

# **Motion**

**Mr. Skirbst**

**Weekly Challenge:** *A train is travelling from north to south. However, there are parts of the train that are always moving from south to north. What are they?*



## **Galileo Galilei**

February 15, 1564 – January 8, 1642

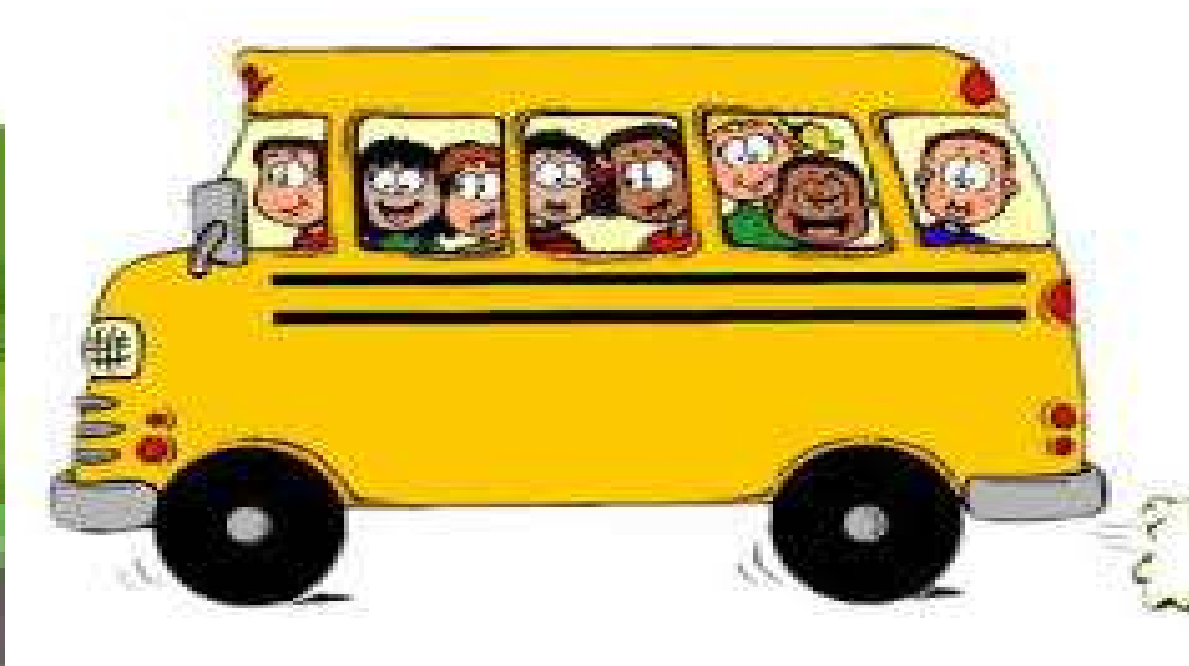
He was an Italian physicist significant in the scientific revolution of the Renaissance. He is credited with being the **first to measure speed** by defining it as the distance over time.

# Frame of reference

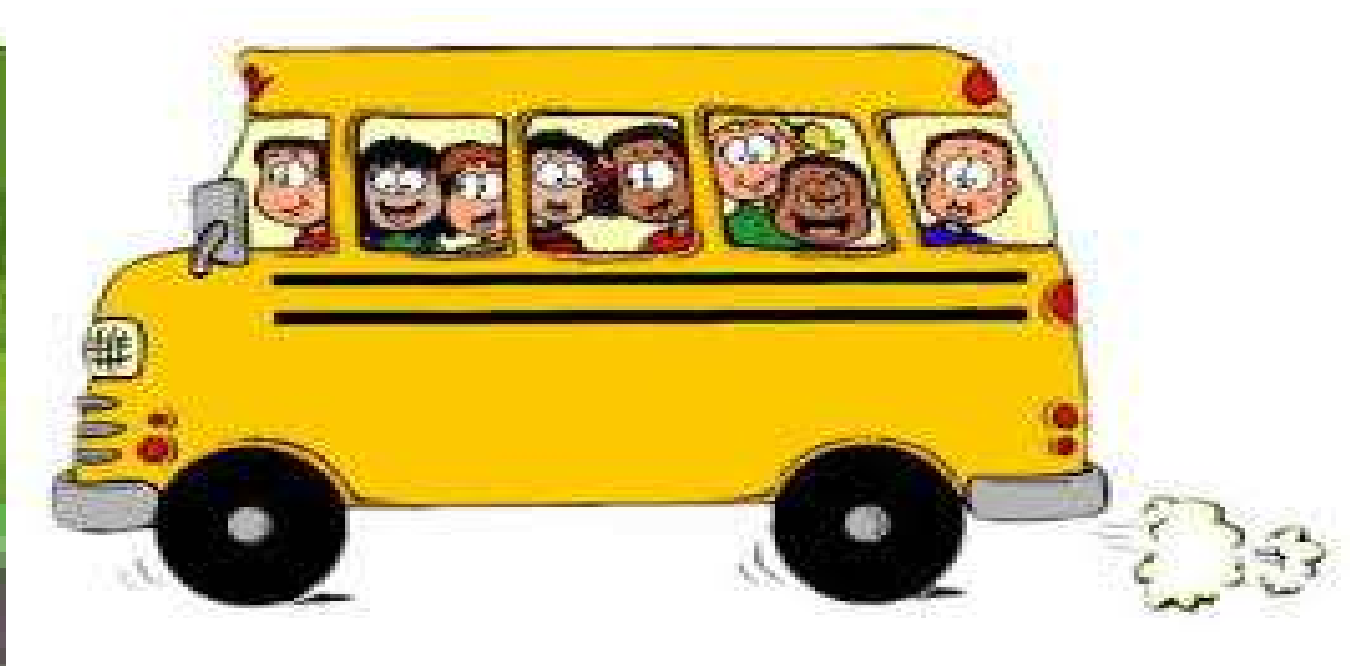
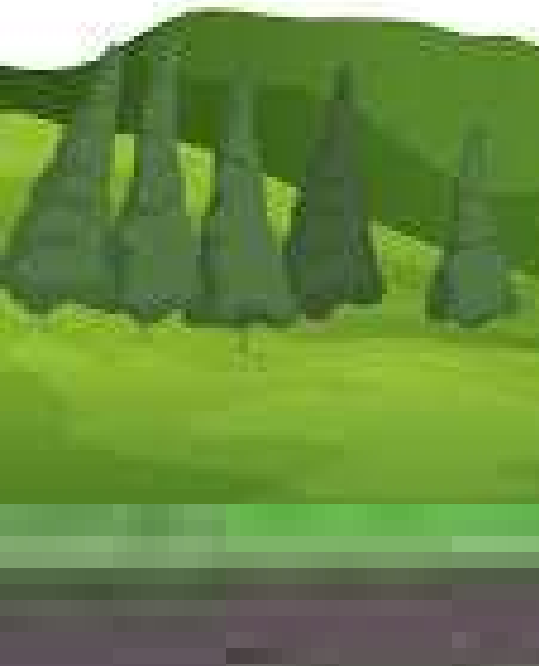
# Frame of reference

**Object or background  
with which movement  
is compared**

# Frame of reference



# Frame of reference



# Frame of reference



# Frame of reference





# What is motion?



# What is motion?



# What is motion?



# What is motion?



# What is motion?



# What is motion?



# What is motion?



# What is motion?





# What is motion?



# Motion

**change in position over a  
period of time**

# Motion

a change in position

motion is

over

a period of time

# Motion

$$\text{motion} = \frac{\text{distance}}{\text{time}}$$

# Motion

motion =



distance

-----



time

# **SPEED:**

**rate at which an object moves**

**SPEED:**



**SPEED:**



*miles per hour*



# **SPEED:**



*miles per hour*

*distance per time*

# **SPEED:**



*miles per hour*

*distance per time*

*distance divided by time*

# SPEED:



*miles per hour*

*distance per time*

*distance divided by time*

***Speed = distance / time***

# **SPEED:**

**rate** at which an object moves

$$S = d / t$$

**S = speed; d = distance; t = time**

# SPEED:

$$S = d / t$$

$S = \text{speed}; d = \text{distance}; t = \text{time}$

**Constant speed – does NOT change over time**

**Average speed = TOTAL distance / TOTAL time**

***Example:***

**If an object moves \_\_\_\_\_ meters in \_\_\_\_\_ sec,  
What is its speed?**

***Example:***

**If an object moves 10 meters in 5 sec,  
What is its speed?**

# VELOCITY





# VELOCITY

*speed in a given direction*

Ex. 10 km/hr **east**

# ACCELERATION

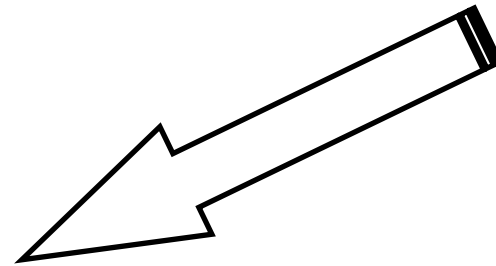


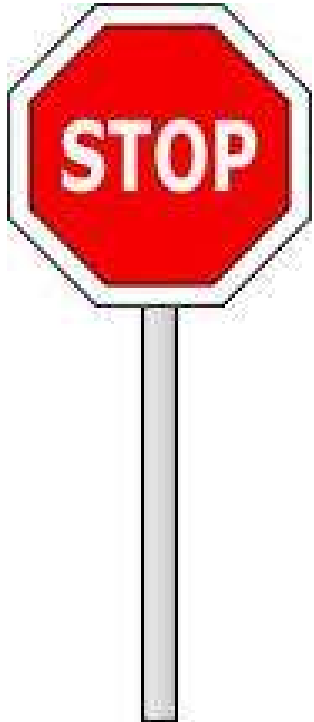
# ACCELERATION



# ACCELERATION

Rate of change in velocity





# **ACCELERATION**

**is the rate of change in velocity**

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**is the rate of change in velocity**

**A =**



# ACCELERATION

*is the rate of change in velocity*

**A =**

# ACCELERATION

*is the rate of change in velocity*

$$A = \text{velocity}_{\text{final}} - \text{velocity}_{\text{original}}$$

# ACCELERATION

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$$A = \text{velocity}_{\text{final}} - \text{velocity}_{\text{original}}$$

# ACCELERATION

*is the rate of change in velocity*

$$A = \frac{\text{velocity}_{\text{final}} - \text{velocity}_{\text{original}}}{\text{time}}$$

