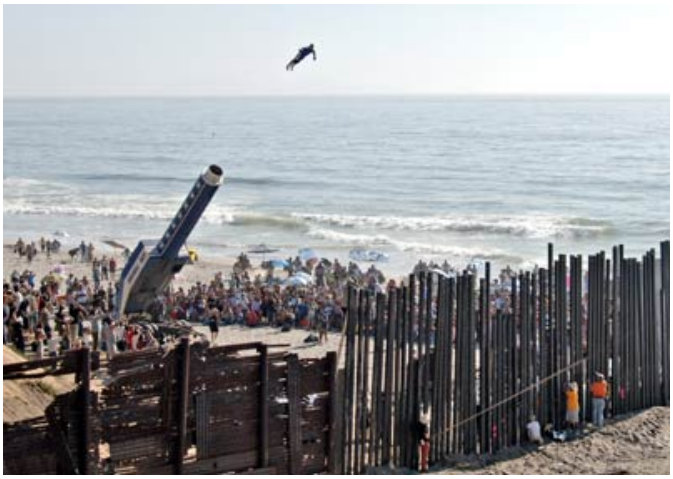
*Check homework

Projectiles

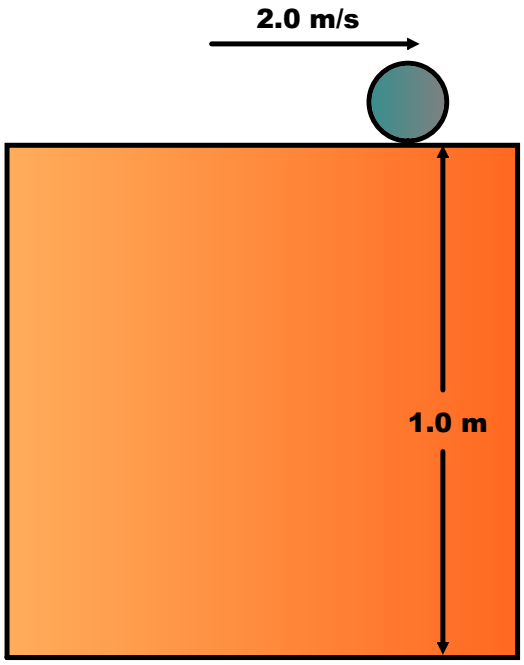
A projectile is any object which is thrown or dropped near the earth's surface.

Projectiles are a combination of two types of motion:
UNIFORM in the x-direction and FREEFALL (acceleration) in the y direction

http://www.youtube.com/watch?v=vBvUBQWK0w4



Ex.1 What type of motion does the ball have as it travels across the desktop?



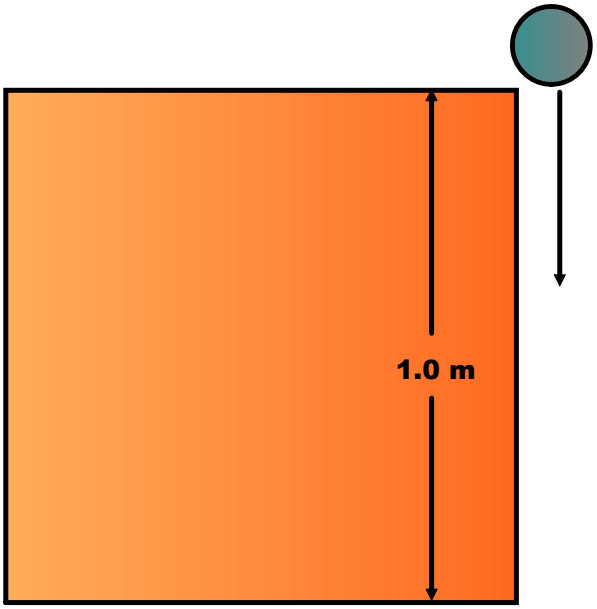
Uniform Motion

Therefore the formula

$d_x = v_x \times t$ applies

What type of motion would this ball have as it falls?

