

# Kinematics



# Galileo Galilei

Italian astronomer,  
physicist and  
engineer  
(1564 - 1642)

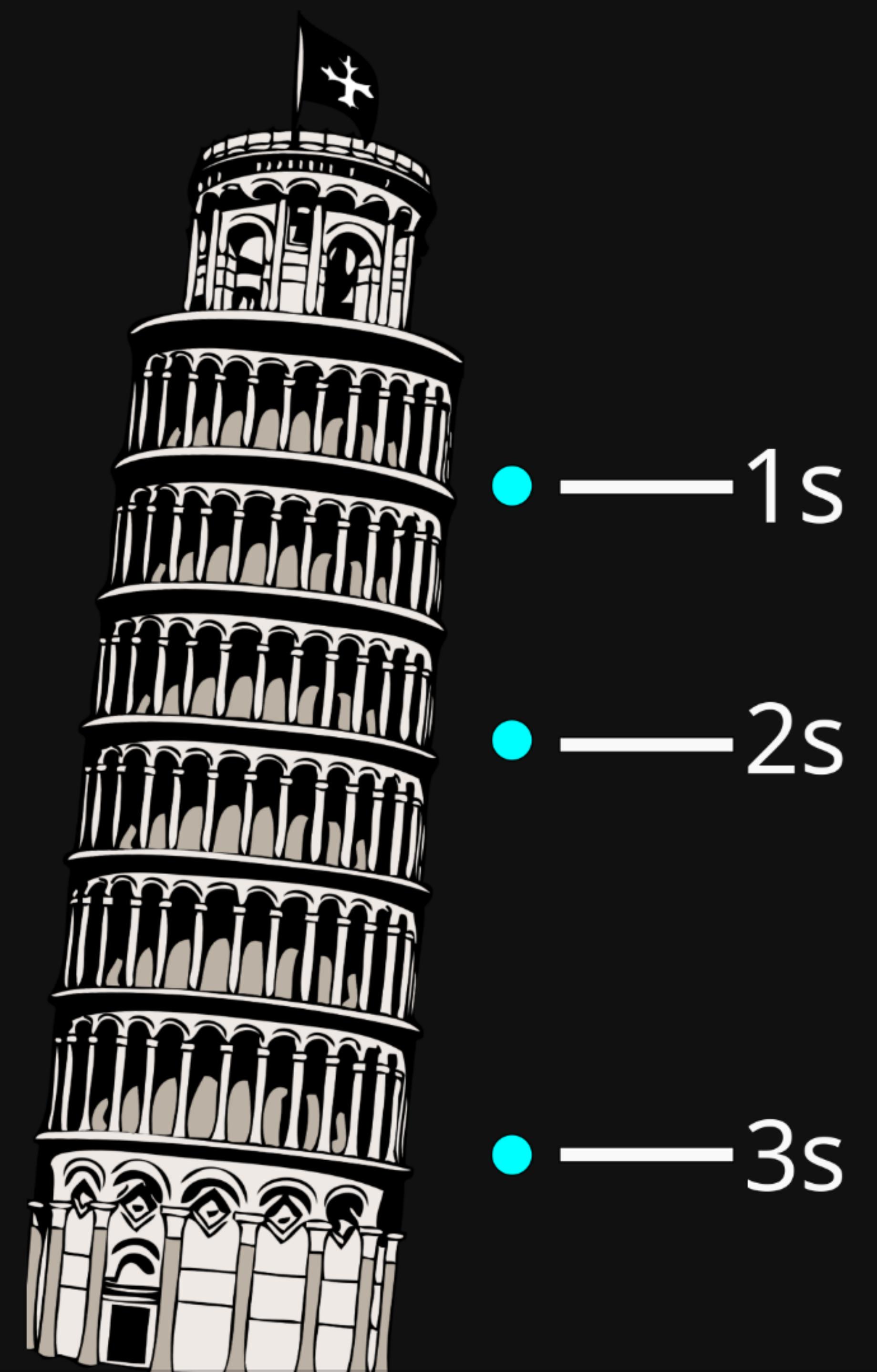


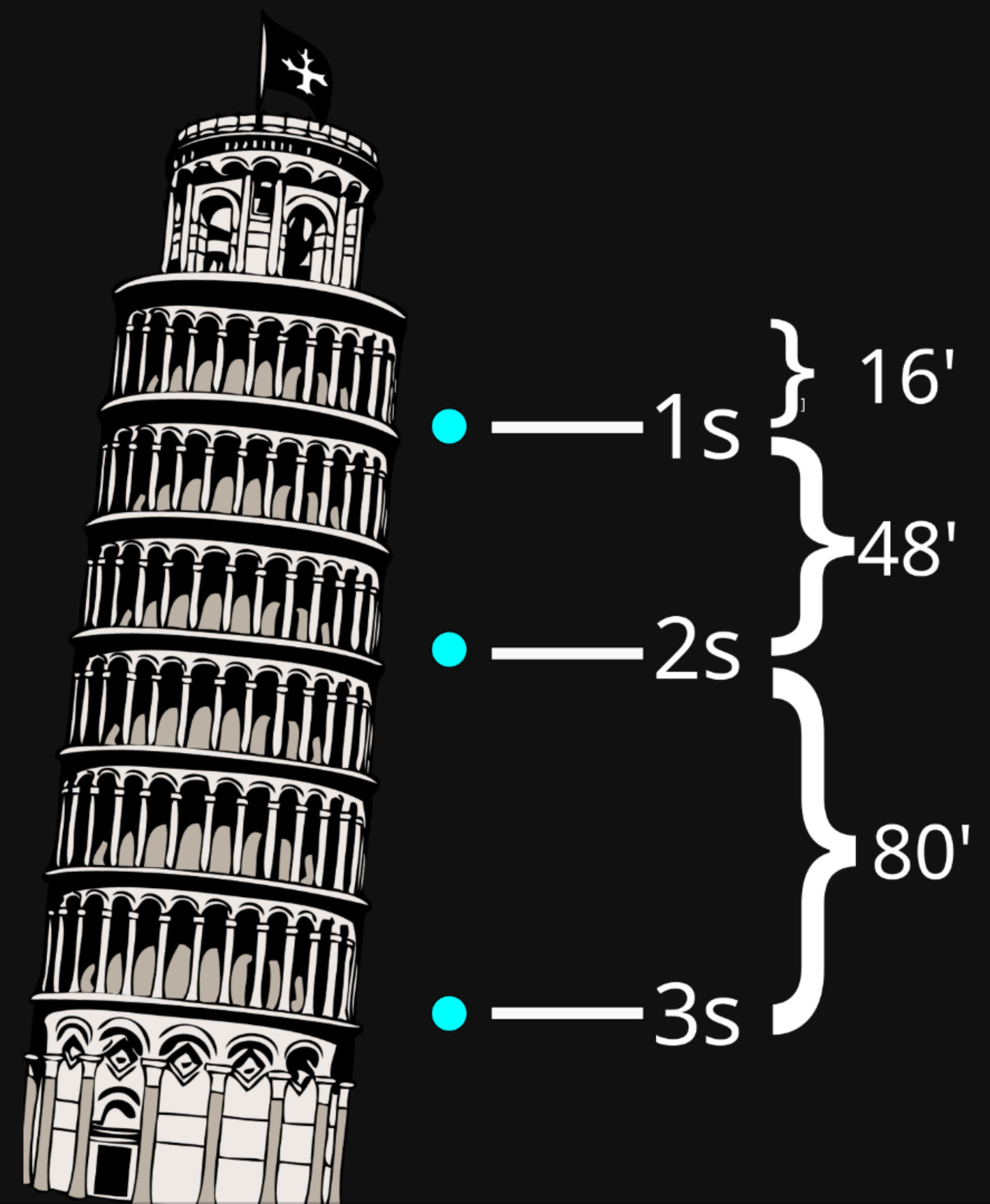
# Galileo Galilei

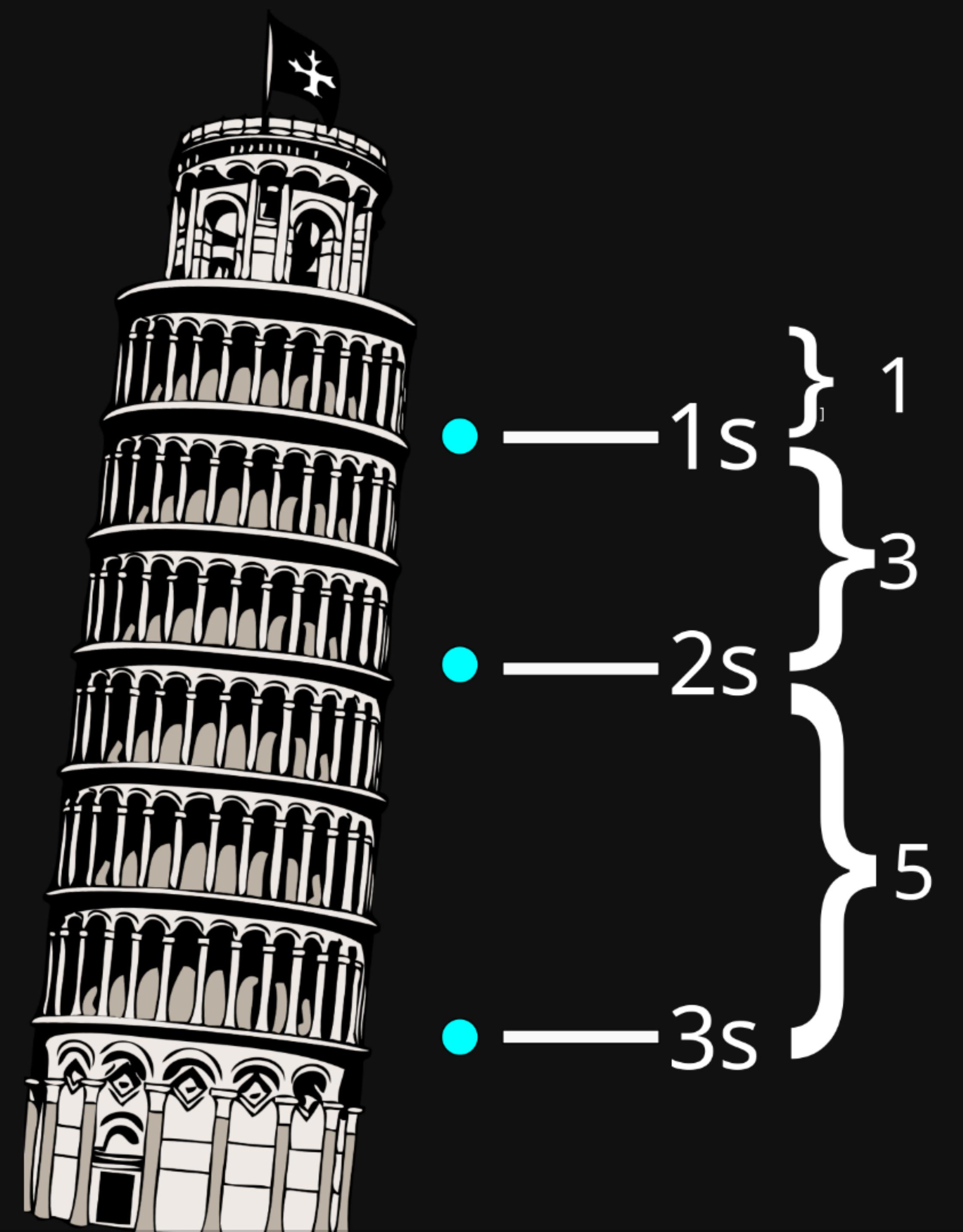
- Speed y velocity
- Gravity y free fall
- Principles of relativity
- Inertia
- Projectiles

