Equations for Exam 1

Chapter 2

$$v_{\text{avg}} = \frac{\Delta x}{\Delta t} \qquad v = \frac{dx}{dt} \qquad a_{\text{avg}} = \frac{\Delta v}{\Delta t} \qquad a = \frac{dv}{dt}$$

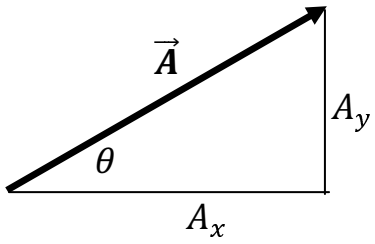
Constant acceleration: $v = v_0 + at$ $\qquad v_{\text{avg}} = \frac{1}{2}(v_0 + v_f)$ $\qquad x = x_0 + v_{\text{avg}}t$

$$x = x_0 + v_0 t + \frac{1}{2}at^2 \qquad v_f^2 = v_0^2 + 2a\Delta x$$

$$g = 9.8\ m/s^2$$

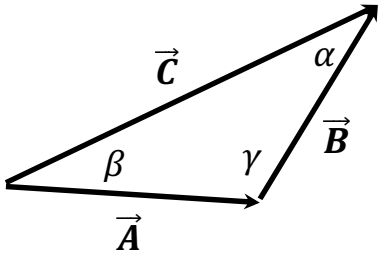
Chapter 3

$\vec{\boldsymbol{A}} = A_x\hat{\boldsymbol{\imath}} + A_y\hat{\boldsymbol{\jmath}}$ $\qquad A_x = A\cos\theta$ $\qquad A_y = A\sin\theta$



$$A = \sqrt{A_x^2 + A_y^2} \qquad \tan\theta = \frac{A_y}{A_x}$$

$\vec{\boldsymbol{C}} = \vec{\boldsymbol{A}} + \vec{\boldsymbol{B}}$ $\qquad C_x = A_x + B_x$ $\qquad C_y = A_y + B_y$



$C^2 = A^2 + B^2 - 2AB\cos\gamma$ $\qquad \frac{\sin\alpha}{A} = \frac{\sin\beta}{B} = \frac{\sin\gamma}{C}$

$\sin^2\theta + \cos^2\theta = 1, \quad \sin 2\theta = 2\sin\theta\cos\theta$

$$ax^2 + bx + c = 0 \quad \Longrightarrow \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

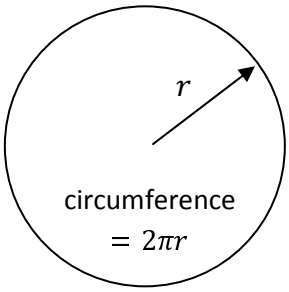
Chapter 4

$$\vec{\boldsymbol{v}}_{\text{avg}} = \frac{\Delta\vec{\boldsymbol{r}}}{\Delta t} \qquad \vec{\boldsymbol{v}} = \frac{d\vec{\boldsymbol{r}}}{dt} \qquad \vec{\boldsymbol{a}}_{\text{avg}} = \frac{\Delta\vec{\boldsymbol{v}}}{\Delta t} \qquad \vec{\boldsymbol{a}} = \frac{d\vec{\boldsymbol{v}}}{dt}$$

Case 1: $\vec{\boldsymbol{v}} = \vec{\boldsymbol{v}}_0 + \vec{\boldsymbol{a}}t$ $\qquad \vec{\boldsymbol{r}} = \vec{\boldsymbol{r}}_0 + \vec{\boldsymbol{v}}_0 t + \frac{1}{2}\vec{\boldsymbol{a}}t^2$

$$x = x_0 + v_{0x}t, \qquad y = y_0 + v_{0y}t + \frac{1}{2}at^2$$

Case 2: $a_c = a_r = \frac{v^2}{r}$ $\qquad a_t = \frac{dv}{dt}$ $\qquad \vec{\boldsymbol{a}} = \vec{\boldsymbol{a}}_t + \vec{\boldsymbol{a}}_r$



Relative velocities: $\vec{\boldsymbol{v}}_{CA} = \vec{\boldsymbol{v}}_{CB} + \vec{\boldsymbol{v}}_{BA}$