Physics Final

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1 Orbits

Angular velocity: W = $\frac{\theta}{t}$
W = $\frac{2\pi}{t}$
W in units rad/sec
Centripetal acceleration - always towards the center
Gravity is responsible for centripetal acceleration
Centripetal acceleration: $a_c = \frac{v^2}{r}$
Tangetial speed: v = wr
$F_g = \frac{mMG}{r^2}$
$F_g = \frac{mv^2}{R}$
-PE = $\frac{-mMG}{r}$
KE = $\frac{mMG}{2r}$
a = $\frac{MG}{r^2}$
$\frac{1}{2}mv^2 = \frac{mMG}{r}$
Launch velocity for circular orbit:

$$v = \sqrt{aR}$$

Launch velocity for escape:

$$v = \sqrt{\frac{2MG}{r}}$$

2 Electrostatics

Separation between two points:

$$-\Delta x = \frac{\Delta v}{E}$$

Force of electric field on a charge:

$$F = Eq$$

Change in PE:

$$PE = Vq$$

Power = $\frac{\Delta energy}{time}$
$F_B = q_v B$
$q_v B = qE$

3 Torques

$\tau = rFsin\Delta\theta$

4 Thermodynamics

Monatomic: KE = $\frac{3}{2}$K$_B T$
Diatomic: KE = $\frac{5}{2}$ K$_B T$
U = mCT
$\Delta v = mc\Delta T$
$\Delta U = mC_p\Delta T$
$\Delta U = mL$