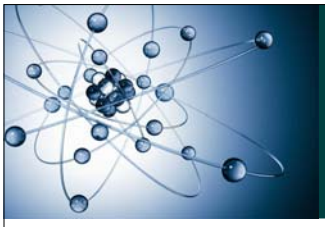
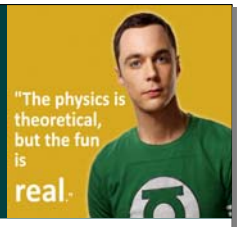


Physics 20

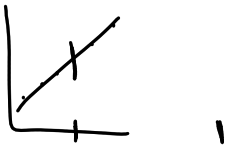
Essential Skills Review

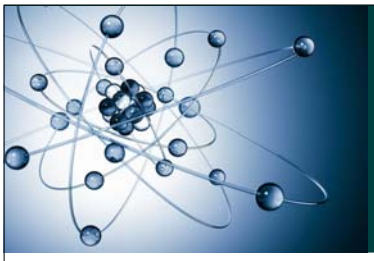


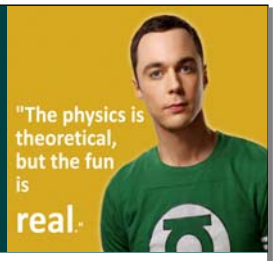
0.2 Graphing, Algebra, Trigonometry

Expectations When Graphing:

1) **Title** - y-variable vs. x-variable, underlined, at top of graph
2) **Axes Labels** - manipulated variable (x), responding (y), include units
3) **Pencil** - enough said
4) **Scale** - your graph should take up the entire graph area so choose appropriate scales for the axes
5) **Slope** - m = rise/run or m = $(y_2 - y_1)/(x_2 - x_1)$
6) **Interpolate** - estimate a value within the data set
7) **Extrapolate** - estimate a value outside of the data set







Algebra - Manipulating Equations/Formulas

- "opposite operations"
- "reverse BEDMAS"
- "what you do to one side, you always do to the other"

**this is the fundamental skill required for Physics 20.

When completing Physics questions, the should ALWAYS be organized in the following way:

list all variables	formula	substitute (with units) and solve

Ex.) Solve for *t*.

$t \cdot v = \frac{d}{t} \cdot t$

$\frac{tv}{v} = \frac{d}{v}$

$t = \frac{d}{v}$

Ex.) Solve for h.

$E = mgh$

$\frac{E}{mg} = \frac{mgh}{mg}$

$\frac{E}{mg} = h$

Ex.) Solve for v_i.

$t \cdot a = \frac{v_f - v_i}{t} \cdot t$

$ta = v_f - v_i$

$-v_f \quad -v_f$

$\frac{ta - v_f}{-1} = \frac{-v_i}{-1}$

$-ta + v_f = v_i$

Ex.) Solve for m.

$T = 2\pi\sqrt{(m/k)}$

$\frac{T}{2\pi} = \frac{2\pi\sqrt{(m/k)}}{2\pi}$

$\left(\frac{T}{2\pi}\right)^2 = \sqrt{m/k}^2$

$\frac{k}{1} \cdot \frac{T^2}{4\pi^2} = \frac{m}{k} \cdot k$

$\frac{kT^2}{4\pi^2} = m$

Trigonometry

*calculator in degree mode

You must use all the decimals of any number you calculate in order to reach the correct final answer. This means you should be familiar with the 2nd Ans function on your calculator.

Ex.) $\sin(25^o) = 0.4226182617...$

Now, mulitply that answer by 18: 2nd Ans x 18 = 7.607128711...

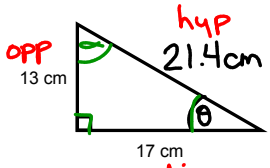
If we had rounded our first answer to 0.4, then: 0.4 x 18 = 7.2 (way off)

SOH CAH TOA

- we use primary trigonometric ratios (SOH CAH TOA) to find the missing sides or angles of right angle triangles

- this is an essential skill for Physics 20

Ex.) Solve the triangle:



$a^2+b^2=c^2$

$\sqrt{13^2+17^2}=\sqrt{c^2}$

$21.4=c$

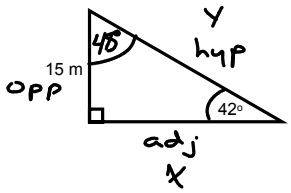
$\tan\theta=\frac{13}{17}$ 2nd tan (13÷17)

$\theta=37^\circ$ $\tan^{-1}$

$180^\circ-90^\circ-37^\circ$

$\alpha=53^\circ$

Ex.) Solve:

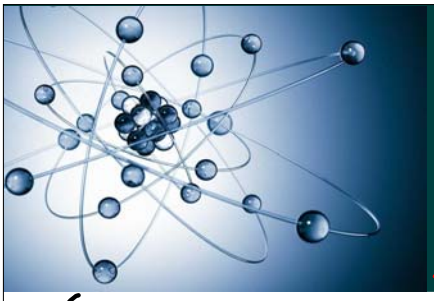


$\tan 42^\circ=\frac{15}{x}$

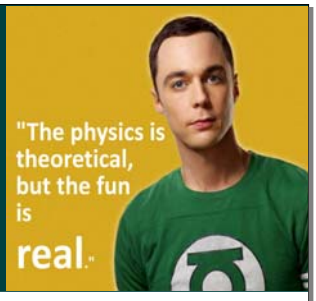
$x=\frac{15}{\tan 42^\circ}=17\text{ m}$

$\sin 42^\circ=\frac{15}{y}$

$y=\frac{15}{\sin 42^\circ}=22\text{m}$



÷3.6



- $\left(\frac{30\,km}{1\,h} \times \frac{1000\,m}{1\,km} \times \frac{1\,h}{60\,min} \times \frac{1\,min}{60\,s}\right) = 8.3\,m/s$

$0.2\overline{7} \rightarrow \frac{5}{18}$ $\quad \frac{18}{5} = 3.6$

- $12.5\,m/s \times 3.6 = 45\,km/h$