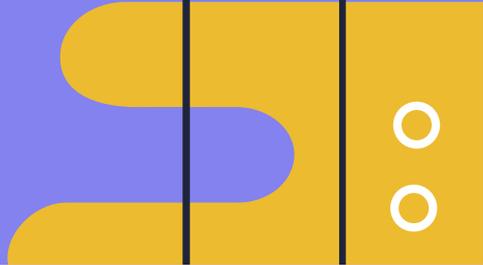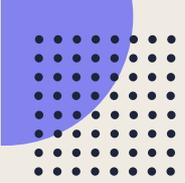# Intro to Kinematics

Quick Definition

Kinematics: the science of describing the motion of objects using words, diagrams, numbers, graphs, and equations.

Crash Course Video!

Kinematic Equations

- can be utilized to predict unknown information about an object's motion if other information is known

- each kinematic equation includes 4 variables
  - so, if 3 of the 4 variables are known, then we can solve for the unknown variable

- The variables you may see are:
  - : Displacement; standard unit of meters (m)
  - : Velocity; standard unit of meters per second (m/s)
  - : Acceleration; standard unit of meters per second squared (m/s^2)
  - : Time; standard unit of seconds (s)

$$\vec{x}$$

The "Big 4" Equations

1. $x = v_i t + \dfrac{1}{2} a t^2$

2. $v_f{}^2 = v_i{}^2 + 2ax$

3. $v_f = v_i + at$

4. $x = \dfrac{v_i + v_f}{2} \cdot t$

Mini-Lab Time!

Calculating Gravitational Acceleration

Time to calculate together!

Name	$\vec{v}$	d	h	g
Emily	22.22 in/s	12 in	29.5 in	202.29 in/s^2
Sonoka	10 in/0.84 s = 11.91 in/s	4 in	28.5 in	505.33 in/s^2
Sol	10in/0.56 s = 17.857 in/s	12 in	30 in	132.866 in/s^2
Yidi	10 in/0.61	11 in	30 in	133.296 in/s^2

Name	$\vec{v}$	d	h	g
Louise	10 in/s	4.5 in	30 in	296.296 in/s^2
Alaina	10.87 in/s	10 in	30 in	70.89 in/s^2
Betty	2.2 in/s	2.5 in	30 in	46.464 in/s^2
Erin	9.7 m/s	23 in	27 in	9.6 in/s^2

Time to calculate together!

Name	g
Emily	202.29 in/s^2 = 5.138 m/s^2
Sonoka	505.33 in/s^2 = 12.835 m/s^2
Sol	132.866 in/s^2 = 3.375 m/s^2
Yidi	133.296 in/s^2 = 3.3857 m/s^2
Louise	296.296 in/s^2 = 7.54 m/s^2
Alaina	70.89 in/s^2 = 1.80 m/s^2
Betty	46.464 in/s^2 = 1.18 m/s^2
Erin	9.6 in/s^2 = 0.244 m/s^2

Name	$\vec{v}$	d	h	g
Natale	0.45 s = 10 in/0.45s = 22.22 in/s	34 in	29.5 in	24.2 in/s^2 = 0.6 m/s^2

Gravitational Acceleration

Drumroll.....

The real acceleration due to gravity on earth is: **9.8 m/s^2**

386.09 in/s^2

This value varies a bit, depending on factors such as your altitude, but for physics purposes, most scientists use this value when making calculations.