Course: Physics
NGSS Core Disciplinary Idea: PS2.B: Types of Interactions

- Newton's law of universal gravitation ~~and Coulomb's law~~ provide the mathematical models to describe and predict the effects of gravitational ~~and electrostatic~~ forces between distant objects.
- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun.

https://ngss.nsta.org/DisciplinaryCoreIdeas.aspx?id=5

(AP Physics C) Unit: Kinematics: Motion in Two Dimensions and Gravitation
https://apcentral.collegeboard.org/media/pdf/ap-physics-c-mechanics-course-and-exam-description.pdf
Topic 1.2, Page 32: Kinematics: Motion in Two Dimensions
Topic 7.1, Page 104: Gravitation

(AP Physics 1) Unit: Position, Velocity, and Acceleration in Two Dimensions
https://www.gusd.net/cms/lib/CA01000648/Centricity/Domain/179/ap-physics-1-course-and-exam-description.pdf
Topic 1.1, Page 37: Position, Velocity, and Acceleration (in Two Dimensions)
Topic 2.2, Page 49: The Gravitational Field

Standard: Determine and use the appropriate equation to make predictions about two-dimensional motion.

Level	Description
4.0	**In addition to score 3.0 performance, the learner will be able to:** correctly apply the following equations accurately in multi-step problems without prompting ☐ kinematic equations (aka constant acceleration equations) ☐ Constant velocity equation ☐ Trigonometry for right triangles for projectile motion
3.0	**In addition to score 2.0 performance, the learner will be able to:** correctly apply the following equations accurately in multi-step problems with prompting ☐ kinematic equations (aka constant acceleration equations) ☐ Constant velocity equation ☐ Trigonometry for right triangles for projectile motion determine which of the following equations to apply to a particular situation and use them in simple problems

	☐ range equation ☐ universal gravitation ☐ kinematic equations (aka constant acceleration equations) ☐ Constant velocity equation
2.0	**The learner will be able to:** I know and describe: ☐ That at its highest point, a projectile's v_y = 0 m/s. ☐ That assuming no air resistance, mass does not matter for projectile motion ☐ the connection between inertia and x-direction motion ☐ that accelerated motion in one direction + linear motion in the other combine to make a parabola
1.0	**With help, partial success at score 2.0. Learner will be able to:** accurately use all of the constant acceleration equations. describe: ☐ The horizontal motion of a projectile is constant. ☐ Objects in free fall accelerate at a rate of 9.8 m/s^2 ☐ factors that affect time of flight (vertical velocity, height, rate of gravity) ☐ factors that affect how far out a projectile lands (horizontal velocity, time in the air)

Pre-Requisites:

Metric Prefixes
Unit Conversions
Trigonometry
Digitally graphing data
Constant Acceleration Equations
Definition of Mass and Inertia