A. Uniform
B. Accelerated



Accelerated Motion

Therefore the following formulas apply:

$d = v_1 t + 1/2\, a t^2$ [no v_f]

$d = v_2 t - 1/2 a t^2$ [no v_i]

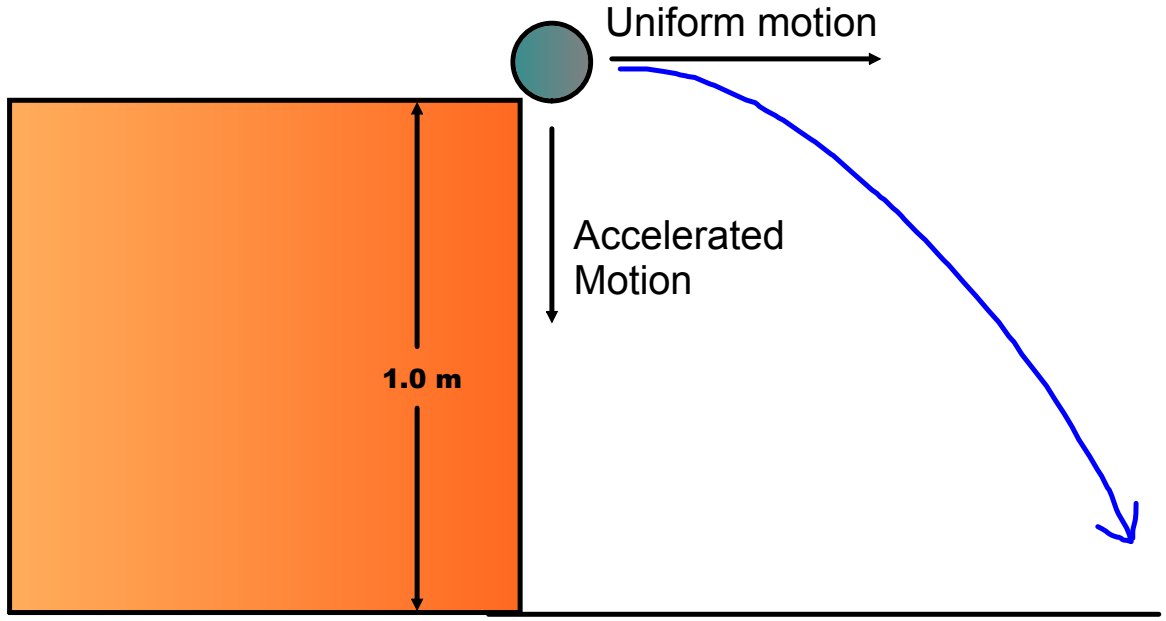
$v_2^2 = v_i^2 + 2ad$ [no t]

$d = \frac{v_1 + v_2}{2} t$ [no a]

$v_2 = v_1 + at$ [no d]

$a_y = -9.80\ m/s^2$

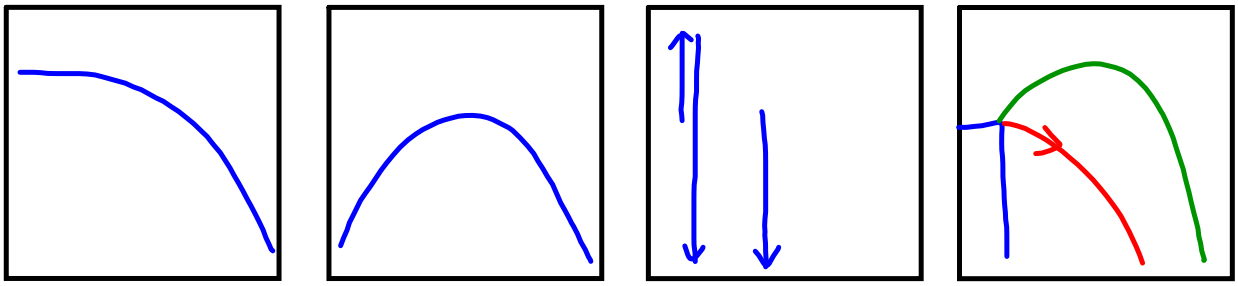
Projectile Motion has both Uniform and Accelerated components to its motion. **Uniform in the horizontal** dimension and **accelerated in the vertical** dimension.



