Science & Literacy Activity

GRADES 6-8

OVERVIEW

This activity, which is aligned to the Common Core State Standards (CCSS) for English Language Arts, introduces students to scientific knowledge and language related to astronomy. Students will read content-rich texts, visit the Cullman Hall of the Universe, and use what they have learned to complete a CCSS-aligned writing task, creating an illustrated text about astronomy.

Common Core State Standards:
WST.6-8.2, WST.6-8.8, WST.6-8.9
RST.6-8.1, RST.6-8.2, RST.6-8.4, RST.6-8.7, RST.6-8.10

New York State Science Core Curriculum:
PS 1.1a, PS 1.1b

Next Generation Science Standards:
PE MS-ESS1-2
DCI 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.

Materials in this activity include:

- Teacher instructions for:
  - Pre-visit student reading
  - Visit to the Cullman Hall of the Universe and student worksheet
  - Post-visit writing task
- Text for student reading: "The Space Between Stars: Scale Models of Our Universe"
- Student Worksheet for the Cullman Hall of the Universe visit
- Student Writing Guidelines
- Teacher rubric for writing assessment

SUPPORTS FOR DIVERSE LEARNERS: An Overview

This resource has been designed to engage all learners with the principles of Universal Design for Learning in mind. It represents information in multiple ways and offers multiple ways for your students to engage with content as they read about, discuss, view, and write about scientific concepts. Different parts of the experience (e.g. reading texts, or locating information in the hall) may challenge individual students. However, the arc of learning is designed to offer varied opportunities to learn. We suggest that all learners experience each activity, even if challenging. We have provided ways to adapt each step of the activities for students with different skill-levels. If any students have an Individualized Education Program (IEP), consult it for additional accommodations or modifications.

1. BEFORE YOUR VISIT

This part of the activity engages students in reading a non-fiction text about astronomy. The reading will prepare students for their visit by introducing them to the topic and framing their investigation.

Student Reading

Have students read "The Space Between Stars: Scale Models of Our Universe." Have them write notes in the large right-hand margin. For example, they could underline key passages, paraphrase important information, or write down questions that they have. They may also use this space for drawings or diagrams of relevant processes.

Ask:

- How do the planets compare in size to the whole solar system? *(A: Although planets like Earth are large on a human scale, they are extremely small when compared to the entire solar system. For example, if Earth were the size of a sunflower seed, it would be ninety feet away from the Sun in a scale model.)*
- Why does the author use everyday objects when comparing the size of astronomical objects with the distances between them? *(A: The author suggests that it is difficult to understand vast distances without using scale models. By comparing astronomical objects with common things that we see all the time, the huge distances become easier to understand.)*
- What comparisons made in the reading are the most surprising to you and why? *(A: Answers will vary.)*

They can work in pairs, small groups, or as a class. During discussion, remind students to use evidence from the text to explain their thinking, and to use specific examples, such as parts of the scale model.

SUPPORTS FOR DIVERSE LEARNERS: Student Reading
- "Chunking" the reading can help keep them from becoming overwhelmed by the length of the text. Present them with only a few sentences or a single paragraph to read and discuss before moving on to the next "chunk."
- Provide "wait-time" for students after you ask a question. This will allow time for students to search for textual evidence or to more clearly formulate their thinking before they speak.
- After the reading, show students the following online interactive called "Scales of the Universe" http://htwins.net/scale2/

2. DURING YOUR VISIT

This part of the activity engages students in exploring the hall.

Museum Visit & Student Worksheet
Explain to students that they will be focusing on four areas of the Cullman Hall of the Universe corresponding to planets, stars, galaxies, and the entire universe, and using worksheets to gather all the necessary information about astronomy. Tell students that back in the classroom they will refer to these notes when completing the writing assignment.

SUPPORTS FOR DIVERSE LEARNERS: Museum Visit
- Review the Student Worksheet with students, clarifying what information they should collect during the visit.
- Have students explore the hall in pairs, with each student completing their own Student Worksheet.
- Encourage student pairs to ask you or their peers for help locating sources of information. Tell students they may not share answers with other pairs, but they may point each other to places in the hall where answers may be found.
- If students can't complete all four sheets, have them complete one or two and "jigsaw" with other groups back in the classroom, to share what they have learned.

3. BACK IN THE CLASSROOM

This part of the activity is to engage students in an informational writing task that draws on the pre-visit reading and on observations made at the Museum.

