

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:

0) OVERDUE: Orbital Ellipses Quick-Lab (WHITE LATE MORNING BIN)

Assigned as HOMEWORK multiple times. Show ALL you OWE.

1a) RE-CHECK Lesson 2: Gravity and the Solar System, pages 60-72, questions 1-21, AND

1b) RE-CHECK Lesson Review, questions 1-9; Describe, Explain, Analyze and Explain questions require multiple sentence answers.

2) Quick Lab: Modeling the Expanding Universe.

★ Due AFTER the 1st Quarter closes; must have DATA today ★

3) Continue reading Unit 1, Lessons 1 & 2 answering the Lesson Review questions 1 - 10 (pages 13 & 25); this is necessary for the Quick Lab.

Sep 25-6:22 AM

Quick Lab: Modeling the Expanding Universe

QUICK LAB DIRECTED Inquiry

Modeling the Expanding Universe

In this lab, you will use a rubber band and a ruler to model the expanding universe.



OBJECTIVES

- Model the expanding universe.
- Calculate modeled expansion rates.

Compare and contrast the model to the actual expanding universe.

MATERIALS

For each group

- pen, ballpoint
- rubber band, thick
- ruler, metric

- scissors

For each student

SAFETY GOOGLES

What are the SAFETY issues with this lab?

What are the consequences for behaving in an UNSAFE manner during this lab?

Oct 21-12:23 PM

Quick Lab: Modeling the Expanding Universe

Name _____ Class _____ Date _____

QUICK LAB DIRECTED Inquiry

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MATERIALS

- For each group
- pen, ballpoint
 - rubber band, thick
 - ruler, metric
- For each student
- scissors
 - SAFETY GOOGLES

PROCEDURE

- 1 Use scissors to cut a **thick rubber band**. Spread the rubber band against a ruler *without stretching the band*.
- 2 Use a **ballpoint pen** to mark the rubber band at each centimeter from 1 cm to 6 cm.
- 3 Hold the first mark (1 cm) in place next to the ruler while stretching the rubber band until the second mark (2 cm) aligns with the 3 cm mark on the ruler.
- 4 Observe and measure how many centimeters each mark has moved from its original location. Record your observations in the table below.

Original mark (cm)	Distance moved (cm)	Answer below
		Carefully examine your data. Using the space below, answer the following question: Did the marks all move the same distance? Compare the distances moved, and describe the differences.

Name _____ Class _____ Date _____

Quick Lab continued

- 6 How could you calculate the rates at which the marks moved when you stretched the rubber band? Calculate the rate of movement for each mark if the rubber band was stretched for 2 seconds, and record your calculations in the table below.

Original mark (cm)	Rate of movement (cm/s)

- 7 What do the expansion rates tell you about the rate of movement relative to the distance from the stretching point?

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Quick Lab: Modeling the Expanding Universe

Name _____ Class _____ Date _____

Quick Lab continued

- 8 How is the rubber band model similar to the expanding universe? How is it different?

- 9 Make two sketches that show galaxies in an area of space. Galaxies can be spiral galaxies, elliptical galaxies, and irregular galaxies. The first sketch will show galaxies as they appear now. The second sketch will show the same galaxies as they will appear at some time in the future.

Your lab show a **BLANK** facing 4th page which may be used to continue answers to questions, your illustration (question 10) or show calculations.

You may use calculators. **HOWEVER, put them away, as well as ALL OTHER MATERIALS** once you have completed your data collection with your partner.

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Quick Lab: Modeling the Expanding Universe

- 4 Observe and measure how many centimeters each mark has moved from its original location. Record your observations in the table below.

Original mark (cm)	Distance moved (cm)	5 Answer below
1	1	Carefully examine your data. Using the space below, Answer the following question: Did the marks all move the same distance? Compare the distances moved, and describe the differences.
2	3	
3	4.7	
4	6.5	
5	8.2	
6	9.8	

DISCLAIMER: This data is from ONE group in another class. USE YOUR DATA!

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PUT GOGGLES AWAY ONCE YOU AND YOUR PARTNER HAVE COMPLETED THE MEASUREMENTS FOR TABLE 1.

Oct 28-7:05 AM

BRAINSTORM with your partner how you will do the calculations required in the **TABLE** under **Question 6**.

USE information from **UNIT 1, Lessons 1 & 2** to help you answer the lab questions.

WORK with your partner to complete the Quick Lab.

NO WANDERING AROUND THE ROOM.

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Quick Lab: Modeling the Expanding Universe

Quick Lab continued

- 6 How could you calculate the rates at which the marks moved when you stretched the rubber band? Calculate the rate of movement for each mark if the rubber band was stretched for 2 seconds, and record your calculations in the table below. **Change HIGHLIGHTED column heading to**

Change in Distance Original mark (cm)	Rate of movement (cm/s)
0	Divide Change in Distance by 2
1	
1.7	
2.5	
3.2	
3.8	

Oct 21-12:23 PM



**DUE DATES TO BE
DETERMINED but will be
AFTER November 2nd.**

Oct 21-12:23 PM