

M 9 Sep  
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# Motion - I - Vocabulary

## Vocabulary

- Position - where it is

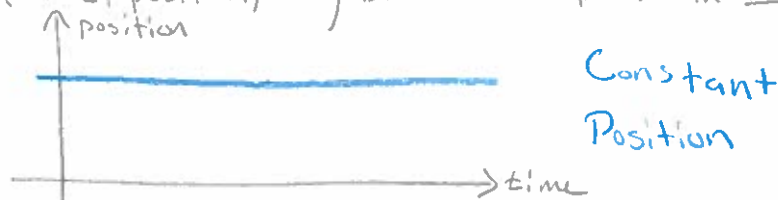
+ Units are meters (m)

+ Examples • Nose  $\rightarrow$  Fingers is 1m

• JC  $\rightarrow$  Ikeja (Kc) is 200 Km

+ Egn • (time, position)  $\rightarrow$  just like a point in Math

+ Graph



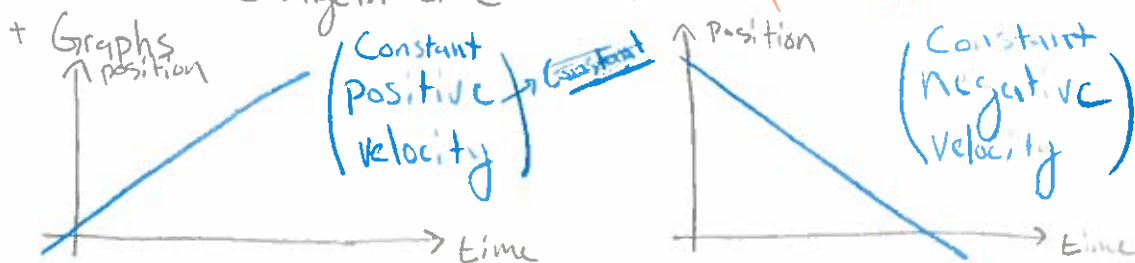
- Velocity - speed  $\pm$  direction - How fast  $\pm$  which way

+ units are meters per second m/s

+ Examples • Walking  $\approx$  1m/s, Fastest Runner  $\approx$  10m/s

+ Egn •  $\frac{\text{Change in Position}}{\text{Change in time}} = \frac{\Delta P}{\Delta t}$  (Change in =  $\Delta$ )

+ Graphs



- Acceleration - change in velocity  $\rightarrow$  (Change in speed or change in direction)

+ units are (m/s<sup>2</sup>) meters/second<sup>2</sup>

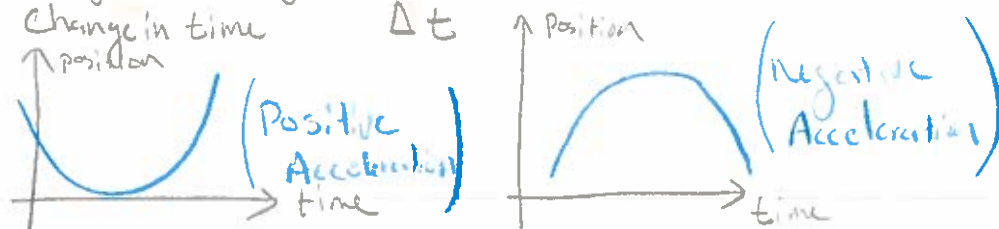
+ Examples are

• Gravity is 10 m/s<sup>2</sup>

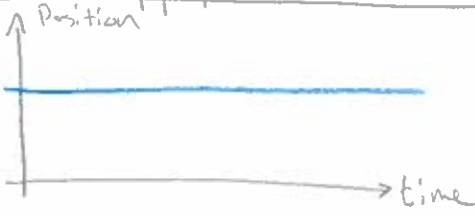
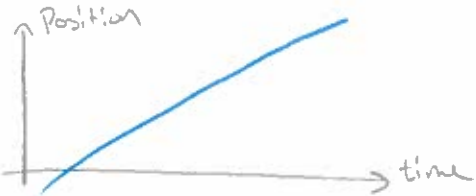
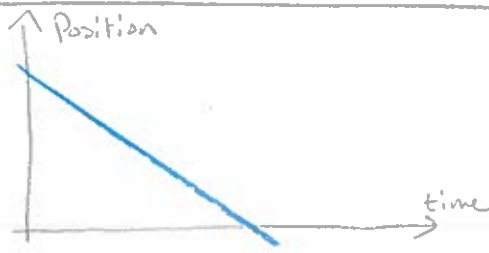
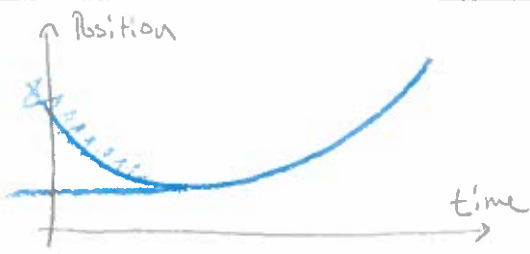
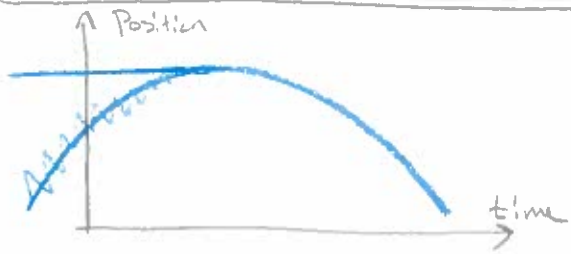
• Avg car  $\approx$  4 m/s<sup>2</sup>

