Phys 2110-4 1/13/12

Note Title 1/13/2012

Topics

Motion (Kinematics) Ch 2, 3

Forces (Dynamics) Ch 4, 5

$\vec{F} = m\vec{a}$

Energy Ch 6, 7

Momentum Ch 9

Rotational Motion Ch 10

Oscillations Ch 11

Waves Ch 14

Thermal Physics

Chap 1

Sci Notation.

0.000350 3.50×10^{-4}

Hw System 3.50 e-4

3.50e-4

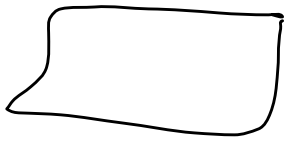
3.50*10^-4

Units

Every number:

$$\frac{\#.\#\times 10^{\#}}{\text{number}} \quad \underbrace{\text{units}}_{\text{units!}} \quad \pm \underbrace{\#\#}_{\text{error}}$$

HW gives you units

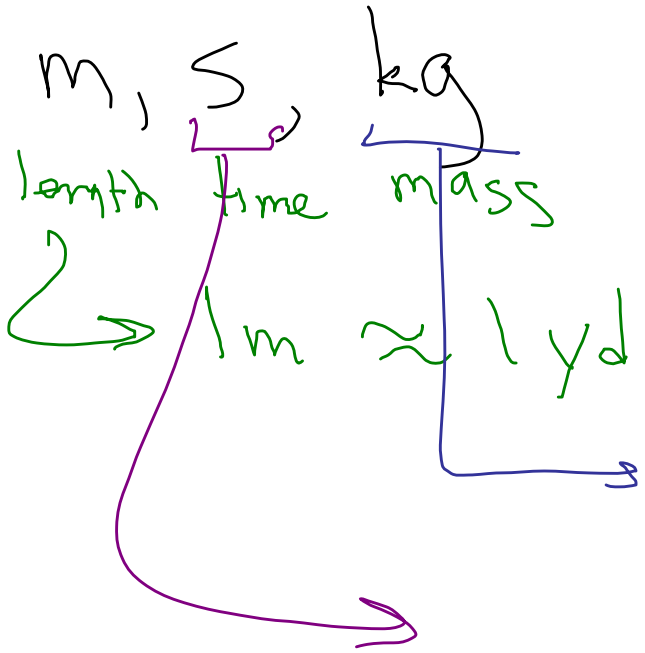


m

nm

MN

Metric System SI



1 kg of mass has a weight of 2.2 lb

Prefixes

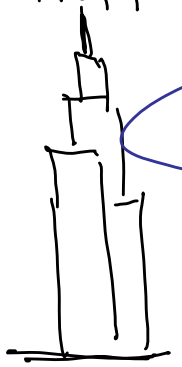
pico	p	10^{-12}
nano	n	10^{-9}
micro	μ	10^{-6}
milli	m	10^{-3}
centi	c	10^{-2}
kilo	k	10^{3}
Mega	M	10^{6}
Giga	G	10^{9}
Tera	T	10^{12}

Converting Units

Factor of 1 Method

Treat unit symbols like factors

Convert 2717 ft to meters



Burj Khalifa

$$= 1$$

$$(2717\ \text{ft})\left(\frac{0.3048\ \text{m}}{1\ \text{ft}}\right) = 828.1\ \text{m}$$

$1\ \text{ft} = 0.3048\ \text{m}$

Convert $70.0 \frac{mi}{h}$ to $\frac{m}{s}$

$$\left(70 \frac{mi}{h}\right)\left(\frac{1\,h}{3600\,s}\right)\left(\frac{5280\,ft}{1\,mi}\right)\left(\frac{0.3048\,m}{1\,ft}\right) \quad \frac{m}{s}$$

