

**Minds on: (in pairs)** \_\_\_\_\_ **Names:** \_\_\_\_\_.

**Part a:**

- Use a metre stick and measure a distance between 2m and the ceiling. Record the height that you have measured.
- Report your height to the front of the class (for teacher's records)
- Drop a pencil, pen, or marble from that height to the ground and measure the time it takes to strike the floor. Record the value
- Repeat the experiment 10x and calculate and **record the average time**
- From the same height, throw the object forward (not up or down) and measure the time it takes to hit the ground. Have a member of your group prepared to catch the falling object so it does not hurt anyone.
- Repeat your measurement for the throwing procedure and calculate and **record the average**
- Return all of your apparatus to where you collected it

Sit down with your group;

-calculate the time you believe the object should have taken to hit the ground in each scenario, using your understanding of the 5 equations of accelerated motion

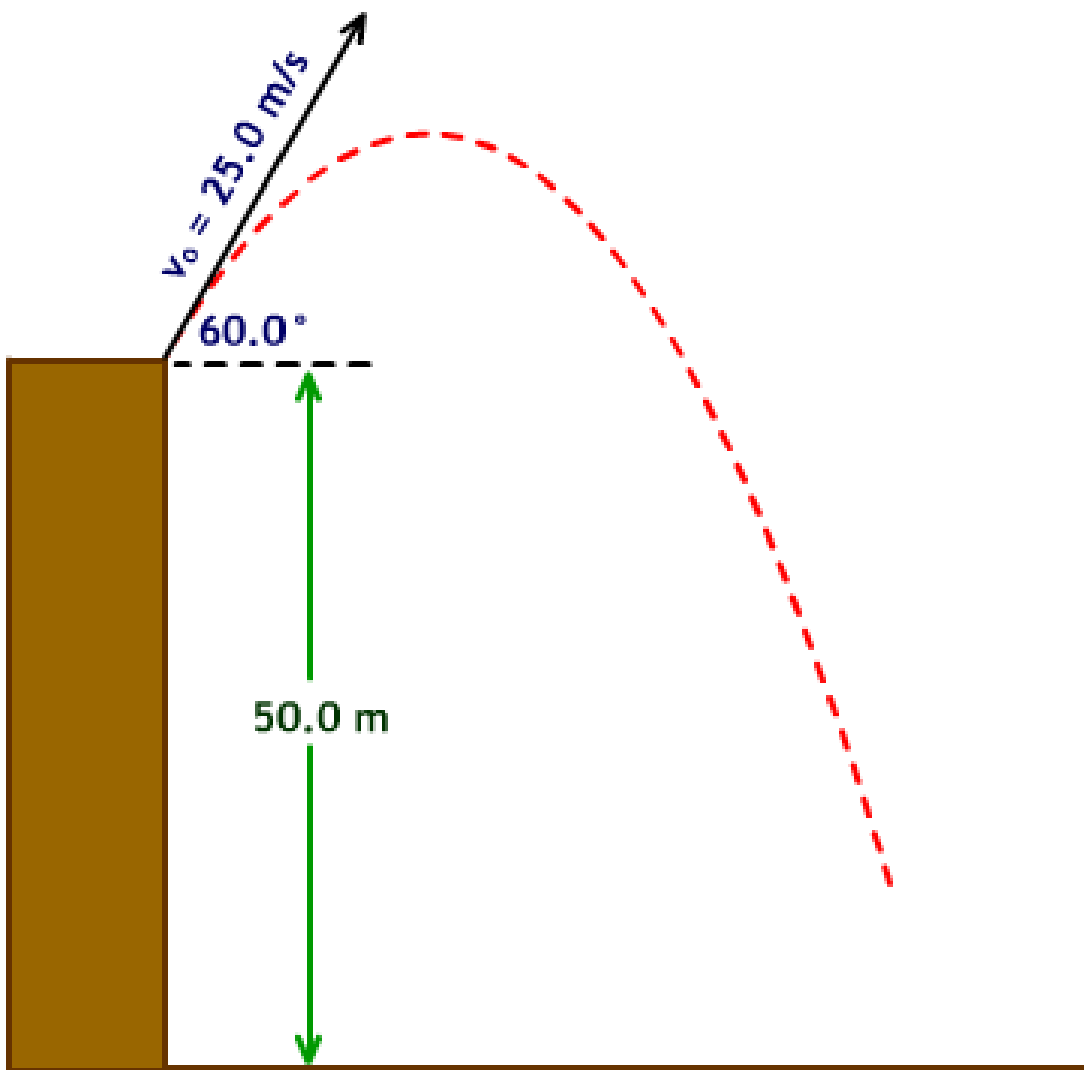
-Report the following to your teacher;

measured time to fall straight down:	
calculated time to fall straight down:	
measured time to fall to the ground from throw:	
calculated time to fall to the ground from throw:	
names of the members of your group:	

**Thinking question: how could you use a tall cliff of a known height and a stopwatch to measure the velocity of an athlete's throw?**