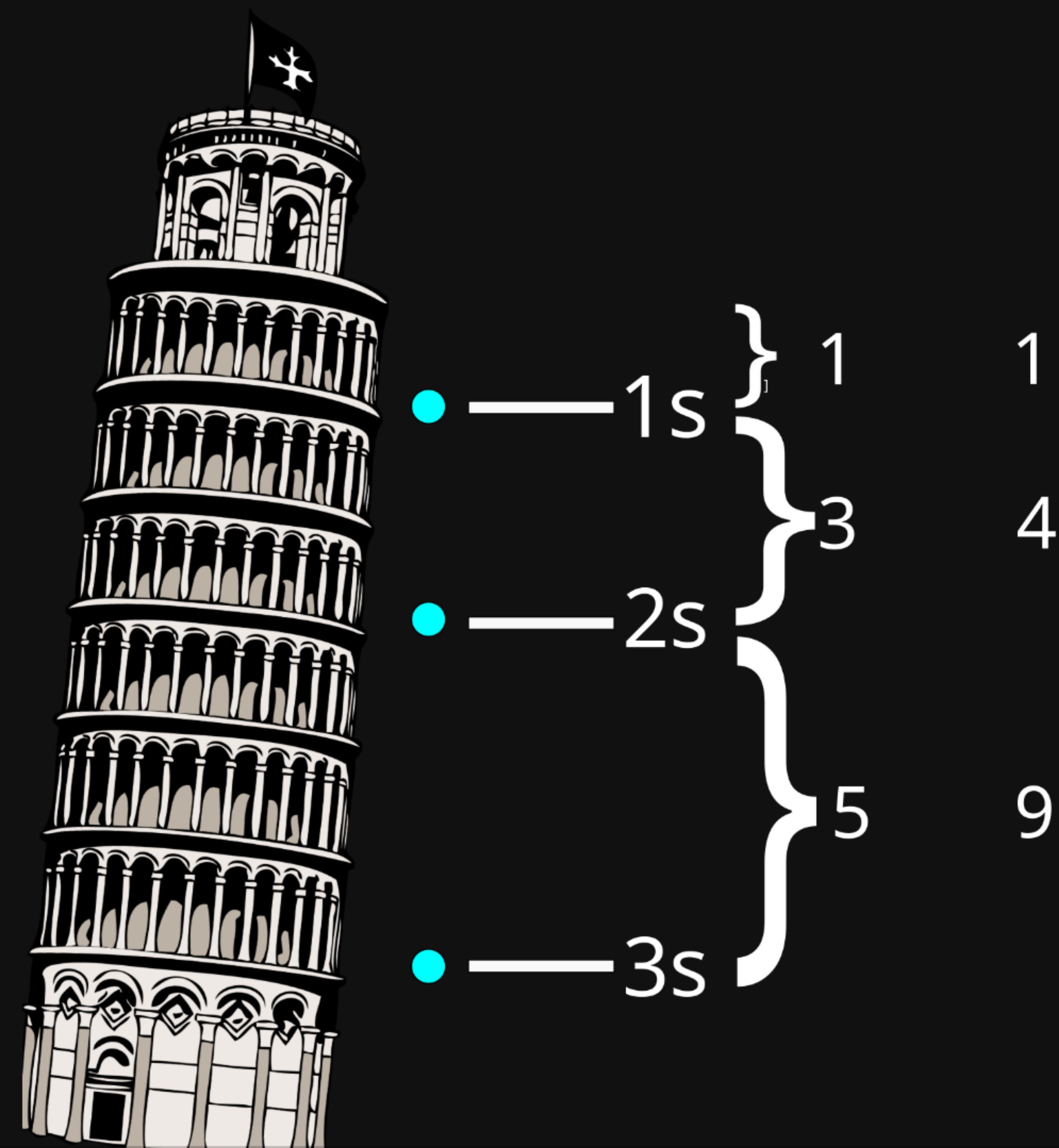


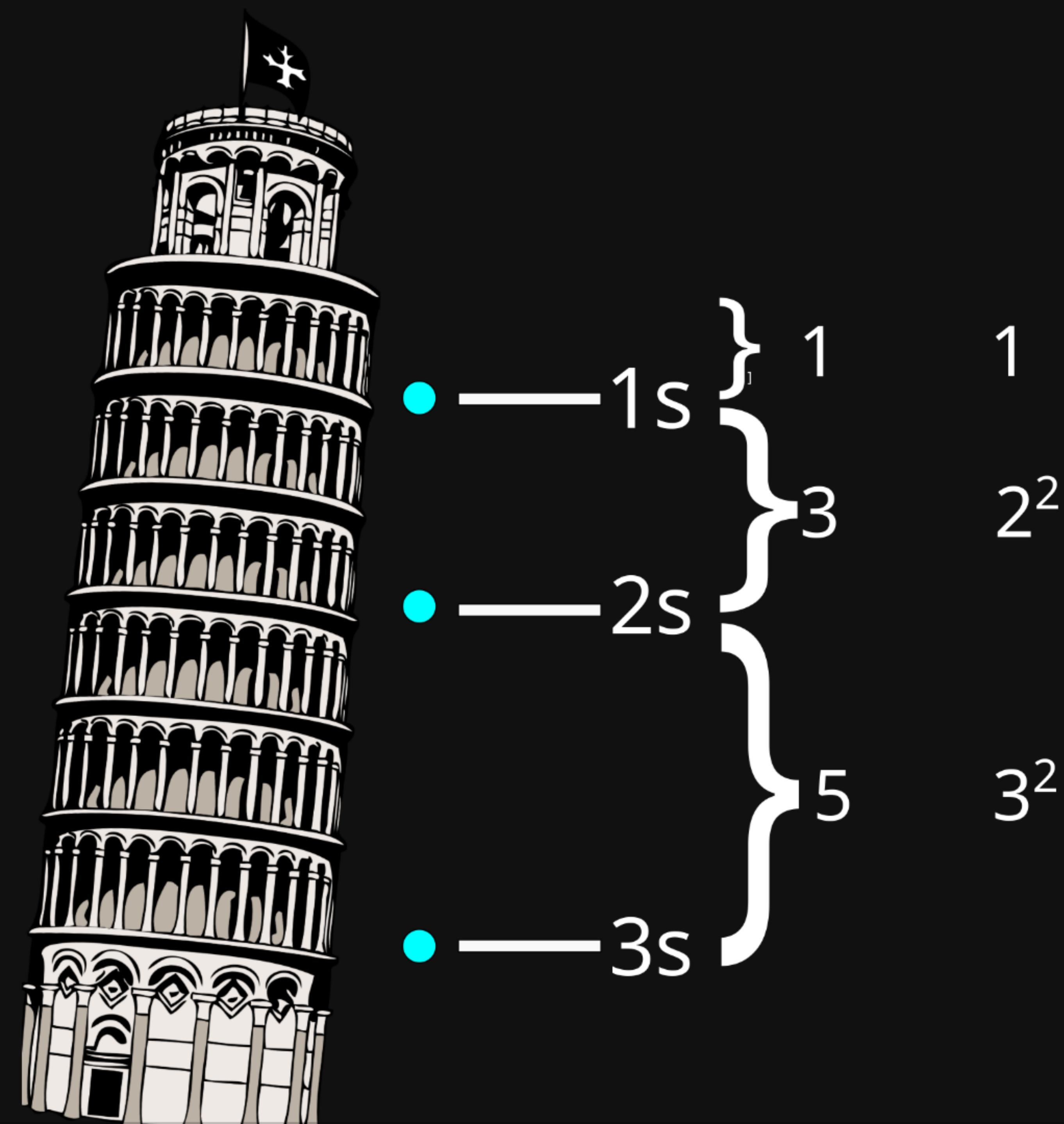












**Is there a relation  
between the time and  
the distance of the  
fall?**



# Answer

# Answer

$$d = \frac{g}{2}t^2$$



# Answer

$$d = \frac{9.81 \frac{m}{s^2}}{2} t^2$$



# Answer

$$d = 4.9t^2 \text{ } m/s^2$$

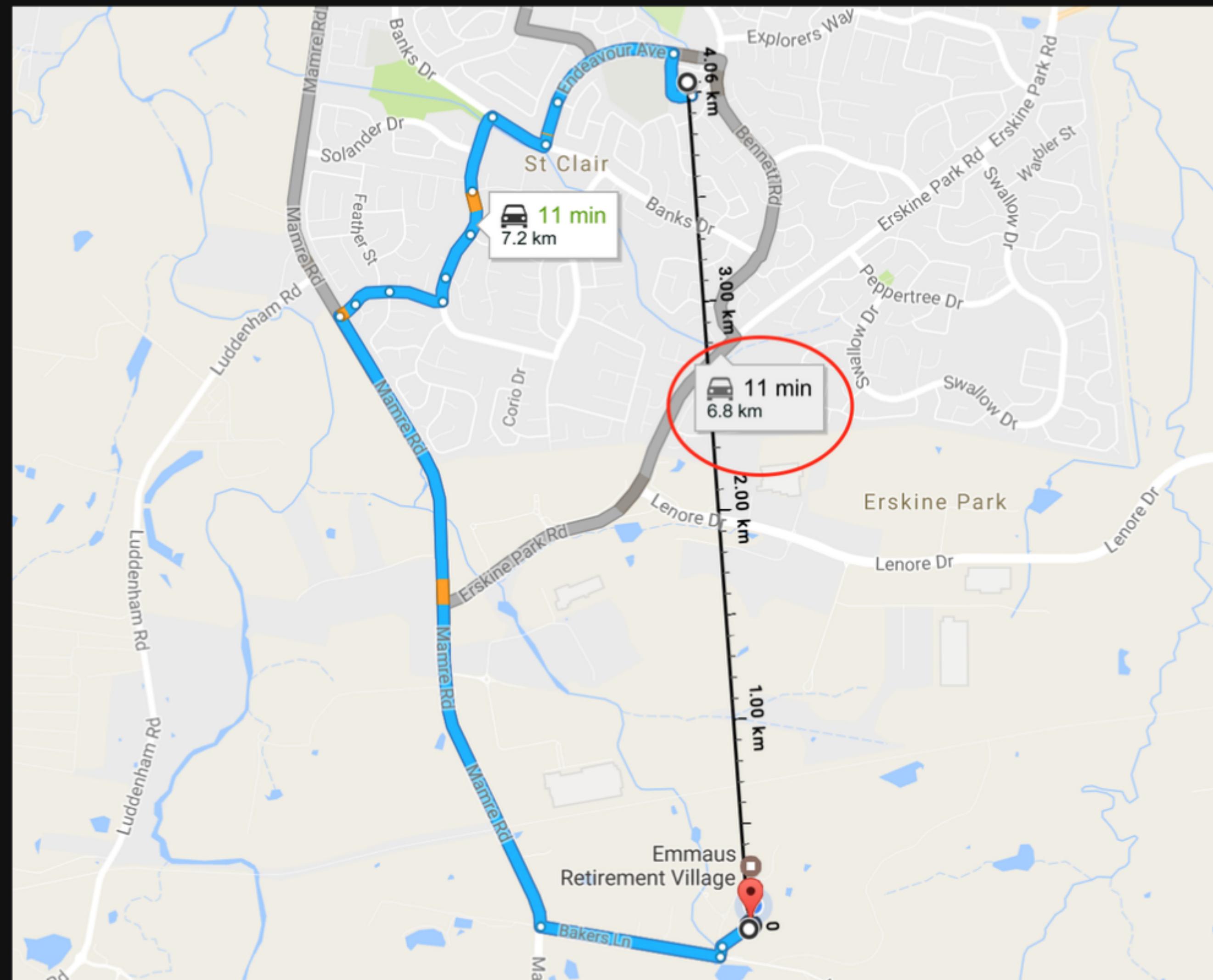


# Experiment 1.



