Formulae for Exam

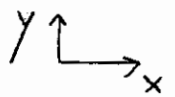
Vectors:

	Cartesian coordinates	Polar coordinates
$\vec{A}$:	$A_x = \lvert\vec{A}\rvert \cos\varphi_A$	$\lvert\vec{A}\rvert \equiv A = \sqrt{A_x^2 + A_y^2}$
	$A_y = \lvert\vec{A}\rvert \sin\varphi_A$	$\tan\varphi_A = \frac{A_y}{A_x}$

$\vec{R} = \vec{A} + \vec{B}$: $R_x = A_x + B_x$

$R_y = A_y + B_y$

Kinematics (at const. acceleration)



	horizontal	vertical
	$x(t) = x_0 + v_{x0}t + \frac{1}{2}a_x t^2$	$y(t) = y_0 + v_{y0}t + \frac{1}{2}a_y t^2$
$\vec{v} = \frac{d\vec{x}}{dt}$	$v_x(t) = v_{x0} + a_x t$	$v_y(t) = v_{y0} + a_y t$
$\vec{a} = \frac{d\vec{v}}{dt} = \frac{d^2\vec{x}}{dt}$	$a_x = \text{const}$	$a_y = \text{const}$
	$v_x^2(t) = v_0^2 + 2a_x(x - x_0)$	$v_y^2(t) = v_0^2 + 2a_y(y - y_0)$

Newton's laws

I) Either $\vec{v}_{object} = \text{const}$ (incl. $v = 0$) or $\sum \vec{F}$ (on object) $\neq 0$

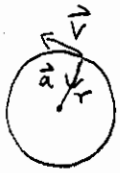
II) $\vec{F} = m\vec{a}$

III) $\vec{F}_{12} = -\vec{F}_{21}$

$1\,N = 1\,kg\,\frac{m}{s^2}$

Circular Motion

$a = \frac{v^2}{r}$



→ study application of Newton's laws to the inclined plane

Gravity: Earth's acceleration: $g = 9.80\,\frac{m}{s^2}$; $\vec{F}_{grav} = m\vec{g}$

Normal force of surface: $\vec{F}_N \perp$ surface