## Projectile Motion

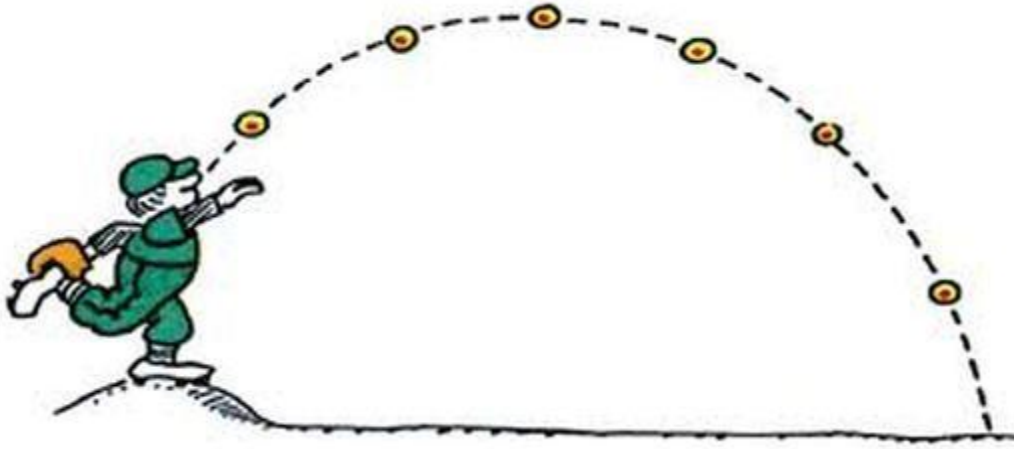
Throw something! You just witnessed projectile motion.



A projectile is an object that moves along a two-dimensional curve as a result of gravity.

Looking at the diagram of a projectile, above, what is the name of the shape of the path travelled by a projectile?

In what two dimensions does the projectile move?

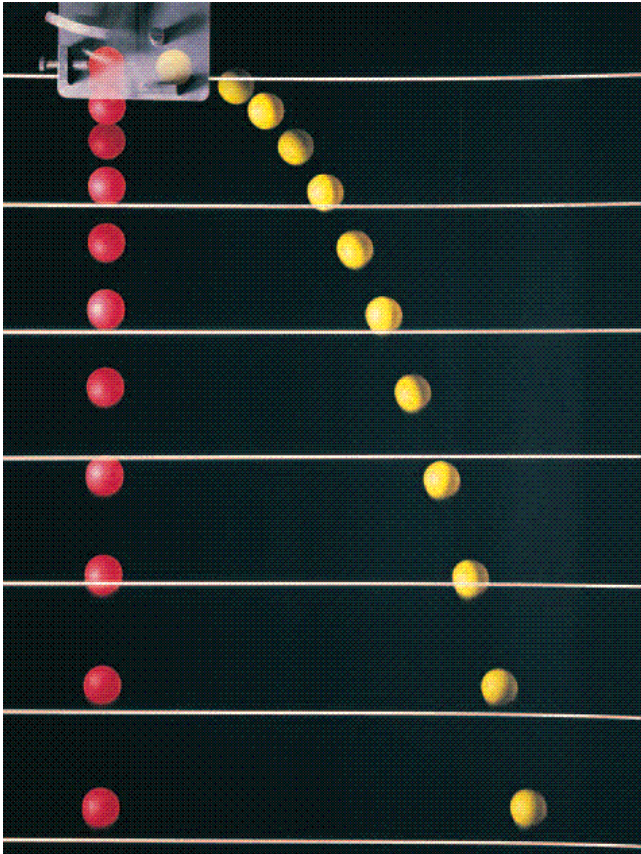


Do you know of any acceleration taking place during this motion?  
What is the value of this acceleration?

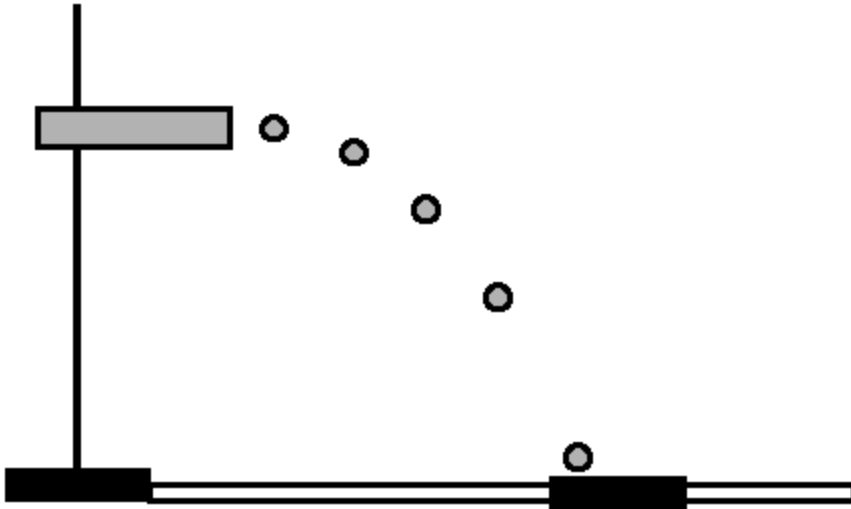
Which dimension will the acceleration work in?

Describe the motion of a projectile in the other dimension:

If a ball were thrown horizontally out a window, and a ball were dropped out the same window at the same time, which ball would hit the ground first?



A cannon launches a ball horizontally off a cliff;



If the cliff were 80m high, how long would it take for the ball to hit the ground?

If the cannon shoots the ball at a velocity of 35m/s [W] then how far would the cannon ball travel before it lands on the ground?

A pencil rolls off a desk, which was 1.25m high. It lands 0.1m away from the base of the desk. How much horizontal (rolling) velocity did the pencil have before it fell off the desk?

Calculate the total speed of the pencil before it hit the floor.

HW: page 81, #2, 5, 8(use 0 degrees for this question)