

Chapter 4 - Introducing Forces

Inertia (see p126 for definition)

Galileo's perception of inertia (see p129 + animation)

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Weight + Mass

mass (kg) - the amount of matter in an object; mass is always the same regardless of location.

Weight (N) - the force of gravity acting on an object; it depends on location  
 ↑  
 Newtons

\* Weight depends on the mass of the object and the acceleration due to gravity

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

$$\vec{F}_g = m \vec{g}$$

where  $\vec{F}_g$  is the weight (force of gravity) (N)  
 $m$  is the mass (kg)  
 $\vec{g}$  is the acceleration due to gravity (9.81  $\frac{m}{s^2}$  near the earth's surface)  
 [down]

	$F_g$ (N) $\xrightarrow{\div 9.81 \frac{m}{s^2}}$	$m$ (kg) $\xrightarrow{\times 2.2 \frac{kg}{lb}}$	$m$ (lb)
E	685N	69.8 kg	154 lb
T	770N	78.5 kg	173 lb

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$m = 4.0 \text{ kg}$   
 $\vec{g} = 1.64 \frac{m}{s^2} [\text{down}]$   
 $\vec{F}_g = ?$

$\vec{F}_g = m \vec{g}$   
 $\vec{F}_g = (4.0 \text{ kg})(1.64 \frac{m}{s^2}) [\text{down}]$   
 $\vec{F}_g = 6.6 \text{ N} [\text{down}]$

$1 \text{ N} = 1 \text{ kg} \cdot \text{m/s}^2$

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