Forces

Name and abbreviation	Description	contact?	direction	How to find its strength	Reactive?	For reactive forces, info about max value...
Gravity, F_g aka weight	Force that planet exerts on all objects near it.	NO	Down towards center of planet	$F_g = 9.8\frac{N}{kg}m$ where m is mass of object. The earth's gravitational field strength is 9.80 N/kg; other planets have different values.	No	
Normal force F_N	Often a support force. Always, a surface prevents an object from passing through.	Yes	Perpendicular to the surface, towards the object	No formula. As big as needed to do its **job**: *keeping the object from passing through the surface.* *Found with ΣF statements...*	Yes	If surface is not strong enough to provide enough F_N that is needed, the surface breaks, F_N become 0, and the object falls through it.
Tension F_T	A cable or rope is attached to the object and pulled upon.	Yes	Direction of the cable or rope, away from object.	No formula. 'Job' is usually to support an object in the air or pull it along a surface. *Given, or Found ΣF statements...*	Sort of...	If rope breaks, this force suddenly becomes 0: object falls or slides down ramp... depends what the tension's 'job' was.
Kinetic Friction F_{kf}	Opposes motion of an object that is sliding on a surface.	Yes	Opposite the direction of motion, along the interface between the object and the surface it is sliding on.	$F_{kf} = \mu_k F_N$ μ_k : coefficient of kinetic friction between the two surfaces F_N is the normal force on the object by the surface it's on.	No	
Static friction F_{sf}	Prevents an object from sliding across a surface, when other force(s) try to make it slide.	Yes	As needed to prevent motion.	No formula! Size is as needed to do its **job**: *prevent motion.* *ALWAYS found with ΣF statements...*	Yes	Max *possible* value *has* a formula: $F_{sf\ max} = \mu_s F_N$ (μ_s is the coefficient of static friction.) If the F_{sf} NEEDED to prevent motion is bigger than $F_{sf\ max}$, object slides. F_{sf} is 'broken' and replaced by F_{kf}.
Spring force F_s	Spring is attached to the object and either stretched or compressed	Yes	Along the 'axis' of the spring.	$F_s = k\,\Delta l$ Here k is spring constant, specific to that spring, Δl is the change in length; (stretch or compression distance).	No	
Air Resistance F_{AR}	Friction-like force between an object moving through the air around it.	Yes (w/ air!)	Opposite the direction of motion.	Super complex formula. Usually so small we ignore this force. It gets big at high speeds and for objects with big surface areas.	No	
Applied force F_A	Catch-all when force is applied	Yes	Direction given	Value is given	no	

When a force is broken up into its x and y parts, it is replaced by those parts -- you don't use the force itself any more.

Reactive forces: value of this type of force is always found using ΣF statements rather than formulas.

Newton's first law: balanced forces ↔ no change in motion (constant velocity or no motion)

You can use 'know' the object doesn't move (or moves with constant velocity) and therefore the forces must be balanced, and use that idea to solve for a force you are not given. OR you can 'know' that the forces balance and therefore the motion of the object does not change.