Writing Task
Distribute the Student Writing Guidelines handout, which includes the following prompt for the writing task:

> Based on your reading, your visit to the Cullman Hall of the Universe, and your discussions, write an essay in which you describe at least three kinds of objects found in the universe.
>
> Be sure to include:
> • information about planets, stars, and galaxies
> • a description of the distances between objects
> • specific examples of planets, stars, and galaxies
>
> Support your discussion with evidence from the reading and the Cullman Hall of the Universe.

Go over the handout with students. Tell them that they will use it while writing, and afterwards, to evaluate and revise their essays.

Before they begin to write, have students use the prompt and guidelines to frame a discussion around the information that they gathered in the Cullman Hall of the Universe and compare their findings. They can work in pairs, small groups, or as a class. Referring to the writing prompt, have students underline or highlight all relevant passages and information from the reading, and their notes from the hall that can be used in their response to the prompt. Instruct each student to take notes on useful information that their peers gathered as they compare findings. Students should write their essays individually.

SUPPORTS FOR DIVERSE LEARNERS: Writing Task
- Re-read the "Before Your Visit" assignment with students. Ask what they saw in the hall that helps them understand objects in the universe.
- Allow time for students to read their essay drafts to a peer and receive feedback based on the Student Writing Guidelines.

Student Reading

The Space Between Stars: Scale Models of Our Universe

Text adapted from *One Universe: At Home in the Cosmos* by Neil de Grasse Tyson, Charles Tsun-Chu Liu, and Robert Irion. Joseph Henry Press, 1999.

It may appear as if the universe has plenty of matter. There are, for instance, more than 100 billion galaxies in the universe. And in turn, each of those galaxies contains more than 100 billion stars. So in order to tally all of the stars in the universe, every person on Earth would have to count five stars per second for the next 10,000 years.

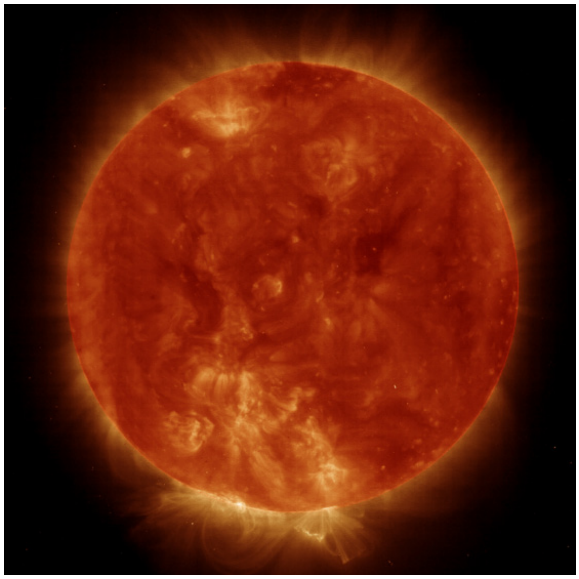
Despite that impressive total, in reality matter is rare in the universe. Atoms, as a whole, are few and far between. On average, there are just a few of them per cubic yard of space. How is it possible for all the matter in the universe to spread so thin?

The key is to comprehend the vast distances between objects in the universe. But since the universe is so large, it is difficult to truly understand these gaps. One way to make this mental leap is to use scale models. By comparing planets, our solar system and even our galaxy with everyday things, the unimaginable distances in the cosmos become easier to understand.

Our Moon is, on average, about 240,000 miles away from Earth.

Let's start by considering our Earth and Moon. If we shrank Earth so that it were the size of a soccer ball, the Moon would be the size of a softball about 30 feet away. Those 30 feet represent the farthest distance we have ever sent people into space. On this same scale, Mars at its closest point would be a mile away from our soccer-ball sized Earth. Sending astronauts to Mars may seem simple, but rocketing 30 feet is nothing at all like rocketing a mile.

Scale Model of Our Solar System



Our star, the Sun, is about 93,000,000 miles from Earth. It may be an average-sized star, but more than a million Earths can fit inside it.

The soccer ball comparison is also useful when trying to imagine the scale of our solar system. But this time, pretend that the soccer ball-sized object is our Sun. Picture this soccer ball at home plate on a baseball diamond. At this new scale, the planet Mercury would look like a pellet of birdseed rounding the Sun at a distance of 35 feet – halfway to the pitcher's mound. Earth becomes the size of a sunflower seed about 90 feet away, orbiting at first base. Jupiter is now a one-inch marble 450 feet away. It is orbiting just beyond the fence in center field. And the dwarf planet Pluto? It's just a grain of pepper, orbiting the Sun in isolation about 3,500 feet away, well past the parking lot. If you throw in five more planets and a dash of dust to represent asteroids, you have a complete model of the relative space in our solar system. This model is a sphere more than a mile across. This sphere contains a soccer ball at its center, flecks of matter here and there, and lots of empty space.

Just beyond that sphere, a swarm of comets called the Oort Cloud surrounds the solar system. The comets, drifting in the cold depths of space, would be like bits of dust in Baltimore orbiting the soccer ball-sized Sun in New York City.

Scale Model of the Distance Between Stars in Our Milky Way Galaxy

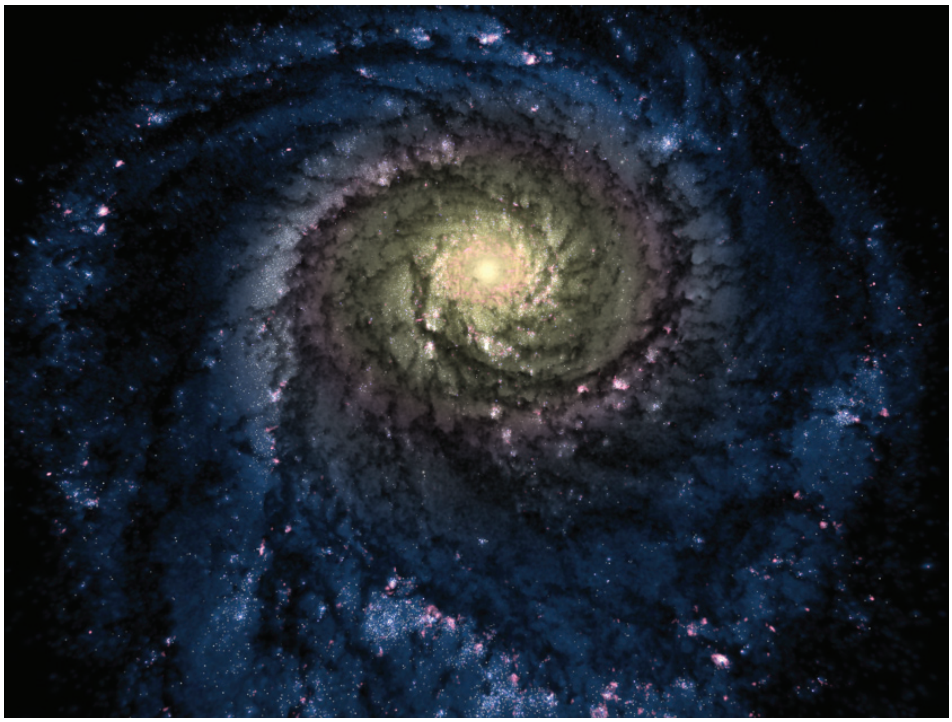
When we consider the distances between stars, things start to seem crazy. If our soccer ball-Sun were in New York City, its nearest neighbor would be another soccer ball 5,000 miles away – in Honolulu, Hawaii. The space between the two is mostly empty, except for a few clouds of gas.

Movies sometimes show starships racing through the galaxy. They pass stars at the rate of one or two every second. That simply isn't realistic. The gaps between stars in the galaxy are so great that starships would have to travel up to 500 million times faster than the speed of light to pass stars so quickly. But matter, which is what starships are made of, can't even match the speed of light once!

Scale Model of the Distance Between Edges of Our Milky Way Galaxy

Other movies show galaxies as swirls of light. Within them, heroes and villains dash from one side to the other at will. To see how unrealistic that is, let's extend our soccer ball-Sun model. If the Milky Way's average stars were the size of soccer balls, the galaxy would measure an astonishing 125 million miles across. That's a lot of space to place 100 billion soccer ball-Suns. Since it's almost too big to comprehend, we'll shrink the scale of our model much further.

Imagine squeezing our entire solar system — planetary orbits and all — into a coffee cup. On that scale, the Sun would be the size of the tip of a needle in the center of the cup. And the Milky Way itself would still cover an area as large as North America!



Our Milky Way Galaxy is about 90,000 light years across, which is about 1/25th the distance to its closest neighbor, the Andromeda Galaxy.

