Chapter: Measurement

Unit

We describe natural phenomena by measuring various aspects of nature. Measurements are associated with the physical quantity. The laws of physics use mathematical relationships among physical quantities.

The system of units used by scientists and engineers around the world is commonly called "the metric system,"

However, since 1960 it has been known officially as the International System, or SI (the abbreviation for its French name, Système International).

Table 1-2

Prefixes for SI Units

Factor	Prefix[a]	Symbol	Factor	Prefix[a]	Symbol
10^{24}	yotta-	Y	10^{-1}	deci-	d
10^{21}	zetta-	Z	**10^{-2}**	**centi-**	**c**
10^{18}	exa-	E	**10^{-3}**	**milli-**	**m**
10^{15}	peta-	P	**10^{-6}**	**micro-**	**μ**
10^{12}	tera-	T	**10^{-9}**	**nano-**	**n**
10^{9}	**giga-**	**G**	**10^{-12}**	**pico-**	**p**
10^{6}	**mega-**	**M**	10^{-15}	femto-	f
10^{3}	**kilo-**	**k**	10^{-18}	atto-	a
10^{2}	hecto-	h	10^{-21}	zepto-	z
10^{1}	deka-	da	10^{-24}	yocto-	y

[a]The most frequently used prefixes are shown in bold type.

SI units:

Mass	Kilograms	kg
Time	Second	s
Length	Meter	m

Dimension

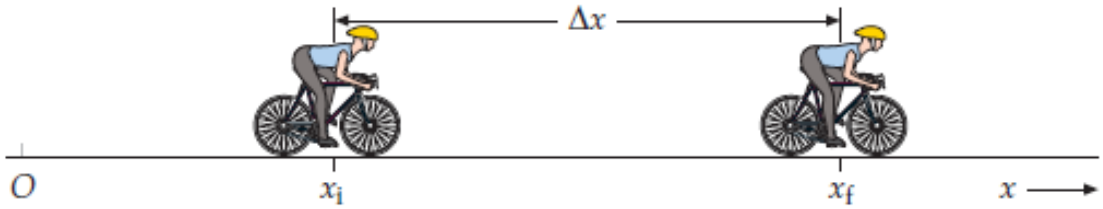
In physics, dimensions describe as the physical nature of a quantity

Quantity	Area (A)	Volume (V)	Speed (v)	Acceleration (a)
Dimensions	L^2	L^3	L/T	L/T^2
SI units	m^2	m^3	m/s	m/s^2
U.S. customary units	ft^2	ft^3	ft/s	ft/s^2

Chapter: Motion along a straight line

Motion

Position & Displacement



$$\Delta x = x_f - x_i$$

Displacement	**Distance or Distance-Travelled**
Displacement is the change in position of the particle.	The distance traveled by a particle is the length of the path a particle takes from its initial position to its final position.
It is a vector quantity.	It is a scalar quantity
It can be positive and negative. It is positive if the change in position is in the direction of increasing x (the $+x$ direction), and negative if it is in the $-x$ direction.	It is always indicated by a positive number.

Average Velocity & Average Speed

Average Speed	**Average Velocity**
Total distance traveled by the particle divided by the total time from start to finish	Ratio of the displacement to the time interval
Always a positive quantity	It can be positive and negative
Scalar quantity	Vector quantity
Unit: m/s	Unit: m/s
Dimension: [L/T]	Dimension: [L/T]

Avg Velocity – graphical interpretation

The slope provides average velocity which is a geometric interpretation.

Average velocity depends on time interval.

At P_2' has higher velocity than P_2 because time interval is shorter. Also, the graph is steeper at P_2' than P_2.