

Normal Force

When a contact force acts perpendicular to the common surface of contact, it is called the “normal force.”

Horizontal Surfaces

- Examples: floor, table top, desk top
- On a horizontal surface the normal force is equal in magnitude but opposite in direction to the weight of an object resting on the surface.
- Bathroom scale reads the normal force.

Elevator

- Middle of ride you are undergoing constant velocity upward, so forces are balanced, so weight and normal force are balanced.
- Start of ride you accelerate upward, so the normal force is greater in magnitude than your weight.
- End of ride you decelerate, so the normal force is smaller in magnitude than your weight.

Ramp or Slope

Given a ramp or slope positioned at some angle θ above the level ground.

An object is on the ramp or slope.

The weight of the object goes straight down.

The weight vector is the hypotenuse of a right triangle. The adjacent side is the perpendicular component = $mg \cos(\theta)$. This perpendicular component is used for the normal force. The opposite side is the parallel component = $mg \sin(\theta)$.