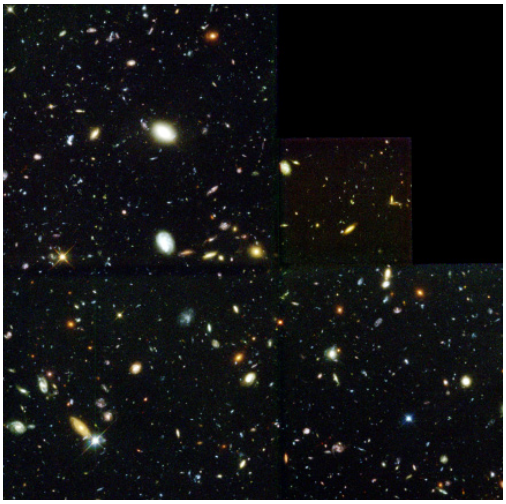
Scale Model of the Distance Between Galaxies

To consider the distances between galaxies, let's take one more step. We will shrink the entire Milky Way into that same coffee cup. At this scale, the nearest large galaxy — Andromeda — would hang in space about seven feet away. Galaxies, compared to the distances between individual stars, are fairly close neighbors in space.

The Beauty of the Beyond

Our series of comparisons may help your mind leap from one scale of the universe to the next. However, such descriptions do not capture the majesty of the matter that inhabits these vast spaces. In that way, pictures truly are worth more than the words we use to describe them. Images from recent decades have raised our awareness of our place in the cosmos. One such picture came from the Galileo spacecraft. On its way to Jupiter, Galileo looked back from beyond the Moon at the Earth-Moon system. The fragile blue color of Earth, and the familiar crescent of the Moon, formed a cozy pair in space. The small gap between them made it clear that the Apollo astronauts had not ventured far fromhome at all.

The Galileo spacecraft captured this view of the Moon in orbit around Earth.



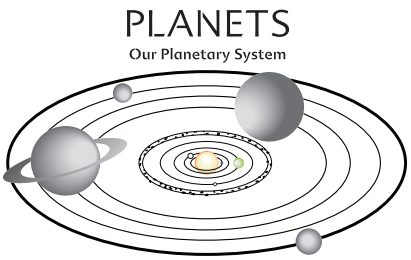
The Hubble Deep Field image shows thousands of galaxies.

Other stirring images came from the Hubble Space Telescope, which captured two "deep-field" images, one in the skies of the Northern Hemisphere and one from the Southern Hemisphere. The telescope stared at a single tiny patch of sky for days on end. Both patches of sky the telescope stared at were the size of a grain of sand held at arm's length. In each of those images were thousands of galaxies, sparkling like gems in an infinite jewel box. These pictures were both exciting and humbling. They were our most detailed glimpses yet into the depths of the cosmos.

Student Worksheet: Investigate PLANETS

Find the "PLANETS" wall (in large green letters). Your investigation will start on the first panel on the left.

Explore the Panel: "Planets"



1. Look at the diagram located on the left side of the panel. Mark Earth's location on this diagram.

2. Describe where Earth is located in our solar system. _____

_____

_____

3. Look through the small oval window called "Our planetary neighborhood." This is what our solar system looks like from far away. Why do you think the planets look so small in this window?

_____

_____

_____

Sketch and label what you see.

Explore the Panel: "What Is a Planet?"

4. Discuss with a partner: Why is it so difficult to define what makes a planet a planet? Record some notes from your discussion. _____

_____

Explore the Panel: "The Solar System"

5. The planets of our solar system are often placed in two groups: terrestrial and gas giants. Compare the pictures of the planets from the two groups. What do all planets have in common? _____

_____

Explore the Panel: "Other Planetary Systems"

6. Astronomers now know that most stars have planets orbiting them. Thousands of planets have been discovered around distant stars. With a partner, discuss what you'd like to know about these newly discovered planets. Record some notes from your discussion. _____

_____

_____

Further Exploration

7. Explore the rest of the Planets section. Use the back of this page to record new information or sketch interesting things that you see.

Student Worksheet: Investigate STARS

Find the "STARS" wall (in large yellow letters). Near the wall, look for a circular table titled "Our Star – The Sun". Your investigation will start here.

Explore: "Our Star – The Sun"

1. Walk around this ring-shaped station, and watch the video in the middle. What does the Sun look like in the video?

2. Discuss with a partner what the Sun looks like to the human eye. Does it ever change? Why are the images in this exhibit so different? Record some notes from your discussion.

Explore "Stars" Wall

3. Look at the diagram located on the left side of the panel. Mark the Sun's location on this diagram.

4. Look into the oval window called "Our Stellar Neighborhood."

Sketch and label what you see.

5. Explore the rest of this wall. What is a star?

6. Describe how stars change over time.

7. Our Sun is an intermediate-mass star. Describe what will happen to the Sun as it ages.

Further Exploration

8. Use the back of this page to record and sketch other interesting facts about stars.

Student Worksheet: Investigate GALAXIES

Find the "GALAXY" wall (in large blue letters). Your investigation will start on the first panel on the left.