Key assumptions:

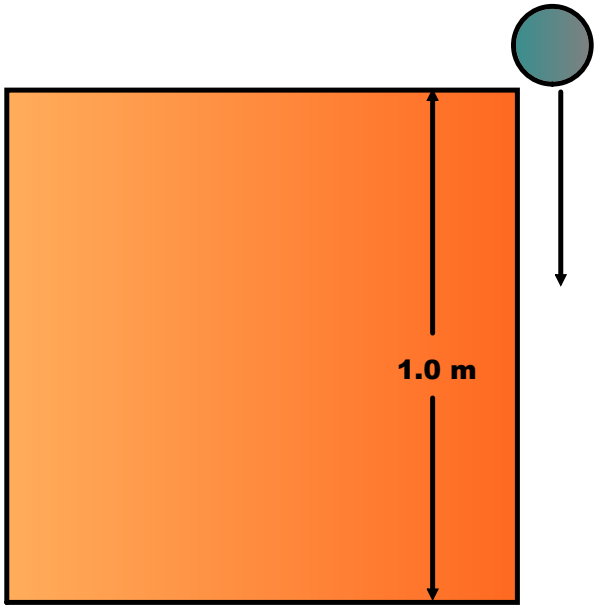
1. Neglect air resistance
2. uniform motion in x (a_x=0)
3. acceleration in y = - 9.80 m/s^2
4. The only force acting on a projectile is F_g
5. "x" and "y" information MUST be kept separate

Examples of trajectories (paths) of some projectiles

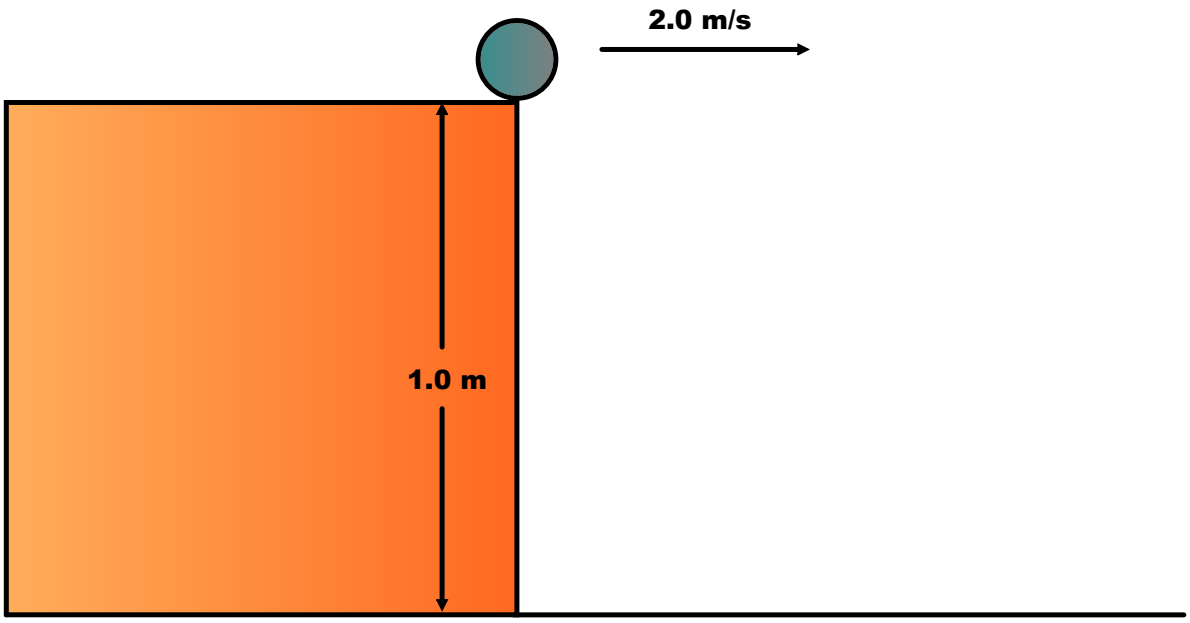


Free body diagram of each?

How long does it take for this ball to hit the floor?



