Equations for Exam 2

Kinematics

$$\vec{\boldsymbol{v}} = \frac{d\vec{\boldsymbol{r}}}{dt} \qquad \vec{\boldsymbol{a}} = \frac{d\vec{\boldsymbol{v}}}{dt} \qquad a_r = \frac{v^2}{R} \qquad a_t = \frac{dv}{dt} \qquad g = 9.8\frac{m}{s^2}$$

special case: $\vec{\boldsymbol{v}} = \vec{\boldsymbol{v}}_0 + \vec{\boldsymbol{a}}t \quad \vec{\boldsymbol{r}} = \vec{\boldsymbol{r}}_0 + \vec{\boldsymbol{v}}_0 t + \frac{1}{2}\vec{\boldsymbol{a}}t^2 \qquad v^2 = v_0^2 + 2\vec{\boldsymbol{a}} \cdot \Delta\vec{\boldsymbol{r}}$

Chapter 5-6

$$\vec{\boldsymbol{F}}_{\text{net}} = m\vec{\boldsymbol{a}} \qquad F_g = mg \qquad F_f < \mu_s F_N \qquad F_f = \mu_k F_N$$

1N = 1 kg m/s^2 $\qquad$ g = 9.8 m/s^2

Chapter 7

W = $\int \vec{\mathbf{F}} \cdot d\vec{\mathbf{r}}$ or $W = \vec{\boldsymbol{F}} \cdot \Delta\vec{\boldsymbol{r}}$ or $W = \int F(x)dx$ or $W = F\Delta x$

$$K = \frac{1}{2}mv^2 \qquad \Delta K = W \qquad \Delta U = -W \qquad E = K + U \qquad F = -\frac{dU}{dx}$$

Special cases: $U_g = mgh$ $\qquad$ $U_s = \frac{1}{2}kx^2$ for $F_s = -kx$

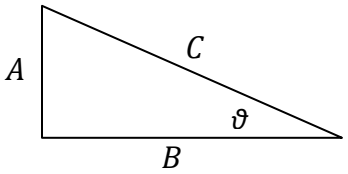
1 J = 1 N m $\qquad$ $\vec{\boldsymbol{A}} \cdot \vec{\boldsymbol{B}} = AB\cos\theta = A_x B_x + A_y B_y + \ldots$

Chapter 8

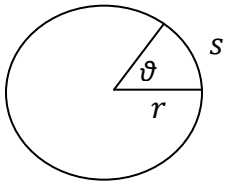
$$\Delta E = W_{nc} \qquad P = \frac{dW}{dt} = \vec{\boldsymbol{F}} \cdot \vec{\boldsymbol{v}} \qquad 1\text{W} = \frac{1\text{J}}{\text{s}} \qquad 1\text{ hp} = 746\text{ W}$$

Mathematics

$\sin\theta = \frac{A}{C}$ $\quad$ $\cos\theta = \frac{B}{C}$ $\quad$ $\tan\theta = \frac{A}{B}$ $\quad$ $C^2 = A^2 + B^2$



$s = r\theta$ $\quad$ $A = \pi r^2$



$\frac{dx^n}{dx} = nx^{n-1}$ $\quad$ $\int x^n dx = \frac{x^{n+1}}{n+1}$