Chapter 3 of Tipler & Mosca, section 3
Circular Motion

1. Uniform Circular motion:
   
a.) Constant speed, go around a circle or just part of one (an arc). Speed and radius.

   b.) Velocity vector is changing, so there is acceleration.

   c.) $T$ is period for complete circle, so $V = \frac{2\pi R}{T}$
d.) Put velocity vectors on a plot, with tails at the origin:

Tip of $\vec{V}$ goes around circle in period $T$. radius of this circle is $V$.

Thus rate of change of $\vec{V}$ with time is $a = 2\pi V / T$ and since $T = 2\pi R / V$
$$a = V^2 / R$$
called Centripetal Acceleration

e.) NOT a constant acceleration. Magnitude is constant but Direction rotates.
Points toward center of circle. Demo.

f.) Clicker problem
A satellite in “low earth orbit” travels a few hundred km above the surface of the Earth. The orbit radius is $7 \times 10^6$ m. If $g$ is still 9.8 m/s$^2$ at that height, what is the speed of the satellite?

A. $7.0 \times 10^7$ m/s
B. $8.3 \times 10^3$ m/s
C. $6.3 \times 10^3$ m/s
D. $4.3 \times 10^3$ m/s
E. $5.0 \times 10^7$ m/s
2. “Circular” motion with change of speed
   a.) Centripetal acceleration always perpendicular to $\vec{V}$ (toward inside of turn)
   b.) Change of speed result of Tangential acceleration. (parallel to $\vec{V}$ -- just like one dimensional case.)
   c.) Homework problem example.

3. General case of “curvy” motion
   a.) At any point along a particle’s path the acceleration vector has one component parallel to $\vec{V}$ and another perpendicular. That is all there is.
   b.) Parallel component is the tangential acceleration – changes speed.
   c.) Perp component is centripetal acceleration – changes direction.
   d.) What about the projectile?