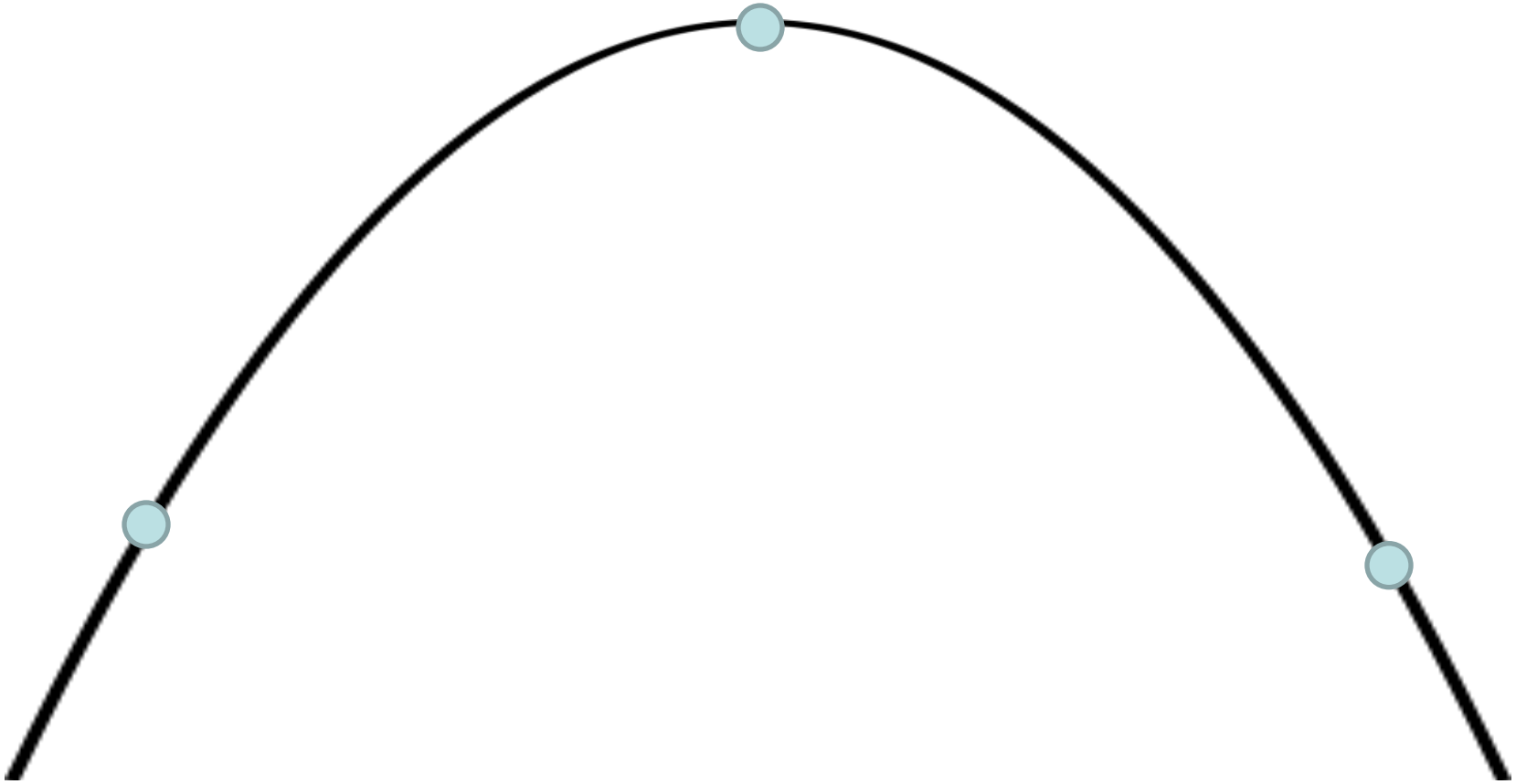
Projectile Motion

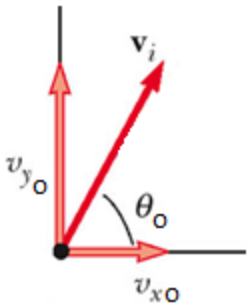


1-D Kinematics

$$x = x_o + v_o t + \frac{1}{2} a t^2$$

$$v_x = v_o + at$$

2-D Kinematics



$$v_{xo} = v_o \cos\theta_o$$

$$v_{yo} = v_o \sin\theta_o$$

$$x = x_o + v_{xo} t + \frac{1}{2} a_x t^2$$

$$v_x = v_{xo} + a_x t$$

$$a_x = 0$$

$$a_y = -g$$

$$y = y_o + v_{yo} t + \frac{1}{2} a_y t^2$$

