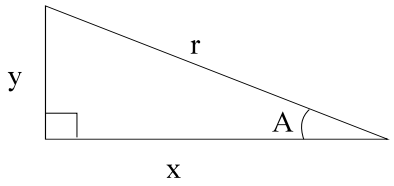
PHYS 210 - GENERAL PHYSICS I KNOW SHEET

There are some basic tools that a scientist should have at his/her disposal without having to consult a reference. This list consists of relationships that will serve you well to know. Commit these all to memory! Items 1 - 8 you should have seen in high school mathematics at some point. Items 9 and 10, the Constants, and the Formulae we will encounter this semester - make sure you commit them to memory after they are introduced in a reading assignment.

1. $a x^2 + b x + c = 0$ ⇨⇨ $x = \frac{1}{2a}\left[-b \pm \sqrt{b^2 - 4ac} \right]$

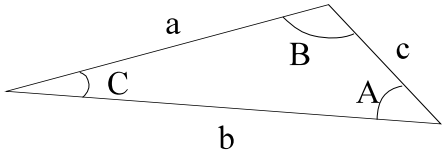
2. For right triangles:
   $\sin A = y/r$
   $\cos A = x/r$
   $\tan A = y/x$
   $x^2 + y^2 = r^2$



3. $\sin (A \pm B) = \sin A \cos B \pm \cos A \sin B$
   $\cos (A \pm B) = \cos A \cos B \mp \sin A \sin B$

4. Law of Cosines: $a^2 = b^2 + c^2 - 2 b c \cos A$

   Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$



5. Circle: C = circumference = $2 \pi r$ A⊙ = Area = πr^2

6. Cylinder: A = surface area = $2 \pi r L + 2 \pi r^2$ V = volume = $\pi r^2 L$

7. Sphere: A = surface area = $4 \pi r^2$ V = volume = $4/3 \pi r^3$

8. $\sin^2 A + \cos^2 A = 1$

9. $|\vec{a} \times \vec{b}| = ab \sin\theta$; $\vec{a} \times \vec{b} = \hat{i}(a_y b_z - b_y a_z) + \hat{j}(a_z b_x - b_z a_x) + \hat{k}(a_x b_y - b_x a_y)$

10. $\vec{a} \cdot \vec{b} = a_x b_x + a_y b_y + a_z b_z = ab \cos\theta$

Physical Constants: [Memorize as we encounter these in class.]

$g = 9.8$ m/s^2 $G = 6.67 \times 10^{-11}$ N m^2/kg^2 $c = 3.00 \times 10^8$ m/s

Physical Formulae: [Memorize as we encounter these in class.]

$$\vec{v} = \frac{d\vec{r}}{dt} \quad \vec{a} = \frac{d\vec{v}}{dt} \quad \vec{F}_{NET} = m\vec{a} = \frac{d\vec{p}}{dt} \quad W = \int \vec{F} \cdot d\vec{r} \quad U_g = mgy \quad a_c = \frac{v^2}{r}$$

$$F_G = mg \quad \vec{F}_{GRAV} = \frac{GmM}{r^2}\hat{r} \quad F_s \le \mu_s N \quad F_{spring} = -kx \quad K = \frac{1}{2}mv^2$$

$$\vec{p} = m\vec{v} \quad \vec{\tau} = \vec{r} \times \vec{F} \quad \vec{v} = \vec{\omega} \times \vec{r} \quad \vec{l} = \vec{r} \times \vec{p} \quad f = \frac{1}{T} \quad \omega = \frac{2\pi}{T}$$

Text Appendix A: *Derivatives*: Know them all! *Integrals*: Know the first five in the first column and the 3rd, 5th, and 6th in the second column [integrals of e^{ax}, sin(ax), and cos(ax)]