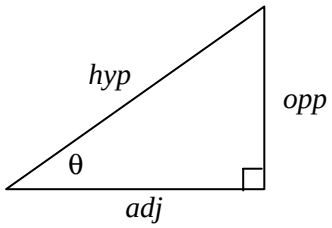
KINEMATICS: PROJECTILE MOTION

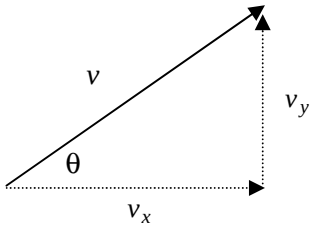
Physics Notes
Chapter 3

Trigonometric Ratios

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$



Vector Diagrams



Resultant Vectors

$$v^2 = v_x^2 + v_y^2$$

$$\theta = \tan^{-1}\left(\frac{\text{opposite}}{\text{adjacent}}\right)$$

Vector Components

$$v_x = v \cdot \cos\theta$$

$$v_y = v \cdot \sin\theta$$

Horizontal Projectile

Horizontal	Vertical
v_x is constant	$v_y = a \cdot t$
$d_x = v_x \cdot t$	$d_y = \frac{1}{2} \cdot a \cdot t^2$
	$t = \sqrt{\frac{2d}{a}}$

Cannonball Projectile

Horizontal	Vertical
$v_x = v \cdot \cos\theta$	$v_y = v \cdot \sin\theta$
$d_x = v_x \cdot t$	$d_y = v_{yi} \cdot t + \frac{1}{2} \cdot a \cdot t^2$
v_x is constant	$v_y = v_{yi} + a \cdot t$

Name	Symbol	Unit	Notes
Time	t	second	
Distance (horizontal)	d_x	meter	*also called range*
Distance (vertical)	d_y	meter	*also called height*
Velocity (horizontal)	v_x	m/s	
Velocity (vertical)	v_y	m/s	
Velocity (resultant)	v	m/s	
Acceleration (gravity)	g	m/s^2	- 9.8 m/s^2
Launch Angle	θ	degrees	