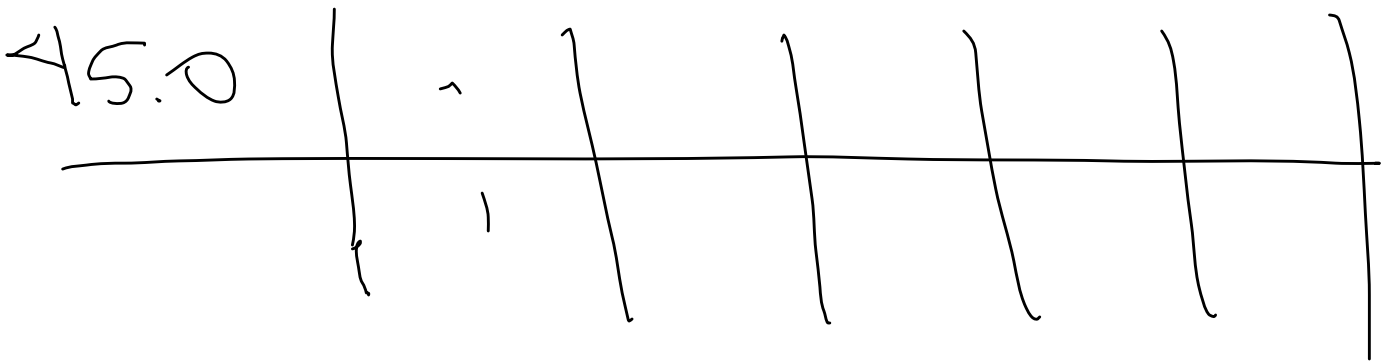
$$= 31.3 \frac{m}{s}$$

Volume

3145 cm^3 conv to m^3 $\quad 1\,m^3 = 100\,cm^3$

$$(3145\,cm^3)\left(\frac{1\,m}{100\,cm}\right)^3 = 3.145 \times 10^{-3}\ m^3$$

$\left(45.0 \frac{m}{s^2}\right)$



OK be careful

1000 kg = 1 g

Accuracy "Significant Figures"

3.250 m ≠ 3.25 m

science

Significant figs

Known figs

0.0034

3.4×10^{-3}

Multiply numbers

$(3.25)(8.7) = 2.8275$

2 known → 2 known

$= 2.8$

$(3.10 \times 10^{-15})(4.678 \times 10^{-5}) = 1.45 \times 10^{-19}$

3 known → 3 known

$$
\begin{array}{r}
7.1 \\
+\ 82.348 \\
0.0157 \\
\hline
\end{array}
$$

Goes by dec. places.

Error Analysis

$$(3.12 \pm 0.003)(72.5 \pm 0.05)$$

error error

$$= 214 \pm \text{SS}$$

$$\cos(60.0^\circ)$$

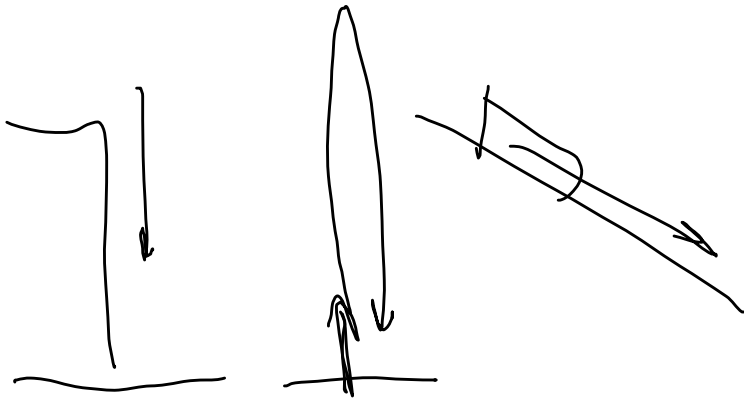
$$\frac{1.00}{3.0} = 0.333333\ldots$$

$$= 0.\overline{3}$$

Not in science

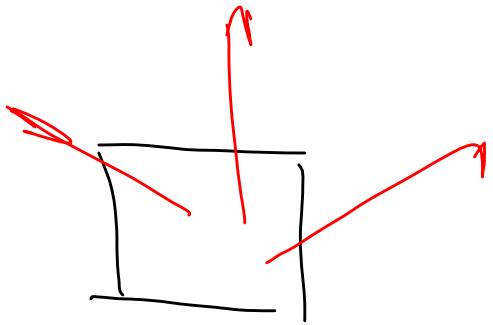
Problem Solving

Draw a diagram humans can read.



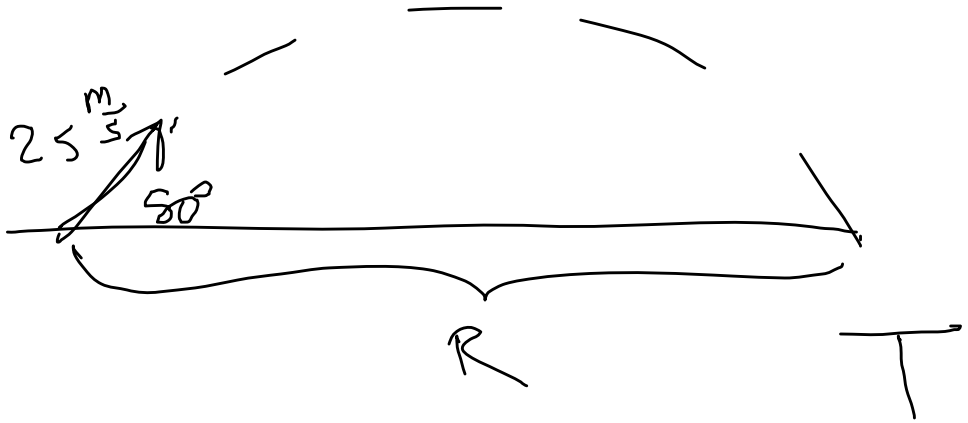
Units.

