

Physics I Equations

Equations:

$$R_x = R \cos \theta$$

$$R^2 = R_x^2 + R_y^2$$

$$\bar{v} = \frac{\Delta x}{\Delta t}$$

for constant a:

$$v_x = v_{0x} + a_x t$$

$$v_x^2 = v_{0x}^2 + 2a_x(x - x_0)$$

$$\sum \vec{F} = m\vec{a}$$

$$F_w = mg$$

$$R_y = R \sin \theta$$

$$\theta = \tan^{-1}\left(\frac{R_y}{R_x}\right)$$

$$\bar{a} = \frac{\Delta v}{\Delta t}$$

$$x = x_0 + v_{0x}t + \frac{1}{2}a_x t^2$$

$$\bar{v} = \frac{1}{2}(v_0 + v)$$

$$\vec{F}_{ab} = -\vec{F}_{ba}$$

Constants:

$$g = 9.81 \text{ m/s}^2$$

Metric System:

$$T = 10^{12}$$

$$k = 10^3$$

$$\mu = 10^{-6}$$

$$G = 10^9$$

$$c = 10^{-2}$$

$$n = 10^{-9}$$

$$M = 10^6$$

$$m = 10^{-3}$$

$$p = 10^{-12}$$

1. A train is traveling on a track at 50 km per hour pulls into a station and has to stop in 30m. What must be the deceleration of the train? How long does it take for the train to stop?

2. A rocket is shot at an angle 30.0° from the ground with a velocity of 250 m/s. How long will the rocket be in the air before hitting the ground? How far does it travel? Ignore air resistance and the curvature of the Earth.

3. A person heads out for hike first walking 4km in a direction 45° north of East, then heading 6 km in the direction 10° north of west. If she finishes up walking 2km due south, how far is she from her original starting point?

4. Two friends are trying to pull a barrel of mass 125kg across a room. One friend pushes the barrel with a force of 450N. The other friend pulls the barrel with a force 600N in the same direction but also up at an angle of 30.0° from the ground. What is the acceleration of the barrel across the room?