

Chapter 1

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1 Units & Dim

$$[\dots] = \text{"Units of"} \tag{1}$$

$$[\text{mass}] = kg \tag{2}$$

$$[\text{length}] = m \tag{3}$$

$$[\text{time}] = s \tag{4}$$

Physics 1A has 3 unit systems			
Sys	$[L]$	$[T]$	$[M]$
Mks	m	s	kg
CGS	cm	s	g
US Customary	ft	s	$slug$

$$[v] = \frac{\text{length}}{\text{time}} \tag{5}$$

$$[v]_{\text{CGS}} = \frac{cm}{s} \tag{6}$$

$$[v]_{\text{MKS}} = \frac{m}{s} \tag{7}$$

$$[v]_{\text{US}} = \frac{ft}{s} \tag{8}$$

$$[F] = [m][a] \quad (9)$$

$$[F] = [m] \frac{[v]}{[T]} \quad (10)$$

$$[F] = [m] \frac{[L]}{[T]^2} \quad (11)$$

$$[F]_{\text{MKS}} = kg \frac{m}{s^2} = \text{N} \quad (12)$$

$$[F]_{\text{CGS}} = g \frac{cm}{s^2} = \text{dyne} \quad (13)$$

$$[F]_{\text{US}} = (sl) \frac{ft}{s^2} = \text{lb} \quad (14)$$

$$[C] = 1 \quad (15)$$

$$[p] = \frac{kg}{m^3} \quad (16)$$

$$[A] = m^2 \quad (17)$$

$$[v] = \frac{m}{s} \quad (18)$$

2 SI Units

Prefix	Symbol	Power	Amount
giga	G	10^9	1,000,000,000
mega	M	10^6	1,000,000
kilo	k	10^3	1,000
base	-	10^0	1
centi	c	10^{-2}	$\frac{1}{100}$
milli	m	10^{-3}	$\frac{1}{1,000}$
micro	μ	10^{-6}	$\frac{1}{1,000,000}$
nano	n	10^{-9}	$\frac{1}{1,000,000,000}$
pico	p	10^{-12}	-

3 Unit Conversion

Given: $mi = 1609m$ $hr = 3600s$

$$\left(\frac{60mi}{1hr} \right) \left(\frac{1609m}{1mi} \right) \left(\frac{1hr}{3600s} \right) = 27m/s$$

Find $9.8 m/s^2$ in mph/s

$$\left(\frac{9.8m}{s^2} \right) \left(\frac{1mi}{1609m} \right) \left(\frac{3,600s}{1hr} \right) = 22mph/s$$

4 Notable Derivatives

$$\frac{d(x^n)}{dx} = nx^{n-1} \quad (19)$$

$$\frac{d(\frac{1}{x^n})}{dx} = \frac{d(x^{-n})}{dx} = -nx^{-n-1} \quad (20)$$

$$\frac{d(Ae^{kx})}{dx} = Ake^{kx} \quad (21)$$

5 Notable Integrals

$$\int (x^n) dx = \frac{1}{n+1} x^{n+1} + C \quad (22)$$

$$\int (x^{-n}) dx = \frac{1}{-n+1} x^{1-n} + C (n \neq 1) \quad (23)$$

$$\int \left(\frac{1}{x}\right) dx = \ln |x| + C \quad (24)$$