Plausible



$7 \frac{m}{s}$ $700 \frac{m}{s}$

$400 \frac{m}{s}$

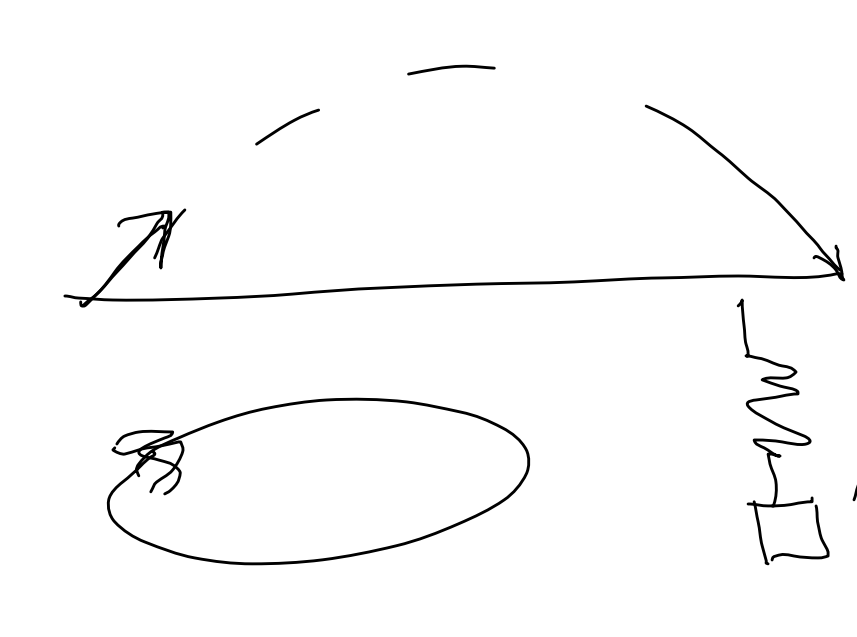


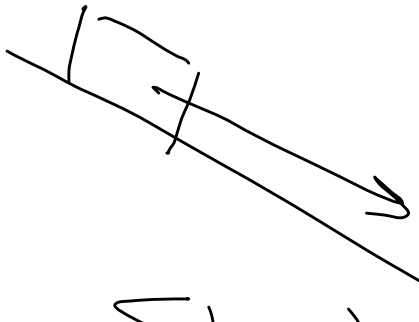
0.00007 s

331412 s

11 min

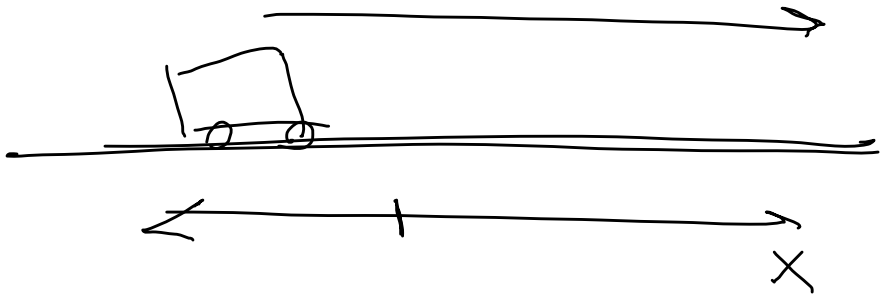
Chap 2 Motion

