

Types of Forces

FORCE - any push or pull. These can have any direction.

Example: Steve pushed the wheelbarrow to the left, with a force of 12 N.

Direction: Any (tells you in the problem)

FBD:

FBD (Free Body Diagram) - diagram showing an object and all of the forces acting on it, The forces should be labeled and point in the appropriate direction.

GRAVITY - force of attraction between any two objects. On Earth the force of gravity *always points straight down* (toward the center of the Earth).

Direction: Straight down

Equation: $F_{\text{gravity}} = \text{mass} * \text{Acceleration due to gravity}$
 $g = 10 \text{ m/s}^2$

$$F_g = m g$$

FBD

NORMAL FORCE - Force due to a surface pushing on, or holding up an object. There is no equation, but if the surface is flat (like a table) then the normal force is usually equal to the force of gravity.

Direction: *perpendicular* to the surface

Equation: None, use Newton's second law to find F_N

FBD -

Tension - Force in a rope or string.

Direction: Points in the direction of the rope AWAY from the object

Equation: None, use Newton's 2nd Law

FBD:

Friction - Contact force that prevents slipping. Keep an eye out for problems that say 'frictionless'.

Direction: Parallel to a surface, opposite the direction of motion.

Equation: $F_{\text{friction}} = \text{coefficient of friction} * \text{Normal Force}$

$$F_{\text{fr}} = \mu F_N$$

FBD:

Spring Force - Force caused by a spring.

Direction: Along the length of the spring

Equation: $F = kx$

FBD: