



Speed/Acceleration

Tech Ed

Speed – a measure of how fast something is moving

- Instantaneous Speed: How fast something is moving at any specific time.
- Average Speed: Combination of different speeds traveled during a period of time.

$$\text{Speed} = \frac{\text{Total distance traveled}}{\text{Time taken}}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Acceleration

- Acceleration is the process of changing how fast something is moving. (positive or negative)
- Velocity = Speed and direction

$$\vec{a} = \frac{\text{Change in Velocity}}{\text{Change in Time}} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{v}_f - \vec{v}_i}{t_f - t_i}$$

Full Track = 23'

Short Track = 1'



Fastest CAD Maglev (Full Track)

- Track = 23'
- Fastest time ever = 1.45 sec
- Speed = 23'/1.45sec = 15.86 feet per second
- 15.86 x 60 seconds = 951.6 feet per minute
- 951.6 x 60 minutes = 57,103.45 feet per hour
- 57,103.45/5,280 = 10.82 miles per hour.

$$\text{Speed} = \frac{\text{Total distance traveled}}{\text{Time taken}}$$

Fastest CAD Maglev (Short)

- Short – 1'
- Fastest time ever - .049 sec
- Speed = 1'/0.049sec = 20.408 feet per second
- 20.408 x 60 seconds = 1,224.48
- 1,224.48 x 60 minutes = 73,469.39 feet per hour
- 73,469.39/5,280' = 13.91 miles per hour
- This is such a short distance at the end of the track we will use this as a final velocity (speed).

$$\text{Speed} = \frac{\text{Total distance traveled}}{\text{Time taken}}$$

Acceleration

- Acceleration is the process of changing velocity (speed). (positive or negative)

$$\vec{a} = \frac{\text{Change in Velocity}}{\text{Change in Time}} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{v}_f - \vec{v}_i}{t_f - t_i}$$

Acceleration Fastest Maglev

- Final Velocity = 13.91 mph
- Initial Velocity = 0 mph
- Time = 1.45 seconds
- $13.91 \text{ MPH} - 0 \text{ MPH} / 1.45 \text{ seconds} = \underline{9.59 \text{ miles per hour per second}}$
- This means that the car gained 9.59 MPH every second.

Information

- Full Track = 23'
- Short Track = 1'
- Short Track avg. speed = Final Velocity
- 5,280' = 1 Mile
- 60 Minutes = 1 Hour
- 60 Seconds = 1 Minute

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\vec{a} = \frac{\text{Change in Velocity}}{\text{Change in Time}} = \frac{\Delta \vec{v}}{\Delta t} = \frac{\vec{v}_f - \vec{v}_i}{t_f - t_i}$$

Mr. Goubeaux Example

$$\text{Speed} = \frac{\text{Total distance traveled}}{\text{Time taken}}$$

- Part 1

- $25/30 = .833$ miles per minute
- $.833 \times 60 = 49.98$ miles per hour

- Part 2

- $60\text{mph} = 25 \text{ miles} / \text{Time}$
- $25 \text{ miles} / 60\text{mph} = .416$ hours
- $= 25 \text{ min}$

- Part 3

- This crazy increase of speed only helps Mr. G arrive to school 5min faster. It is not worth trying to go that fast!

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$