Physics Formulae

EK = ½mv2

W = F∙∆d

 = ma∙∆d (since F = ma)

 = m(vf2 - vi2)∙∆d (since a = vf2 - vi2

 2∆d 2∆d)

 = m(vf2 - vi2)

 2

 = ½mvf2 - ½mvi2

 = EKf - EKi

 = ∆EK

 W = F∙∆d

 W = mg∙∆y

∆Eg = mg∙∆y

ET = EG + EK

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FX = -kx or FX = kx

W = ½F∙x

Ee = ½kx2 (since W=Ee and F = kx)

aC = 4π2r

 T2

T2 = 4π2r

 aC

 T = 2π√r

 √aC

 T = 2π√A (since r = A for the reference circle)

 √aC

-kx = maX (since FX = -kx and FX = maX)

 aX = k

 -x m

 T = 2π√A

 √aC

 = 2π√-x (since A/aC = -x/aX)

 √aX

 = 2π√m (since -x/aX = m/k)

 √k

f = 1 (√k) (since f = 1/T)

 2π(√m)

Ee = ½kA2

ET = ½kx2 + ½mv2 (and sometimes - GMm/r2)

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P = mv

I = F∙∆t

 ∆PTi = ∆PTf

m1∆u1 + m2∆u2 = m1∆v1 + m2∆v2

 EKi = EKf

½m1∆u12 + ½m2∆u22 = ½m1∆v12 + ½m2∆v22

 ∆P1 = -∆P2

m1∆v1 = -m2∆v2

P2 = m2v2 = mv2 = EK

2m 2m 2

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FG = GMm

 r2

 g = GM (since FG = mg)

 r2

v = √(GM/r)

r3 α T2

r3 = CST2

CS= r3/T2

 T = 2πr

 v

 T = 2πr\_\_ (since v = √(GM/r))

 √(GM/r)

T2 = 4π2r2

 GM/r

T2 = 4π2r2(r)

 GM

T2 = 4π2r3

 GM

r3 = GM

T2 4π2

C = r3 = GM

 T2 4π2

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W = √(F1∙F2)(r2-r1)

 = √[(GMm/r12)(GMm/r22)](r2-r1)

 = GMm(r2-r1)

 r1r2

 = GMm - GMm

 r1 r2

 ∆Eg = E2 - E1

 = GMm - GMm

 r1 r2

 = - GMm - -GMm

 r2 r1

 = W

As r2 --> ∞, Eg2 --> 0, so if r2 is outside the gravitational field:

∆Eg = 0 - E1

 = 0 - -GMm

 r1

ET = EK + Eg = 0

 EK = Eg

 ½mv2 = - -GMm

 r2

 vesc =√(2GM/r)

 EK = Eg

½mv2 = - -GMm

 r2

 Eesc = GMm

 r2

EB = -ET

 = - (½mv2 - GMm/r)