fr}^2} = \sqrt{m^2 \cdot g^2 + F^2}$



Answer: $\sqrt{m^2 \cdot g^2 + F^2}$.