

## **CBL Earth Science**

### **Earth Science: Geology, the Environment, and the Universe**

#### **Quarter 4, Week 9, Day 1**

**Standard Focus: Earth Sciences 2.a “Students know that the solar system is located on the outer edge of the disk-shaped Milky Way galaxy, which spans 100,000 light years” and 2.b “students know galaxies are made of billions of stars and comprise most of the visible mass of the universe”**

## **PREPARE**

### **1. Background knowledge necessary for today’s reading**

Ancient civilizations have creation myths involving the Milky Way. In Greek mythology, the Milky Way was said to be a trail of milk left by Hera as she suckled Heracles, the son of her husband Zeus and a beautiful mortal. The Mayans thought the Milky Way was the road along which souls walked to the Underworld. The believed that the point in which the Milky Way appeared as a vertical band in the sky represented the moment of creation.

### **2. Vocabulary Word Wall**

Introduce 3-5 important words from today’s reading

**Variable stars**

**RR Lyrae variable**

**Cepheid variables**

**Milky Way**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

## READ

3. Review the vocabulary and concepts previously covered in this chapter.
4. Read directions for the investigation
5. Read text: Ch. 31.1, pp. 833-834

## RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- It is difficult for us to see the Milky Way's size and shape because we are in the galaxy.
- Variable stars are used to estimate the distances to globular clusters of stars.
- The galactic center is towards the constellation Sagittarius.

7. Post information to the billboard. Add new information to ongoing whole class projects.

## EXPLORE

8. Explore today's investigation
9. Explore today's simulation
10. Collect data and post

One possible activity: What Are Your Ideas About the Universe?

Procedure: Students view and organize images as they complete a questionnaire

Discussion: Discuss student answers to questions posed in the survey

Key questions: How big? How far? How old?

Source: <http://cfa-www.harvard.edu/seuforum/download/CQEdGuide.pdf>

## **EXTEND**

11. **Prompt every student to write a short product tied to today's Reading**
12. **Close with a short summary**

Extend the reading to the students' lives or to the world

## **CBL Earth Science**

### **Earth Science: Geology, the Environment, and the Universe**

#### **Quarter 4, Week 9, Day 2**

#### **Standard Focus: Earth Sciences 2.a and 2.b**

## **PREPARE**

### **1. Background knowledge necessary for today's reading**

The Milky Way like other spiral galaxies has a bulge, a disk, and a halo. The halo contains globular clusters, the bulge houses old stars, and is at the center of the disk. The disk is filled with dust, gas, and young stars in spiral arms. The sun is located halfway along the Orion spiral arm.

### **2. Vocabulary Word Wall**

Introduce 3-5 important words from today's reading

#### **halo**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

## **READ**

### **3. Review the vocabulary and concepts previously covered in this chapter.**

### **4. Read directions for the investigation**

### **5. Read text: Ch. 31.1, pp. 835-836**

## RESPOND

### 6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- Astronomers use radio waves to determine the shape of a galaxy.
- The galaxy contains about 100 billion stars.
- The Sun is located on the minor arm of Orion.

### 7. Post information to the billboard. Add new information to ongoing whole class projects.

## EXPLORE

### 8. Explore today's investigation

### 9. Explore today's simulation

### 10. Collect data and post

One possible activity: Paper Plate Education – Milky Way Galaxy

Procedure: Students construct models using paper plates

Discussion: Discuss the parts of the Milky Way

Key question: How does our galaxies compare to others?

Source: <http://analyzer.depaul/paperplate/Milky%20WayGalaxy.htm>

## **EXTEND**

11. **Prompt every student to write a short product tied to today's Reading**
12. **Close with a short summary**

Extend the reading to the students' lives or to the world

## **CBL Earth Science**

### **Earth Science: Geology, the Environment, and the Universe**

#### **Quarter 4, Week 9, Day 3**

#### **Standard Focus: Earth Sciences 2.a and 2.b**

## **PREPARE**

### **1. Background knowledge necessary for today's reading**

Elliptical galaxies as their name suggests, are generally egg shaped. Each elliptical galaxy is assigned a number ranging from 0 to 7 depending on how elliptical it is. A 0 galaxy appears almost circular and the most elliptical is a 7. Elliptical galaxies are the dominant type of galaxies in most clusters and groups of galaxies. They range in size from giants to dwarfs.

### **2. Vocabulary Word Wall**

Introduce 3-5 important words from today's reading

#### **spiral density wave**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

## **READ**

### **3. Review the vocabulary and concepts previously covered in this chapter.**

### **4. Read directions for the investigation**

### **5. Read text: Ch.31.1, pp. 836-838**

## RESPOND

### 6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- The globular clusters in the halo of the Milky Way are the oldest-known objects in the galaxy.
- Most of the young stars in the galaxy are located in the spiral arms.
- Astronomers do not clearly understand how the spiral arms are maintained.

