

5.2 Projectile Motion

LEARNING TARGETS

5.2 I can interpret, analyze, and calculate the motion of a zero launch angle projectile.

ZERO LAUNCH ANGLE

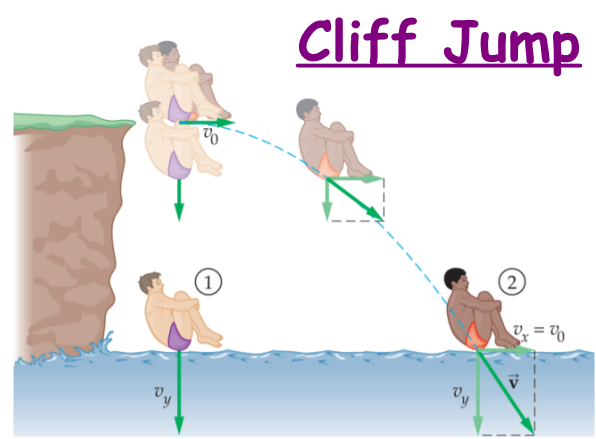
A toy car that is traveling 0.800 m/s runs off the edge of a table that is 1.225 m high.

a) How far from the base of the table will the car land?

$x_f = ?$
 $x_0 = 0$
 $v_{0x} = 0.800 \text{ m/s}$
 $a_x = 0$
 $y_f = 1.225 \text{ m}$
 $y_0 = 0$
 $v_{0y} = 0$
 $a_y = 9.8 \text{ m/s}^2$

$x_f = x_0 + v_{0x}t + \frac{1}{2}a_x t^2$
 $x_f = v_{0x}t$
 $x_f = (0.8 \text{ m/s})(0.5 \text{ s})$
 $x_f = 0.4 \text{ m}$

$y_f = y_0 + v_{0y}t + \frac{1}{2}a_y t^2$
 $y_f = \frac{1}{2}a_y t^2$
 $\sqrt{\frac{2y_f}{a_y}} = t$
 $t = 0.5 \text{ s}$



ZERO LAUNCH ANGLE

A toy car that is traveling 0.800 m/s runs off the edge of a table that is 1.225 m high.

a) How fast will the car be traveling on impact?

$a_y = 9.8 \text{ m/s}^2$
 $v_{0y} = 0$
 $y_f = 1.225 \text{ m}$
 $v_{0x} = 0.800 \text{ m/s}$
 $a_x = 0$
 $v_{0x} = 0.800 \text{ m/s}$
 $v_{fy} = 4.9 \text{ m/s}$

$v_{fy} = v_{0y} + a_y t$
 $v_{fy}^2 = v_{0y}^2 + 2a_y(y_f - y_0)$
 $v_{fy} = \sqrt{2a_y y_f} = 4.9 \text{ m/s}$

$v_f = \sqrt{v_{fx}^2 + v_{fy}^2} = \sqrt{0.8^2 + 4.9^2}$
 $v_f = 4.96 \text{ m/s}$