

Horizontal Projectiles Dart VS Steel

Horizontal Projectiles

Objective:

Use horizontal projectile equations to calculate velocity, distance or time for horizontal projectiles.

Vertical Motion

$$V_y = a \cdot t$$

$$d_y = \frac{1}{2} a \cdot t^2$$

Horizontal Motion

$$V_x \text{ is constant}$$

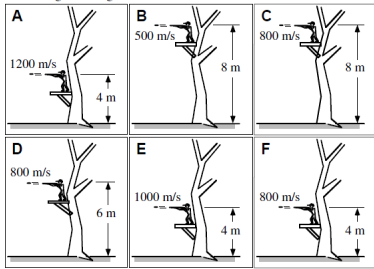
$$d_x = v_x \cdot t$$

Calculate the launch velocity (v_x) of the dart.

$V_y = 5.5 \frac{m}{s}$
 1.5 m
 $V_x = 7.3 \text{ m/s}$
 4.0 m
 $V_x = ?$
 $d_x = 4 \text{ m}$
 $d_y = 1.5 \text{ m}$
 $a = 10 \text{ m/s}^2$
 $d_x = V_x \cdot t$
 $V_x = \frac{d_x}{t} = \frac{4 \text{ m}}{.55 \text{ s}}$
 $V_x = 7.3 \text{ m/s}$
 $V_r = ?$
 $9.1 \frac{m}{s}$
 $d_y = \frac{1}{2} a t^2$
 $1.5 \text{ m} = (\frac{1}{2} 10) t^2$
 $t = .55 \text{ sec}$

RIFLE SHOTS—TIME TO HIT GROUND

Rifles are fired horizontally from platforms at various heights. The bullets fired from these rifles are identical, but they leave the rifle barrels at different speeds as shown in the diagrams. All of the bullets miss their targets and hit the ground. Ignore air resistance in this task.



Students who are asked to rank these situations on the basis of how long it takes the bullets to hit the ground respond as follows:

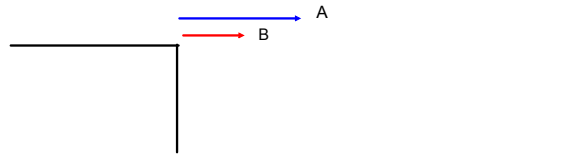
PROJECTILE MOTION FOR TWO ROCKS—VELOCITY AND ACCELERATION GRAPHS I

Two identical rocks are thrown horizontally from a cliff with Rock A having a greater velocity at the instant it is released than Rock B. For this exercise, you should ignore air resistance. Use a coordinate system with up as the positive vertical direction, away from the cliff as the positive horizontal direction, and with the origin at the point of release at the top of the cliff.

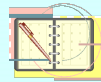
a) Sketch velocity vs. time graphs for each of the rocks.

b) Which rock hits the ground first?

c) Which rock lands farthest from the base of the cliff?



Assignments . . .



- Chapter 2 HW # 23-28

EX.

23a. $V_x = ?$ $V_x = 24 \frac{m}{s}$... is constant!

b. $V_y = at$ $(-10 \frac{m}{s^2})(.86 \text{ s}) = -8.6 \frac{m}{s}$