# BASIC CONCEPTS

# Distance vs displacement





# the FASTEST **THINGS** in the WORLD




$$velocity = \frac{distance}{time}$$

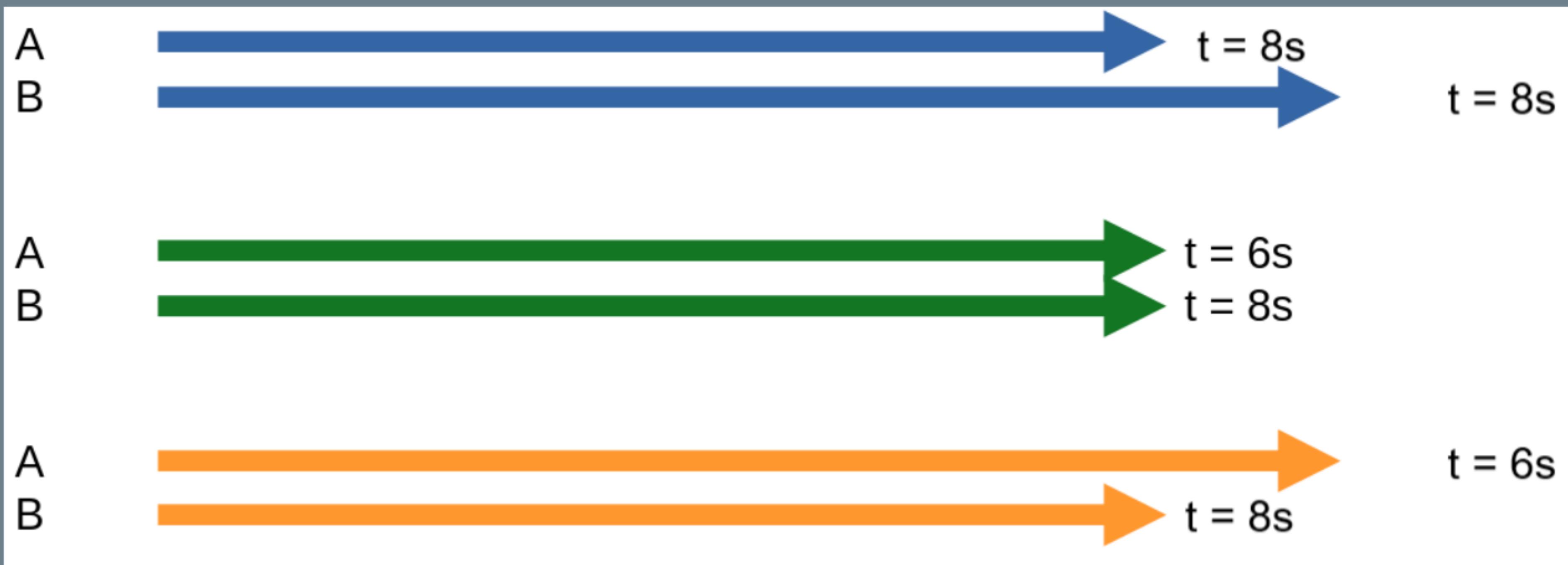
$$v = \frac{[m]}{[s]}$$



# Velocity

- Like an arrow, it has:
  - Magnitude
  - Direction
  - Sense

# Poll about velocity



# Acceleration

# Acceleration

## A change in velocity



A dynamic photograph of a motorcycle rider leaning into a turn on a racetrack. The rider is wearing a black helmet and a dark racing suit with 'Buell' printed on the sleeve. The motorcycle is a dark sport bike. The background shows a blurred racetrack and grandstands under a cloudy sky.

# Acceleration

A change in velocity

- Magnitude

A diagram set against a dark blue background with a glowing yellow sun at the center. Four Earth-like planets are shown in elliptical orbits. A green curved arrow at the top indicates a counter-clockwise direction of motion. A red curved arrow at the bottom indicates a clockwise direction of motion. A blue curved arrow on the right indicates a counter-clockwise direction of motion. A blue curved arrow on the left indicates a clockwise direction of motion. A large white text box contains the word "Acceleration" and the definition "A change in velocity". Below the text box, two bullet points list the components of acceleration: "Magnitude" and "Direction".