### 7. Post information to the billboard. Add new information to ongoing whole class projects.

## EXPLORE

### 8. Explore today's investigation

### 9. Explore today's simulation

### 10. Collect data and post

One possible activity: Paper Plate Education – Milky Way Galaxy

Procedure: Students complete their models

Discussion: Discuss parts of the galaxy

Key question: What other spiral shapes occur in nature?

Source:

<http://analyzer.depaul.edu/paperplate/Galaxy%20Models.htm>

## **EXTEND**

11. **Prompt every student to write a short product tied to today's Reading**
12. **Close with a short summary**

Extend the reading to the students' lives or to the world

**CBL Earth Science**  
**Earth Science: Geology, the Environment, and the Universe**  
**Quarter 4, Week 9, Day 4**  
**Standard Focus: Earth Sciences 2.b**

## **PREPARE**

1. **Background knowledge necessary for today's reading**  
Edwin Hubble (1889-1953), for whom the Hubble telescope is named, was one of the twentieth century's leading astronomers. Most astronomers of the time thought that the universe was contained within the Milky Way galaxy. In 1923, Hubble observed a Cepheid variable star in the Andromeda nebula. From this he deduced that what he saw was another galaxy, not a nearby star cluster. The discovery led to a profound shift in thoughts about the universe.

2. **Vocabulary Word Wall**  
Introduce 3-5 important words from today's reading

**spiral galaxies      elliptical galaxies**  
**irregular galaxies**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

## **READ**

3. **Review the vocabulary and concepts previously covered in this chapter.**
4. **Read directions for the investigation**
5. **Read text:** Ch. 31.2, pp. 839-841

## RESPOND

### 6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- There are billions of galaxies in the universe.
- Galaxies are classified according to their shapes.

### 7. Post information to the billboard. Add new information to ongoing whole class projects.

## EXPLORE

### 8. Explore today's investigation

### 9. Explore today's simulation

### 10. Collect data and post

One possible activity: The Universe at Your Fingertips – Galaxy Sorting

Procedure: Students compare similarities and differences among photos of galaxies

Discussion: Discuss types of galaxies and their characteristics

Key question: What classification groups were determined?

Source:

[http://www.astrosociety.org/educatio/astro/act5/gal\\_sort.html](http://www.astrosociety.org/educatio/astro/act5/gal_sort.html)

## **EXTEND**

11. **Prompt every student to write a short product tied to today's reading**
12. **Close with a short summary**

Extend the reading to the students' lives or to the world

## **CBL Earth Science**

### **Earth Science: Geology, the Environment, and the Universe**

#### **Quarter 4, Week 9, Day 5**

**Standard Focus: Earth Sciences 2.b and 2.g “students know how the red shift from different galaxies and the cosmic background radiation provide evidence for the “big bang” model that suggests that the universe has been expanding for 10 to 20 billion years”**

## **PREPARE**

### **1. Background knowledge necessary for today’s reading**

By the end of the 1920s, Hubble had discovered enough galaxies that he developed a system for classifying them. In studying the spectra of 46 galaxies he found that the farther away they were from each other the faster they moved away from each other. Based on this, he concluded that the universe was expanding. The Hubble telescope was launched in 1990. It continues to expand our knowledge of the universe.

### **2. Vocabulary Word Wall**

Introduce 3-5 important words from today’s reading

**superclusters  
constant**

**dark matter**

**Hubble**

- Show, say, explain, expand, explode or buzz about the word briefly
- Show, say, define the word quickly and add to the word wall.

## READ

3. Review the vocabulary and concepts previously covered in this chapter.
4. Read directions for the investigation
5. Read text: Ch. 31.2, pp.841-843

## RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events/concepts to the billboard

Students might mention:

- Most galaxies are located in groups.
- The universe is expanding.
- The Hubble constant measures the rate of expansion.

7. Post information to the billboard. Add new information to ongoing whole class projects.

## EXPLORE

8. Explore today's investigation
9. Explore today's simulation
10. Collect data and post

One possible activity: Modeling the Expanding Universe

Procedure: Students model how galaxies move away from each other

Discussion: Discuss Hubble's discovery

Key question: Is there a center of the universe?

Source: <http://cfa-www.harvard.edu/seuforum/download/CQEdGuide.pdf>

## **EXTEND**

- 11. Prompt every student to write a short product tied to today's Reading**
- 12. Close with a short summary**

Extend the reading to the students' lives or to the world