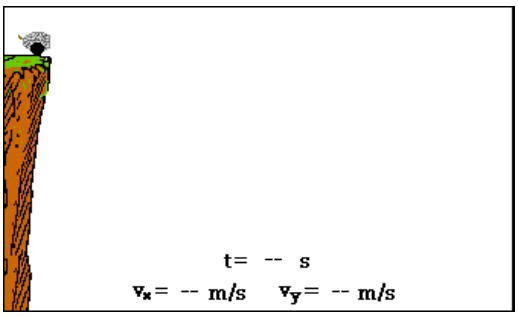
How far does the ball travel to the right while it is falling?
(ie What is the ball's range?)



Ex 2: A projectile rolls horizontally off a 12.0 m high ledge with an initial velocity of $v_x = 2.5$ m/s.

a) Sketch the trajectory (path) of the projectile.

b) Sketch the velocity vectors of the projectile at 3 points in its path.



http://www.glenbrook.k12.il.us/gbssci/Phys/mmedia/vectors/hlp.html

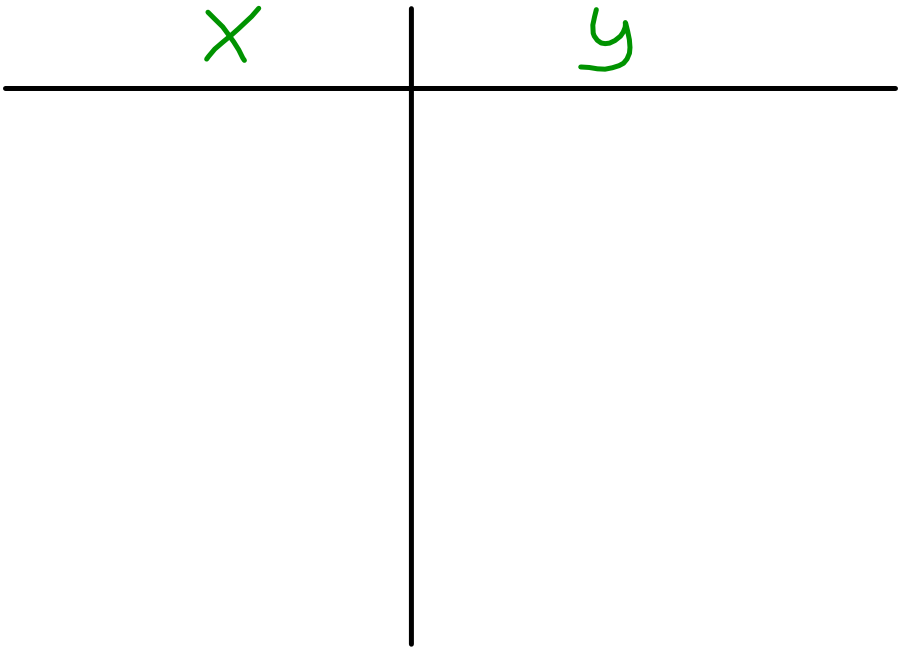
http://www.glenbrook.k12.il.us/gbssci/Phys/mmedia/vectors/mzng.html

http://www.glenbrook.k12.il.us/gbssci/Phys/Class/vectors/u3l2a.html

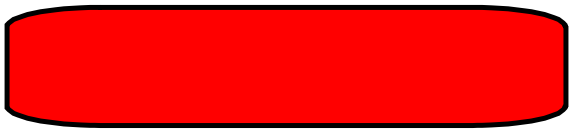
c) Sketch the acceleration vectors of the projectile at 3 points in its path.

d) Calculate the range (max horizontal displacement) of the projectile?

2. Givens (Keep the x and y in separate columns)

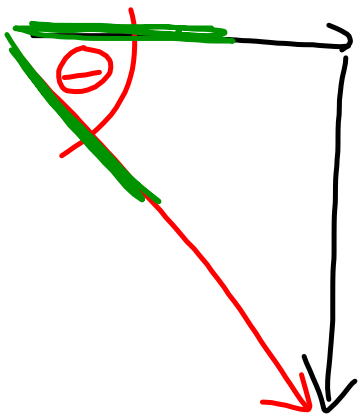


e) Find the velocity (magnitude and direction) at t = 0.930 s



Ex.3 A ball is thrown horizontally from a rooftop 50.0m high and lands 45m from the base. What was the ball's initial speed?

What is the ball's final velocity?



– SqF.