# Acceleration

A change in velocity

- Magnitude
- Direction

# Acceleration

## A change in velocity

- Magnitude
- Direction
- Sense

$$a = \frac{v_f - v_i}{t}$$

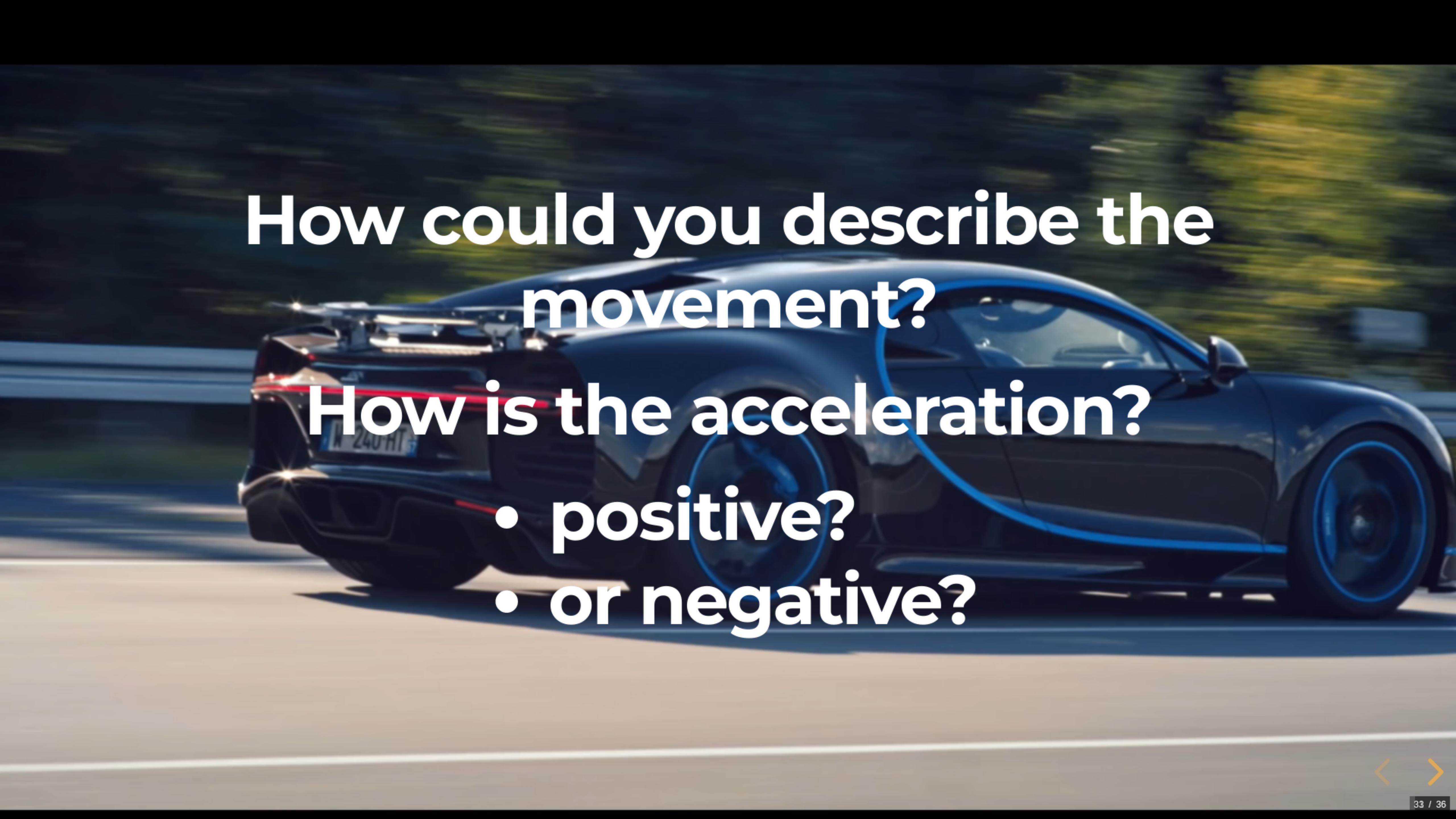
$$a = \frac{[m]}{[s^2]}$$





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How could you describe the movement?

How is the acceleration?

- positive?
- or negative?

# Experiment 2

- ¿Hacia dónde apunta la velocidad cuando la pelota sube?
  - ¿Y la aceleración?
- ¿Hacia dónde de apunta la velocidad cuando la pelota baja?
  - ¿Y la aceleración?



# Questions?

# Homework

