Equations that are not on the AP Physics 1 Formula Sheet

**Keep in mind the equations listed below do not necessarily need to be “memorized.” It is more important to understand the proportionalities rather than the equation itself. For example, for** $v\_{orbit}=\sqrt{\frac{GM}{r}}$**, if you increase mass of the planet,** $M$**, by a factor of** $2$ **then you increase the orbital velocity by a factor of** $\sqrt{2}$

**Banked Curve**

Angle of a banked curve: $θ=tan^{-1}\left(\frac{a\_{c}}{g}\right)=tan^{-1}\left(\frac{v^{2}}{gr}\right)$

 This came from Ideal Speed on a Banked Curve: $v=\sqrt{gr\tan(θ)}$

Maximum speed through a flat turn: $v\_{max}=\sqrt{μ\_{s}gr}$

**Circular Motion/Gravitation**

Velocity of a particle moving in a circle: $v=\frac{Circumference}{Period}=\frac{2πr}{T}=2πrf$

Gravitational field/acceleration: $g\_{planet}=\frac{GM}{R^{2}}$

Orbital Velocity:$v\_{orbit}=\sqrt{\frac{GM}{r}}$

\*\*\*Orbital Period: $T^{2}=\left(\frac{4π^{2}}{GM}\right)r^{3}$

Orbital Period: $T=2π\sqrt{\frac{r}{g}}$

Always aim the +x-axis to the center of the circle: $\sum\_{}^{}F\_{x}=In Forces+Out Forces=ma\_{c}=m\frac{v^{2}}{r}$

**Negative**

**Positive**