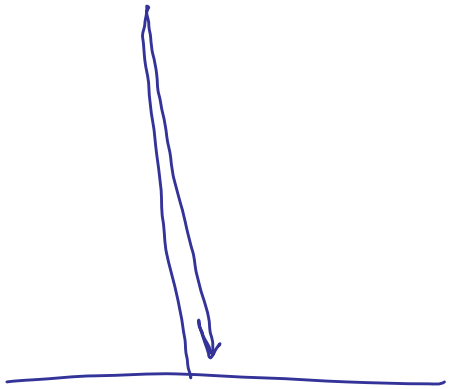




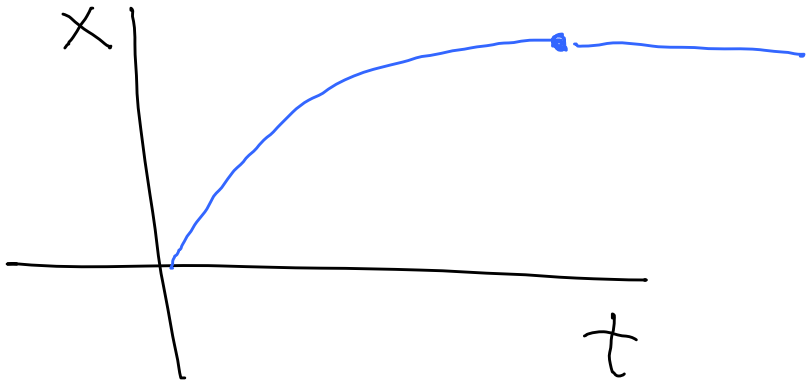
Start simple

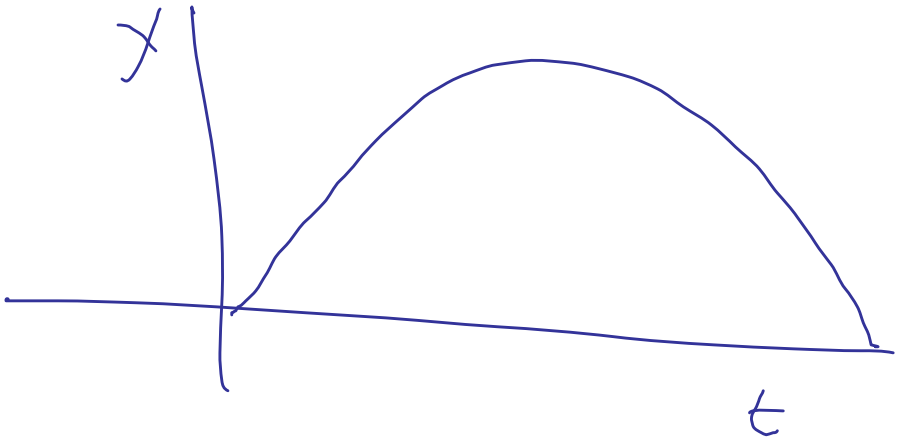
1-Dimensional

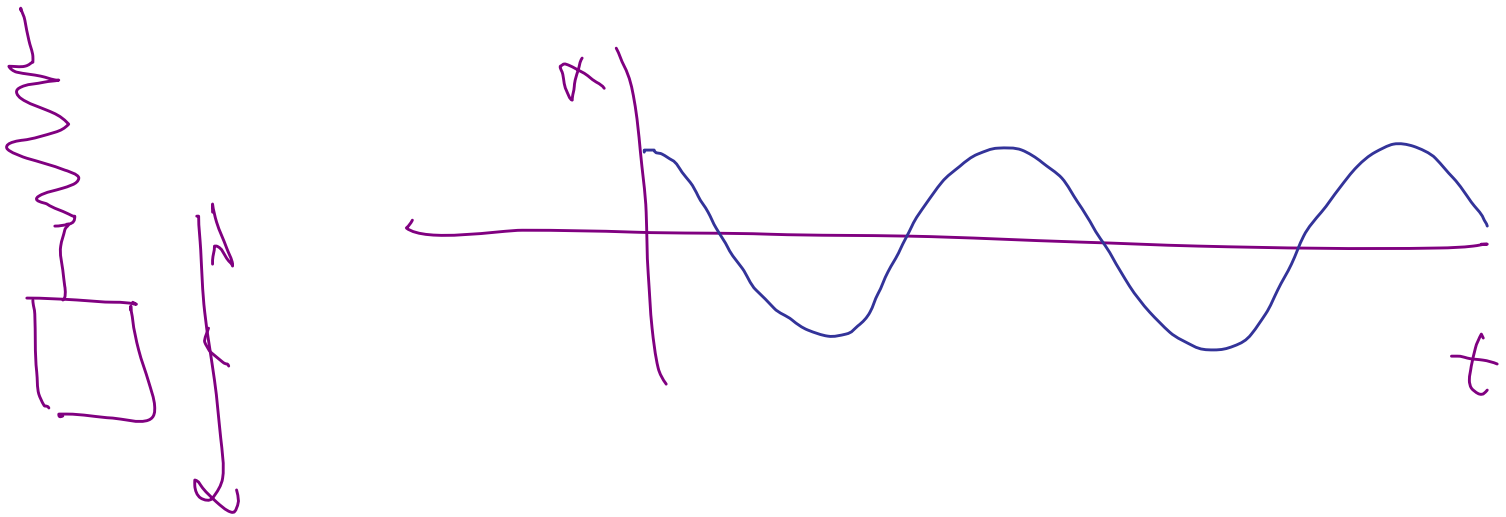




Function $x(t)$






x
t