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One-Dimensional Motion and The Metric System

One Dimensional Motion

Newton's 1st Law- "An object that is at rest, and an object that is moving will continue to move in a straight line with constant speed, if and only if the net force acting on that object is zero."

Newton's 2nd Law- The acceleration of an object is proportional to the net force and inversely proportional to the mass of the object being accelerated.

Newton's 3rd Law- It states that all force come in pairs. Ex. The gravity holding you down to earth and the gravity keeping you flying through the ground.

Normal Force- F_N = mass (m) x acceleration (a). Where acceleration equals 9.8 m/s.

Weight- gravitational force experience on an object. Ex: F_g = mass (m) x gravitational field (g).

Gravitational Field- a vector quantity that relates the mass of an object to the gravitational force it experiences at a given location.

Inertia- tendency to resist changes in velocity.

Net force- sum of all the forces on an object.

Mass vs Weight- Mass is NOT interchangeable with weight. Weight is a force and mass is an amount. Weight, when in space, will be different than on Earth because of the fact that there is a flux or lack thereof in gravity. Meanwhile, mass will remain constant no matter the location.

The Metric System

SI Base Units-

TABLE 1.4 SI Base Units

Physical Quantity	Name of Unit	Abbreviation
Mass	Kilogram	kg
Length	Meter	m
Time	Second	s[a]
Temperature	Kelvin	K
Amount of substance	Mole	mol
Electric current	Ampere	A
Luminous intensity	Candela	cd

[a]The abbreviation sec is frequently used.

Prefixes- The primary prefixes used in this portion of the Physics curriculum are Milli-, Centi-, and Kilo-. One of the mnemonic devices that contains these and additional prefixes is, "King Henry's Daughter Makes Delicious Chocolate Muffins". This includes Kilo-, Hecto-, Deca-,

Meter(or other base unit), Deci-, Centi-, and Milli- ranging from Kilo- being the largest to Milli- the smallest.

For further clarity, here is the numerical value of each member of the Metric System:

Prefix	Distance from Base Unit	Example
milli-	0.001	millimeter
centi-	0.01	centimeter
deci-	0.1	decimeter
(no prefix, just unit, eg "meter")	0	meter
deka-	10	dekameter
hecto-	100	hectometer
kilo-	1000	kilometer

Significant Figures-

Rules:

- Nonzero numbers are significant (that is, 1,2,3,4,5,6,7,8 and 9)
- Zeros between significant figures are significant
- Zeros to the right of the decimal AND to the right of a significant figure are significant
- Small counting numbers (under, say, 10,000) are usually considered exact and have infinite significant figures (ex. 2 chickens)

Addition and Subtraction:

- The answer cannot be more precise than the least precise measurement
  - ex. 2.58 + 2.6 + 2.575
- The simple sum is 7.755. One number goes to the tenths place. That's the least precise number (final digit is farthest to left). So the answer can only be reported to the tenths place. The answer is 7.8.

Multiplication and Division:

- The answer will always have the same number of sig figs as the measurement with the fewest total sig figs.
  - ex. 6.341 x 9.24
- The calculator gives you 58.59084. The actual answer is 3 sig figs (due to the 9.24, as it has the least number of sig figs).
  - The answer is 58.6