Some of the Forces We Know and Love.

1. The Force due to Gravity (Fg) (take 1):

* This is a simple and naïve look at gravity as the force that Earth (or another planet) exerts on an object.
* It points “down” and by “down” we mean “toward the centre of the planet”.
* Its magnitude depends upon the mass of the object and the strength of the gravitational field (g) on the planet.
* On Earth g=9.80N/kg. Meaning the Earth pulls down with 9.80N of force for every 1kg of mass.

$$F\_{g}=mg$$

 where

 m is the mass of the object in kg

 g is the gravitational field strength (g=9.80N/kg on Earth)

2. The Normal Force (FN):

* When 2 solid objects come into contact they push each other apart. This force is called the Normal Force.
* The Normal Force is always *repulsive.*
* The Normal Force always acts perpendicular to the surfaces in contact.
* There is no formula. The normal force is as strong as it needs to be to prevent solid objects from passing through one another. This assumes that our solid objects are rigid and do not deform, and that they do not break.

3. The Frictional Force (Ff)

* Friction is the force that *resists slipping* between surfaces.
* When 2 solid objects are in contact and the slide, OR ATTEMPT TO SLIDE, friction acts to prevent that sliding/slipping.
* Friction acts parallel to the surface.
* The magnitude of friction depeds upon two factors:
* The relative “grippyness” or “slipperiness” of the two surfaces measured as a unitless coefficient called μ. Usually μ is between 0 and 1 (0< μ <1), but it can be greater than 1 in rare cases. A small value of μ means low friction or “slippery”, a large vale means high friction or “grippy”.
* How hard the two surfaces are pressed together. This is the Normal Force between the two surfaces.

$$0 \leq F\_{f} \leq μF\_{N}$$

4. The Force of Tension (FT)

* This is the force that exists in a (massless) string/rope/chain/cable that is pulled in opposite directions from both ends.
* Its magnitude is the same at all points along the string.
* Tension can only pull. This means it will point AWAY from the object at all points of contact.
* By using a pulley (massless/frictionless) ropes can allow forces to be applied around corners without losing strength.

5. The Elastic/Spring Force (Fs)

* As the name implies this is the force applied by an elastic or a spring that has been stretched or compressed from its *natural* or *rest length.*
* We will assume our springs are massless and frictionless.
* The magnitude of the force depends upon two factors:
* The strength of the spring. This depends on the material, the gauge, how tightly wound and many other factors. It is measured with a number called the *spring constant, k*, in units of N/m.
* How much the length of the spring has been *changed from rest length*.

$$F\_{s}=kx$$

 where

 k is the spring constant in N/m

 x is the amount of stretch or compression in m.

* The direction of the force is RESTORATIVE. In other words the force is such that the spring will return to its natural length.