# ACCELERATION

Rate of change in velocity

$$A = ( V_f - V_o ) / t$$

**A = acceleration**

**V<sub>f</sub> = final velocity**

**V<sub>o</sub> = original velocity**

**t = time**

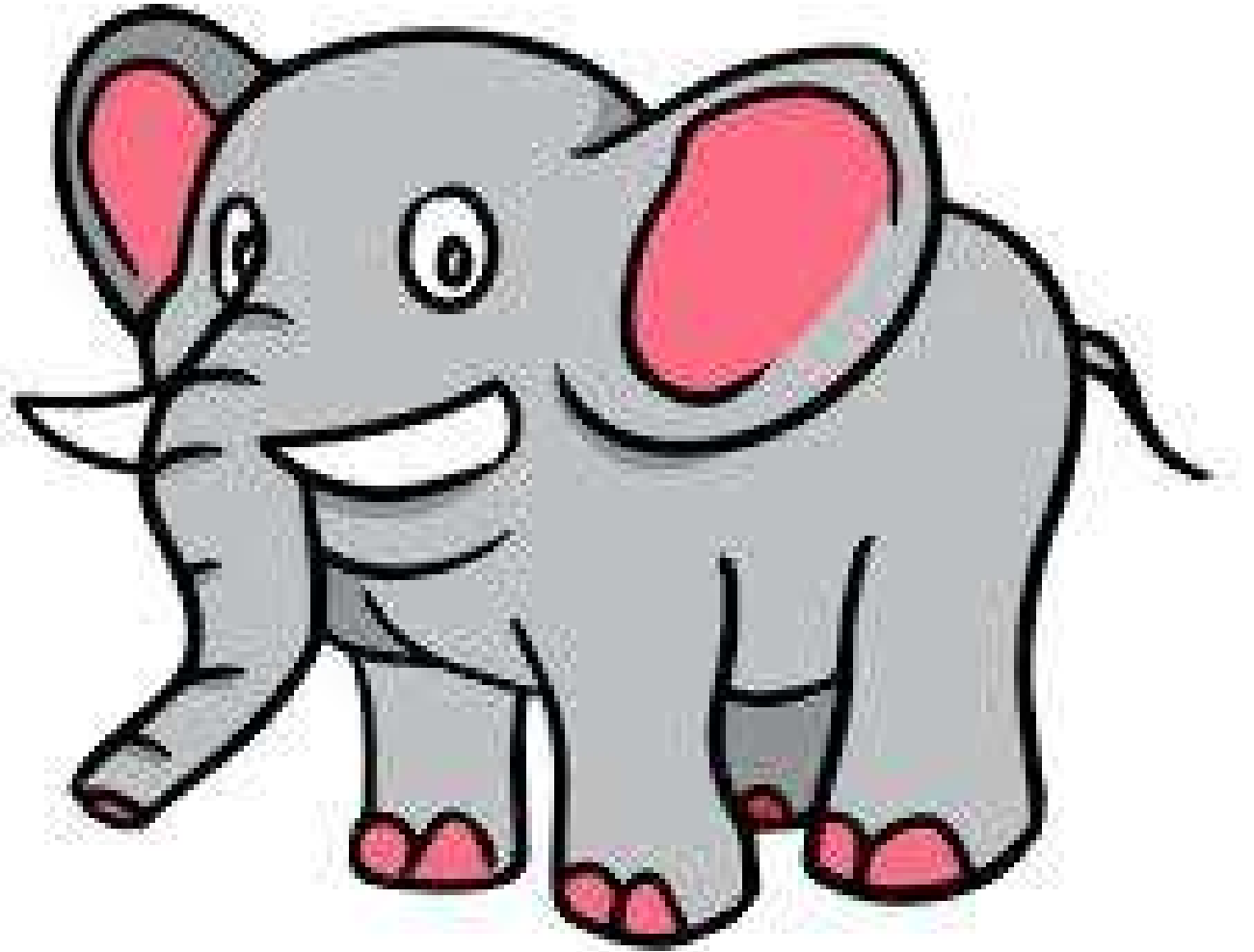
**Example:**

**A car is able to reach 100 km/hr (east) in 5 seconds from a starting line. What is its acceleration?**

# MOMENTUM

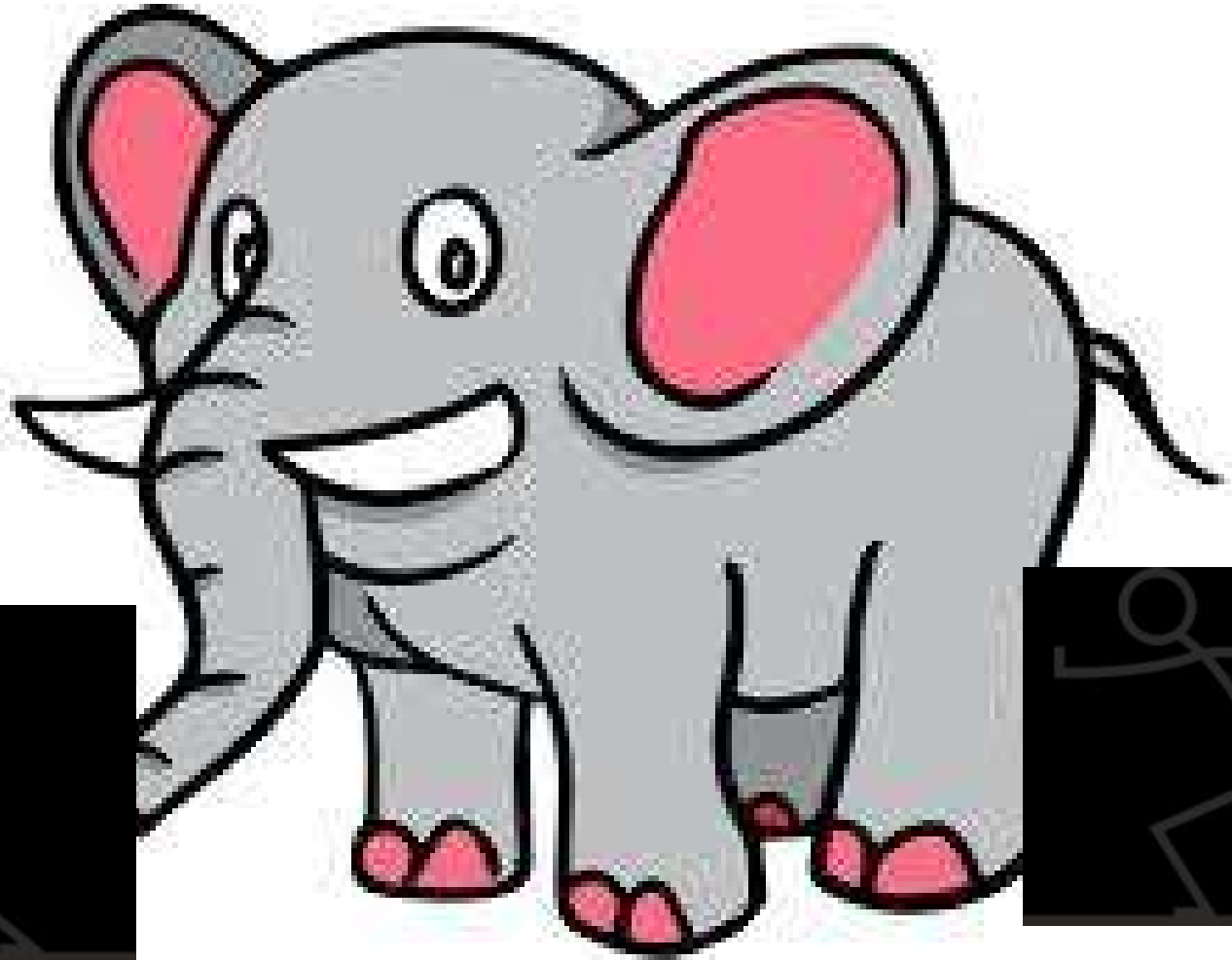


# MOMENTUM





# MOMENTUM

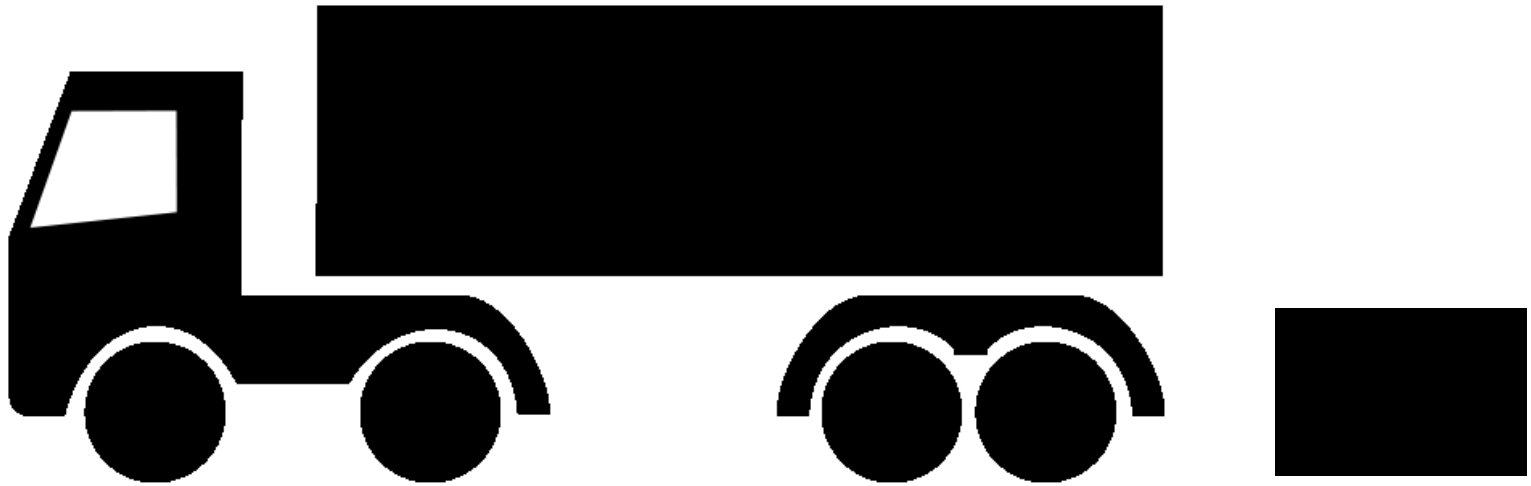


# **MOMENTUM**

**how difficult it is to start  
or stop an object**

# MOMENTUM

**how difficult it is to start  
or stop an object**



# MOMENTUM

how difficult it is to start  
or stop an object



# MOMENTUM

how difficult it is to start  
or stop an object

$$M = (m) (v)$$

**M = momentum**

**m = mass**

**v = velocity**

**Example:**

**A truck has a mass of 10,000 kg and is moving at a velocity of 100 km/hr.**

**What is its momentum?**

# LAB

Timekeeper

Driver

Recorder

Calculator

