

# Unit Learning Targets

Department: Science

Course: Physics/Physics with Technology

Instructor(s): Jessica Rodriguez

**Standard III:** Students will understand the factors determining the strength of gravitational and electrical forces. (Unit 4: Central Force Model)

**Objective I:** Relate the strength of the gravitational force to the distance between two objects and the mass of the objects (Newton's law of universal gravitation).

## Student-Friendly Learning Target Statements

<b>Know</b>	<p><b>Knowledge Targets</b></p> <p><i>"What I need to know"</i></p>	<p>I know that more mass means more gravitational force (that mass and the gravitational force are directly related).</p> <p>I know the difference between mass and weight.</p> <p>I know that the farther the distance between objects the less the force (force is inversely proportional to the distance squared).</p> <p>I know that the centripetal force is directed toward the center and is what keeps an object moving in a circle or orbit.</p> <p>I know that centrifugal force is a fictitious force that arises from an object's inertia when in an accelerated frame of reference.</p> <p>I know that objects moving in a circle at constant speeds are undergoing constant acceleration and do not have constant velocity (changing direction), but do have a constant period of rotation.</p>
<b>Do</b>	<p><b>Reasoning Targets</b></p> <p><i>"What I can do with what I know."</i></p>	<p>I can compare the gravitational forces on objects of different masses.</p> <p>I can compare the gravitational forces on objects at different distances.</p> <p>I can determine whether or not an object will accelerate due to a net central force.</p> <p>I can distinguish between centripetal and centrifugal forces and what causes both.</p> <p>I can compare the speed and period of rotation for objects of different masses or experiencing different net central forces.</p>

	<p><b>Skill Targets</b></p> <p><i>"What I can demonstrate."</i></p>	<p>I can measure the gravitational force on an object using a spring scale.</p> <p>I can solve equations involving gravitational forces, masses, and distances using Newton's law of universal gravitation.</p> <p>I can solve equations to determine the velocity, radius, period, or net central force on an object undergoing uniform circular motion.</p> <p>I can calculate the orbital velocity and period of rotation for satellites and planets.</p> <p>I can do rocket science!</p>
	<p><b>Product Targets</b></p> <p><i>"What I can make to show my learning."</i></p>	<p>I can draw a force diagram for an object and describe the resultant net force causing circular motion.</p> <p>I can draw graphs for central force vs. mass, central force vs. radius, and central force vs. speed for objects undergoing uniform circular motion.</p> <p>I can draw graphs for gravitational force vs. mass and gravitational force vs. distance for objects in orbit.</p>

Essential Learning: The critical knowledge, skills, and dispositions each student must acquire as a result of this unit of instruction.

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