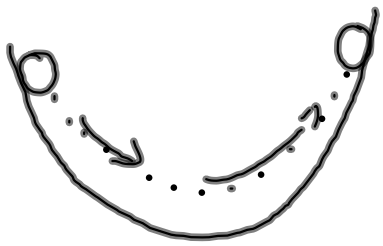
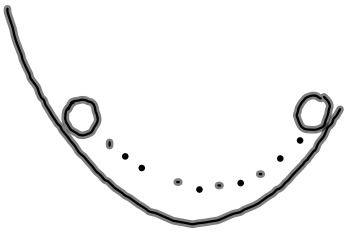
Chapter 4 ~ Introducing Forces

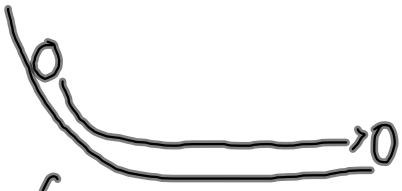
Inertia – definition on p126

Galileo





Galileo's perception of INERTIA



If there were no friction, the ball would keep going forever.

p129 -> #1 Look at this.

Common Forces

mass - the amount of matter in an object (kg)

weight - the force of gravity acting on an object (N)
- depends on location

Newton

$F_g \propto m$

$\vec{F_g} = m\vec{g}$

where F_g is the weight (N)
m is the mass (kg)
g is 9.81 m/s² (near the Earth's surface)

Look at p132 + p133

÷9.81 m/s² ×2.2

	Weight	mass (kg)	mass (lb)
Student 1	340 N	34.7 kg	76.2 lb
Student 2	925 N	94.3 kg	207.4 lb
Student 3	700 N	71.4 kg	157.0 lb

MP 135

$m = 4.0\,kg$

$\vec{g} = 1.64\,m/s^2\,[down]$

$\vec{F_g} = ?$

$\vec{F_g} = m\vec{g}$

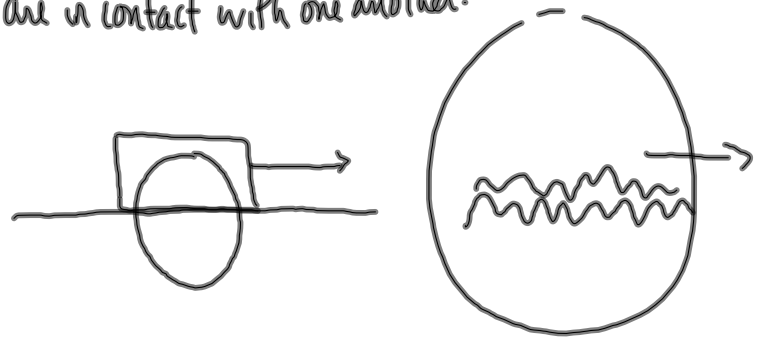
$\vec{F_g} = (4.0\,kg)(1.64\,\frac{m}{s^2})\,[down]$

$\vec{F_g} = 6.6\,N\,[down]$

$kg \cdot \frac{m}{s^2} = N$

Friction

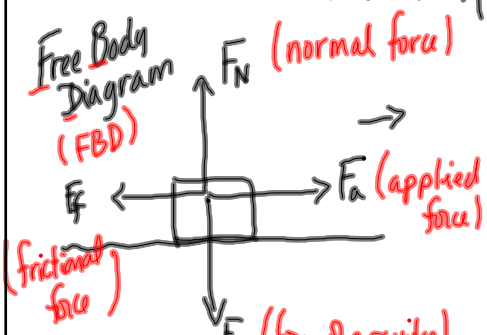
friction depends on the nature of the two surfaces that are in contact with one another.



Static friction - the friction you need to overcome in order to JUST start an object moving.

Kinetic friction - the friction you need to overcome once the object is moving.

Free Body Diagram (FBD)



$$F_f \propto F_N$$

$$F_f = \mu F_N$$

where F_f is the frictional force (N)
F_N is the normal force (N)
μ is the coefficient of friction

* depends on the nature of the surfaces.

Look at p 140