

Planning Guide to Science Content Emphasis

Student Expectation (Content Focus): 6.11B Understand that GRAVITY governs the motion of our Solar System

SE Verb: Understand – to INFER from information received.

Unpacked Student Expectation (Content Focus):

- GRAVITY is a Pulling Force.
- GRAVITY exists on Earth and PULLS objects back down to Earth.
- The Moon and satellites revolve around Earth due to its GRAVITY.
- The Moon's GRAVITY affects Ocean Tides on Earth.
- Planets, asteroids, comets revolve around the Sun because of Sun's GRAVITY.
- Revolution (orbit) around the Sun is Elliptical because of Sun's and Planets' GRAVITY pulling on each other.
- Gravity magnitude in the solar system is determined by the size and mass of the object.
- Milky Way is spiral shape due to Black Hole GRAVITY in the center.
- No GRAVITY in Solar System will cause objects to move in straight line.

Guiding Questions and Possible Activities

What type of action force is GRAVITY? Which direction does GRAVITY pull objects to Earth? (Car Ramp Activity)

What motion does the moon and satellites have with Earth? Why does the moon and satellites revolve around Earth? What force from the Moon causes Ocean Tides? (Ball on String and Water Balloon Activity)

What motion do Planets, Asteroids, Comets have with the Sun? Why do the Planets, Asteroids, and Comets revolve around the Sun? Why do Planets, Asteroids, and Comets have an Elliptical motion around the Sun? (Ball on String and Tug of War Activity)

Why does the Milky Way Galaxy have a shape? What happens to Planets', Asteroids', and Comets' motion if the Sun has no Gravity? (Ball on String Activity)

Using the 5E model lesson activities within the Lesson Cycle (Teaching Focus):

Engage (Initial Teach / Focus) Activity: Car Ramp Activity (Engage how car moves down the ramp with Gravity and cannot move back up the ramp because of Gravity)

S-W-I-R-L: **Write** – observations and inference of car's motion with and against Gravity **Read** – about Gravity **Interact** – Think Pair Share examples of Gravity affecting motion on Earth **Listen** – to a video about Gravity on Earth **Write/Speak** – write/speak to shoulder about how Gravity affects Roller Coasters

Process Skills: Observe, Infer, Record Data

Vocabulary: Force, Gravity, Motion

Formative Assessment (PK, CU, TK, EV): PK – KWL chart on Gravity CU – illustrate and describe 2 different examples of Gravity on Earth and how it affects motion of those objects TK – Write about why Rockets and Space Shuttles need force to go to outer space.

Explore (Focus / Guided and Independent): *Ball on a String and Water Balloon Activity (Explore how objects outside Earth revolve around Earth and how Lunar Gravity affects Ocean Tides by pulling on the water balloon)*

S-W-I-R-L: **Write** – observations and inference of ball motion due to Gravity and Water Balloon **Read** – about Revolution of Planets and Ocean Tides **Interact** – Think Pair Share examples of things in the Solar System Revolving and why they do **Listen** – to a video about Revolution of Planets and Ocean Tides **Write/Speak** – write/speak to shoulder about how Gravity affects the motion of the Moon and the Ocean Tides

Process Skills: Observe, Infer, Record Data, Understand

Vocabulary: Force, Gravity, Revolution, Tides, Motion

Formative Assessment (PK, CU, TK, EV): PK – KWL chart on Gravity CU – justified list of Gravity on Earth, with the Moon, and on Tides TK – Write about what kind of motion do planets, asteroids, and comets have with the Sun and why they do.

Explain (Guided and Independent): *Ball on a String and Tug of War Activity (Explain how planets, asteroids, and comets revolve around the Sun due to its Gravity)*

S-W-I-R-L: **Write** – observations and inference of ball motion and Tug of War due to Gravity creating Elliptical orbit **Listen** – to a video about Revolution of Planets **Interact** – Think Pair Share Create a Trifold with examples of things in the Solar System Revolving around the Solar System and why they do **Write/Speak** – write/speak to shoulder about how Gravity affects the motion of objects in the Solar System and Present out to the class

Process Skills: Observe, Infer, Record Data, Understand

Vocabulary: Force, Gravity, Revolution, Motion, Elliptical Orbit

Formative Assessment (CU, TK, EV): CU – Odd one Out list of effects of Gravity on Earth and the Solar System TK – Create a concept Map about what kind of motion do planets, asteroids, and comets have with the Sun and why they do EV -- Sticky Bars of what Force affects the Earth, Moon, Planets, Asteroids motion in the Solar System.

Elaborate (Independent / Enrichment): *Ball on a String Activity (Elaborate on shape of Milky Way Galaxy and when there is no Gravity in the Solar System)*

S-W-I-R-L: **Write** – observations and inference of the shape of the Milky Way Galaxy and when there is no Gravity in the Solar System

Read – about Gravity and the Milky Way Galaxy **Listen** – to a video about Gravity and the Milky Way Galaxy **Interact** – Think Pair Share examples of objects' motion in the Solar System if there was no Gravity and why the Milky Way is Spiral shaped **Write/Speak** – write/speak to shoulder about how Gravity affects the motion of objects on Earth, the Moon, the Solar System, and the Galaxy.

Process Skills: Observe, Infer, Record Data, Understand

Vocabulary: Force, Gravity, Revolution, Motion, Elliptical Orbit, Milky Way Galaxy

Formative Assessment (CU, TK, EV): CU – Odd one Out list of effects of NO Gravity in the Solar System TK – Create an illustration of the New Vision of the Solar System when there is NO Gravity affect motion of the Planets, Asteroids, Comets EV -- Sticky Bars of what Force affects the Solar System and Galaxies.

Evaluate (Summative):

Summative Assessments (Teaching Focus):