Equation Sheet for Midterm and Final EXSC 365

Linear Kinematics

$speed = \frac{dist}{time}$ $velcoity = \frac{displacment}{time}$ $acceleration = \frac{\Delta velocity}{\Delta time}$

Projectile Equations

$Y = Y_0 + v_v t + \frac{1}{2} g t^2$ $X = X_0 + v_h t$ $MaxHeight = \frac{v_v^{\,2}}{-2g}$ $FlightTime = \frac{2v_v}{-g}$

$HorizontalDisp = v_h(FlightTime)$ $FlightTime = \frac{-v_v - \sqrt{v_v^{\,2} - 2gh}}{g}$

Linear Kinetics

$W = mg$ $F_{Friction} = \mu N$ Linear Momentum: $L = mv$ $F_{Slope} = mg\sin\theta$

Perfectly elastic collision: $m_A v_A = m_B v_B$

Coefficient of restitution: $e = \sqrt{\frac{bounceheight}{dropheight}}$ or $e = \frac{v_2 - v_1}{u_1 - u_2}$

Impulse/Momentum: $F\Delta t = m\Delta v$

Work, Power, & Energy

$U = Fd$ $KE = \frac{1}{2} m v^2$ $GPE = -mgh$ $SE = \frac{1}{2} k\Delta x^2$

$U = \Delta KE + \Delta GPE + \Delta SE$ $P = \frac{U}{t} = Fv$

Fluid Mechanics

$P = \frac{F}{A}$ $\rho = \frac{m}{V}$ $F_{Drag} = \frac{1}{2} C_D \rho A v^2$ $F_{Lift} = \frac{1}{2} C_L \rho A v^2$ $v = \sqrt{\frac{-2mg\sin(\theta)}{C_D \rho A}}$

Conversions

1 lb = 4.45 N	1 mile = 1609 m	1 m = 3.28 ft	1 kg = 2.20 lb