$$v_y = v_{yo} + a_y t$$

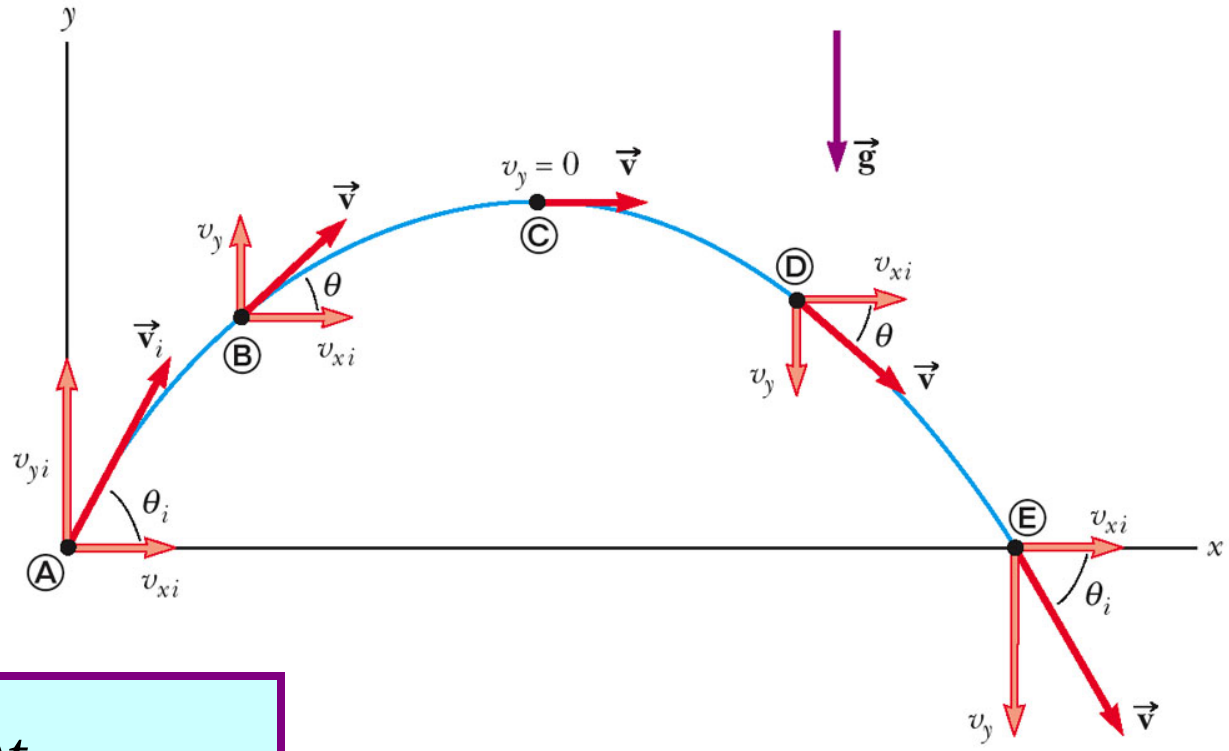
$$x = x_o + v_o(\cos\theta_o)t$$

$$v_x = v_o \cos\theta_o$$

$$y = y_o + (v_o \sin\theta_o)t - \frac{1}{2} g t^2$$

$$v_y = v_o \sin\theta_o - gt$$

Projectile Motion



$$x = x_o + v_o(\cos\theta_o)t$$

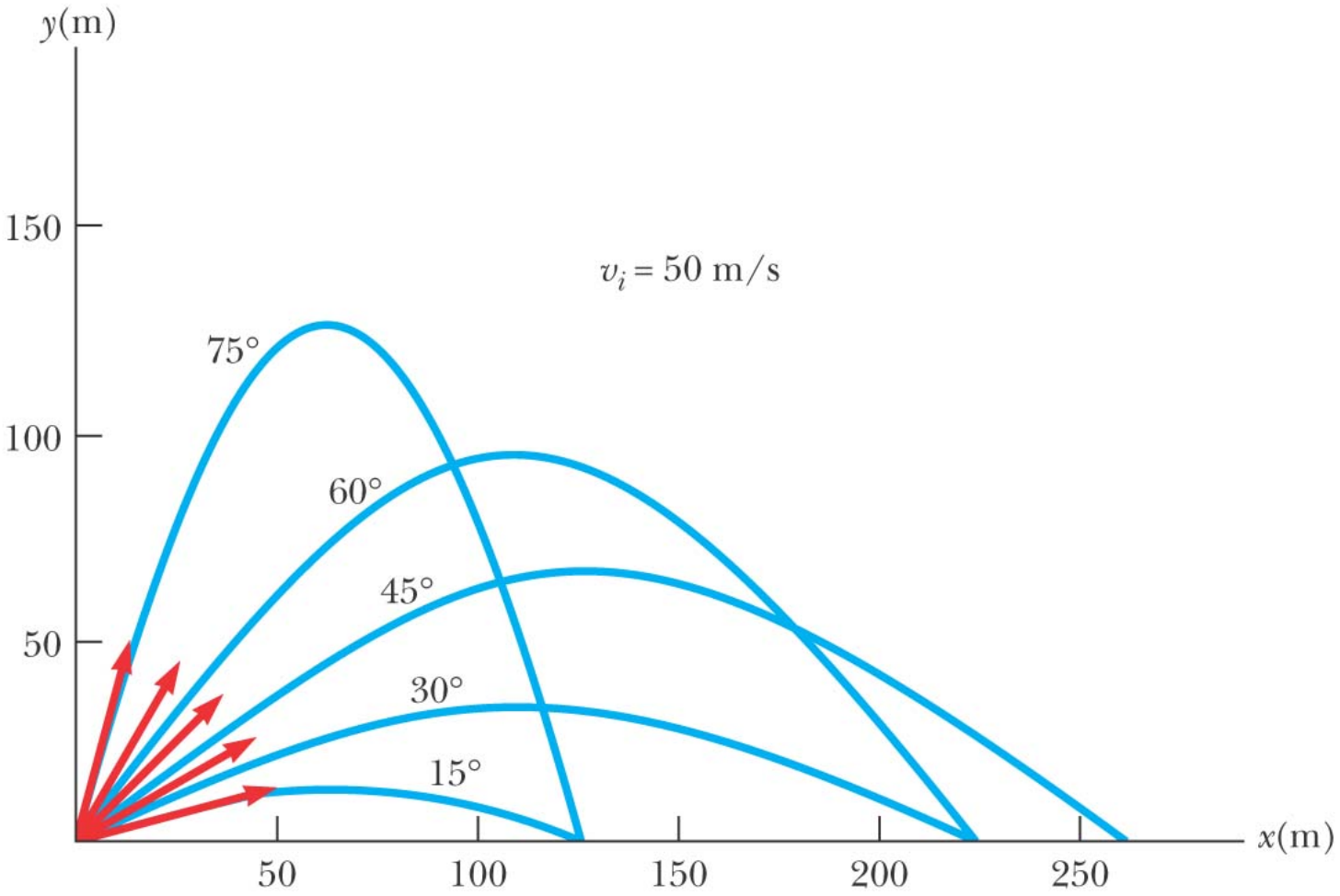
$$v_x = v_o\cos\theta_o$$

$$y = y_o + (v_o\sin\theta_o)t - \frac{1}{2}gt^2$$

$$v_y = v_o\sin\theta_o - gt$$

$$\Delta y = \tan\theta_o\Delta x - \frac{g}{2v_o^2\cos^2\theta_o}(\Delta x)^2$$

Complementary angles will produce the same range



Animations

http://phet.colorado.edu/simulations/sims.php?sim=Projectile_Motion

http://www.walter-fendt.de/ph11e/projectile.htm

http://faraday.physics.utoronto.ca/PVB/Harrison/Flash/ClassMechanics/Relativity/Relativity.html