Derivation of Equation:

1. Starting equation for vertical displacement:

y = y0 + v0y \* t + (½) \* g \* t^2

1. Rearrange the equation:

y = (½) \* g \* t^2 + v0y \* t + y0

Where:

y = Vertical position of grenade at time (t)

g = Acceleration due to gravity

t = Time elapsed since projectile was launched

v0y = initial vertical velocity of projectile

y0 = initial Vertical position of projectile

1. Substitute Variables into equation

PipPosition.y = (1/2) \* gravity \* pipTime \* pipTime + fireVelocity.y \* pipTime + GetPosistion().y

pipPosition = sf::Vector2f(0.0f, gravity / 2.0f) \* pipTime \* pipTime

+ fireVelocity \* pipTime

+ GetPosition();