+ Egn:  $\frac{\text{Change in Velocity}}{\text{Change in time}} = \frac{\Delta V}{\Delta t}$

+ Graphs

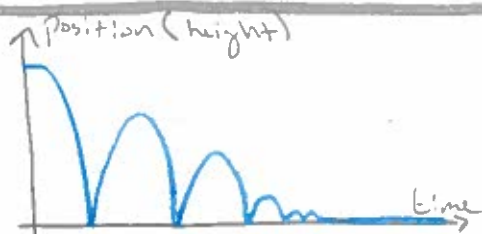


# Motion-2 - Graph Matching

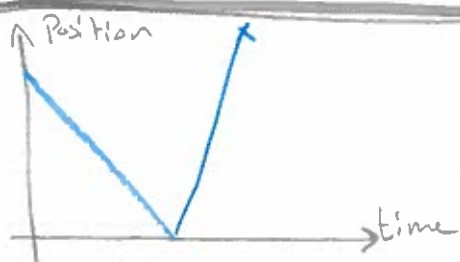
Graph	Description
 <p>A graph with 'Position' on the vertical axis and 'time' on the horizontal axis. A horizontal blue line is drawn at a constant positive position value.</p>	Constant distance From the sensor
 <p>A graph with 'Position' on the vertical axis and 'time' on the horizontal axis. A straight blue line starts from a negative position value and increases linearly with a constant positive slope.</p>	Constant <u>speed</u> <u>away</u> from the sensor.
 <p>A graph with 'Position' on the vertical axis and 'time' on the horizontal axis. A straight blue line starts from a positive position value and decreases linearly with a constant negative slope, crossing the time axis.</p>	Constant speed toward the sensor
 <p>A graph with 'Position' on the vertical axis and 'time' on the horizontal axis. A blue curve starts at a high positive position, decreases to a minimum, and then increases, forming a U-shape. A dashed line is also shown for the initial decreasing part of the curve.</p>	Move away faster & faster (positive acceleration)
 <p>A graph with 'Position' on the vertical axis and 'time' on the horizontal axis. A blue curve starts at a low negative position, increases to a maximum, and then decreases, forming an inverted U-shape. A dashed line is also shown for the initial increasing part of the curve.</p>	Move toward faster & faster (negative acceleration)

+ Graph Matching - Each member match a graph using their body

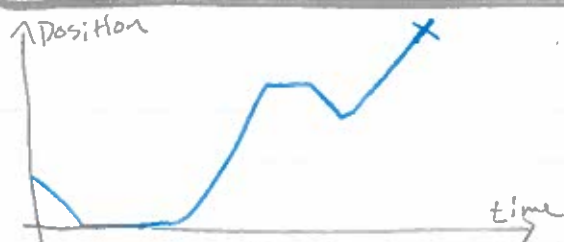
# Motion 3 - Sketching Motion



A bouncing ball.



A baseball thrown by a pitcher & hit faster by a batter.



- Football snapped to QB

- Wait for receiver

- throw

- Caught

- Go back to avoid sack

- Run it to the end zone!

# Motion 4 - Calculations

- Dropped ball -

I drop a ball from 3m and it takes 1 second

$$(0s, 3m) \rightarrow (1s, 0m)$$

$$\text{Velocity} - \frac{\Delta P}{\Delta t} = \frac{0m - 3m}{1s - 0s} = \frac{-3m}{1s} = \boxed{-3m/s}$$

$$\text{Acceleration} - \frac{\Delta V}{\Delta t} = \frac{-3m/s - 0m/s}{1s - 0s} = \frac{-3m/s}{1s} = \boxed{-3m/s^2}$$

- Rocket Take off -

Goes from 0m/s to 90m/s in 3 seconds

$$\text{Acc.} - \frac{\Delta V}{\Delta t} = \frac{90m/s - 0m/s}{3s - 0s} = \frac{90m/s}{3s} = 30m/s^2$$

- Car - 10m/s to 30m/s in 4 seconds

$$\text{Acceleration: } \frac{\Delta V}{\Delta t} = \frac{30m/s - 10m/s}{4s - 0s} = \frac{20m/s}{4s} = 5m/s^2$$

- Who is Fastest -



$$me = \frac{100m}{10s} = 10m/s$$

$$You = \frac{100m}{20s} = 5m/s$$

$$Fred = \frac{100m}{25s} = 4m/s$$