Common Forces

-gravitational forces (weight) UNIT=Newton (N)

WEIGHT

An object's weight, $\vec{F}_g$, is the product of its mass, m, and the acceleration due to gravity, g.

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

Quantity	Symbol	SI unit
force of gravity (weight)	$\vec{F}_g$	N (newton)
mass	m	kg (kilogram)
acceleration due to gravity	$\vec{g}$	$\frac{m}{s^2}$ (metres per second squared)

Unit Analysis

(mass) (acceleration) = $kg\frac{m}{s^2} = N$

Note: The symbol g is reserved for acceleration due to gravity on Earth. In this textbook, g with an appropriate subscript will denote acceleration due to gravity on a celestial object other than Earth, for example, g_{Moon}.

Nov 2 - 8:16 PM

Table 4.3 Free-Fall Accelerations Due to Gravity on Earth

Location	Acceleration due to gravity (m/s^2)	Altitude (m)	Distance from Earth's centre (km)
North Pole	9.8322	0 (sea level)	6357
equator	9.7805	0 (sea level)	6378
Mt. Everest (peak)	9.7647	8850	6387
Mariana Ocean Trench* (bottom)	9.8331	11 034 (below sea level)	6367
International Space Station*	9.0795	250 000	6628

*These values are calculated.

Table 4.4 Free-Fall Accelerations Due to Gravity in the Solar System

Location	Acceleration due to gravity (m/s^2)
Earth	9.81
Moon	1.64
Mars	3.72
Jupiter	25.9

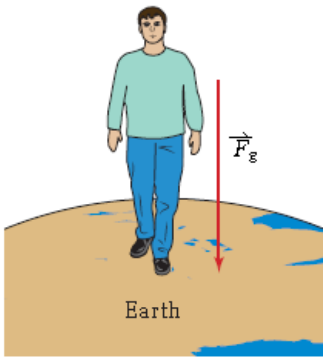
Oct 25-7:54 PM

Weight and Mass Calculations

1. Calculate the weight of a 4.0 kg mass on the surface of the Moon.

Oct 25-8:03 PM

2. A student standing on a scientific spring scale on Earth finds that he weighs 825 N. Find his mass.



Oct 25-8:04 PM

Sticky Shoe Lab

Using your own shoe, measure and record the static frictional force and kinetic frictional force of at least 10 different surfaces in and around the school. Design a table to record your data. Remember to calculate the 'weight' of your shoe.

DO NOT disturb classes during this lab. Be mindful of the fact that 'some' teachers may not appreciate the science you are doing!

Nov 2 - 8:21 PM

Friction Forces

-kinetic frictional forces (when the object is moving)
-static frictional forces (when the object is not moving)
-strength of these forces depends on the nature of the two surfaces
-generally an electromagnetic force between the particles of the two surfaces
-"stick and slip"
-each material has a stickiness factor in relation to another material
-called the coefficient of friction and is unitless *(p. 140 of text)*
-whenever an object exerts a force on a surface, **the object exerts a force directly perpendicular to the surface and is called the *normal force***

Oct 18-8:18 PM

where,

$F_f = \mu F_N$

F_f is the force of friction

F_N is the normal force

μ is the coefficient of friction

Oct 18-8:19 PM

Using your data, calculate the static and kinetic coefficient of friction for each surface you experimented with.

Oct 19-11:29 AM