Disciplinary Core Ideas

ESS1.A: The Universe and Its Stars

- *Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.*

ESS1.B: Earth and the Solar System

- *The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.*
- *The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.*

Plan for the day:

00) OVERDUE: Gas Giants Foldable (WHITE LATE MORN BIN)

0) TURN IN: your choice, #10 or #17 (WHITE LATE MORN BIN)

1a) RE-CHECK Lesson 6: Small Bodies in the Solar System answers to questions 1-22, pages 114-126

1b) RE-CHECK Answers to Lesson Review questions 1-12 on page 127.

2) FINISH Lesson 2: Gravity and the Solar System, pages 60-72, questions 1-21 AND Lesson Review, questions 1-9; Describe, Explain, Analyze and Explain questions require multiple sentence answers.

3) Quick-Lab: HANDOUT (Think about Kepler's Laws, pages 63-64)

Sep 25-6:22 AM

Those who completed the Lesson 6 Questions for HOMEWORK - OPEN your text so I may adjust your score in HAC.

Lesson 6: Small Bodies in the Solar System answers to questions 1-22, (pg 114-126) AND Lesson Review, questions 1-12, (pg 127).

Period 1, 3, and 7: FINISH Lesson 2 Gravity in the Solar System. &2 &6 &8

HOMEWORK - DUE NEXT CLASS

I will check your answers NEXT class meeting (October 14 & 17).

NEXT CLASS

Period 2, 6, and 8: COMPLETE Quick-Lab using the materials shown in diagram on page 63 and in the lab. These materials are already in a container on the student table. Blue/Green pins, Tables 3 & 4.

Red/Yellow pins, Tables 1, 2, 5 & 6.

SAFETY: Anyone who uses the PUSH PINS for anything BUT the intended purpose will result DIRECTLY in a referral. Warnings and Citations will NOT be given.

Sep 30-3:12 PM

YOUR First Last PARTNER'S First Last

12A, 36A, 78A, 12B, 36B 78B

You are working in PAIRS. One group may have 3 if odd number of students in class.

Name:_____ Partner:_____ Class:_____

QUICK LAB DIRECTED INQUIRY

Orbital Ellipses

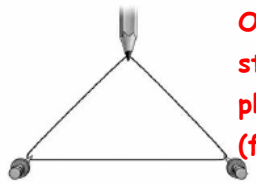
In this lab, you will make models of planetary orbits. Johannes Kepler revolutionized astronomy when he proved that planetary orbits are ellipses, not perfect circles. His first law of planetary motion states that planetary orbits are ellipses (ovals) that have the sun as one focus and an empty point in space as the other focus.

OBJECTIVE
- Describe the orbits of planets.

MATERIALS
For each student
- metric ruler
- paper
- pencil
- 2 pieces of corrugated cardboard, approx. 27 cm × 21 cm
- safety goggles
- strong thread or fine string
- thumbtacks or

PROCEDURE

1. Place the **paper** on top of the **cardboard**. Insert one **thumbtack** through the paper and the cardboard, near the center of the piece of paper. Use the **metric ruler** to measure a location 2 cm from the thumbtack. Insert a second thumbtack at this location. The two thumbtacks will be the *foci* (singular, *focus*) of your ellipse.
2. Tie the ends of the **thread** so that the thread forms a circle. Loop the thread around the thumbtacks and **pencil**, as shown in the illustration below. Hold the pencil vertically with its point touching the paper.



One pin ALWAYS stays in its original place. Label it F1 (focus 1)

3. Pull the string so that it is tight, and use the pencil to trace an ellipse around the foci. Label this ellipse "Ellipse A."

NEXT CLASS

Name _____ Class _____ Date _____

4. Move **one** of the thumbtacks so that the distance between the foci is 4 cm. Predict how the shape of the ellipse will change.

5. Trace the new ellipse, and label it "Ellipse B."
6. A) Describe how changing the distance between the foci affected the shape of the ellipse.

6. B) Was your prediction correct?

Sep 30-3:12 PM

You do NOT need to fill in every line! Use only the space necessary for your response. Complete ALL questions.

Name _____ Class _____ Date _____

7. A) Describe how you would change this setup to create a perfect circle. Change the setup and test your ideas. Label this ellipse "Ellipse C."

7. B) Were your ideas correct?

8. *Eccentricity* is a measure of how much the shape of an ellipse differs from the shape of a perfect circle.

The eccentricity of an ellipse is equal to the distance between its foci divided by the maximum width of the ellipse.

Calculate the eccentricity of each of your ellipses, and record it below.

Ellipse A _____

Ellipse B _____

Ellipse C _____

NEXT CLASS

Name _____ Class _____ Date _____

9. Earth's orbit has an eccentricity of about 0.01. Pluto's orbit has an eccentricity of about 0.24, and the orbit of Halley's comet has an eccentricity of about 0.96. Which of the ellipses you drew most closely matches each of these orbits?

10. The sun is at one focus of Earth's orbit. If Earth's orbit has a very small eccentricity, where is the other focus of Earth's orbit? Explain your answer.

Think about what the first push pin represents in terms of "focus.". That should help you think about what the second push pin represents.

Sep 30-3:12 PM

Do the Math

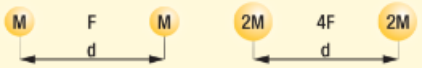
Newton's law of universal gravitation says that the force of gravity:

- increases as the masses of the objects increase and
- decreases as the distance between the objects increases

In these examples, M = mass, d = distance, and F = the force of gravity exerted by two bodies.

Sample Problems

A. In the example below, when two balls have masses of M and the distance between them is d, then the force of gravity is F. If the mass of each ball is increased to 2M (to the right) and the distance stays the same, then the force of gravity increases to 4F.

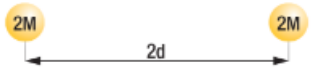


B. In this example, we start out again with a distance of d and masses of M, and the force of gravity is F. If the distance is decreased to ½ d, then the force of gravity increases to 4F.

You Try It

Recall that M = mass, d = distance, and F = the force of gravity exerted by two bodies.

10 Calculate Compare the example below to the sample problems. What would the force of gravity be in the example below? Explain your answer.



Oct 12-12:09 PM

Attachments

- Scale of Earth and Sun.mp4
- Scale of Solar System.mp4