Explore the Panel: "Galaxy"

1. Look at the diagram located on the left side of the panel. Mark the Milky Way Galaxy's location on this diagram.

2. Look through the oval window called "Our Galactic Neighborhood."

Sketch and label what you see.

What's the name of the universal force that holds the galaxy together?

_____

_____

_____

Explore the Panel: "What is a Galaxy?"

3. What is the name of our galaxy?

_____

4. Record some data about our galaxy.

_____

_____

Sketch and label the Milky Way Galaxy.

_____ light years across

Explore the Remaining Panels

5. On the back of this page, sketch the different types of galaxies.

6. What do the different types of galaxies have in common? How do they differ?

_____

_____

Explore "Interacting Galaxies"

7. Turn around, and walk towards the "Interacting galaxies" station (near the green signs "Neptune" and "Uranus"). Watch the video of two galaxies colliding. With a partner, take turns narrating what happens in the video. Record some notes from your narration on the back of this page.

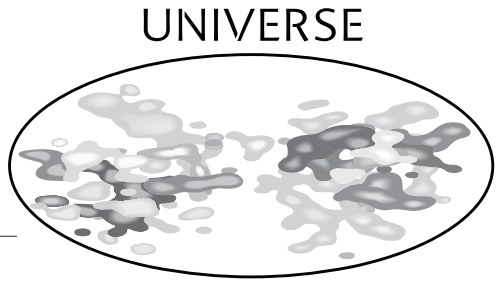
Further Exploration

8. Use the back of this page to record and sketch other interesting facts about galaxies.

Student Worksheet: Investigate the UNIVERSE

Find the "UNIVERSE" wall (in large white letters). Your investigation will start on the first panel on the left.

Explore the Panel: "Universe"



1. Look at the diagram located on the left side of the panel. Mark the Virgo Supercluster's location on this diagram.

2. Why do astronomers use light years instead of kilometers or miles to measure very large distances? _____

_____

_____

3. About how many galaxies are in the observable universe? _____

Explore the Panel: "What Is the Universe?"

4. The universe is all the matter, energy, and space that exist. Describe these three components.

_____

_____

5. Stars, planets, and many other objects are made out of matter. Even the chemicals in the human body are composed of elements including hydrogen, oxygen, and carbon. These elements are the same ones found in stars and planets because all the elements other than hydrogen in our bodies were created within stars, before Earth formed. Record the percentage of elements in the universe in the data table on the right.

Element	Percentage
Hydrogen	
Helium	
Other	

Explore the Panel: "Our View of the Universe"

6. What is the observable universe?

_____

Explore the "Formation and Evolution of the Universe"

Walk back to the beginning and find the panel to the left of the Universe wall.

7. How is the universe changing over time? _____

_____

What will the universe be like billions of years in the future? _____

_____

Further Exploration

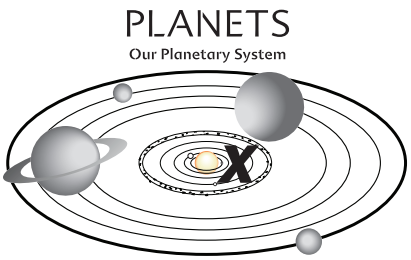
8. Explore the rest of the Universe section. Use the back of this page to record new information or sketch interesting things that you see.

ANSWER KEY

Student Worksheet: Investigate PLANETS

Find the "PLANETS" wall (in large green letters). Your investigation will start on the first panel on the left.

Explore the Panel: "Planets"



1. Look at the diagram located on the left side of the panel. Mark Earth's location on this diagram.

2. Describe where Earth is located in our solar system. *(Answers may include: The Sun is the center of the solar system. Earth orbits the Sun between Mars and Venus. On the diagram, Earth will be the third circle out from the center.)*

3. Look through the small oval window called "Our planetary neighborhood." This is what our solar system looks like from far away. Why do you think the planets look so small in this window? *(Answers may include: The planets look small because they are much smaller than the solar system. When seen from a great distance, planets look like points of light.)*

Sketch and label what you see.

Explore the Panel: "What Is a Planet?"

4. Discuss with a partner: Why is it so difficult to define what makes a planet a planet? Record some notes from your discussion. *(Answers may include: The boundaries between planets, dwarf planets, and asteroids at the low-mass end, and planets and brown dwarfs at the high-mass end are not clear cut.)*

Explore the Panel: "The Solar System"

5. The planets of our solar system are often placed in two groups: terrestrial and gas giants. Compare the pictures of the planets from the two groups. What do all planets have in common?

(Answers may include: All planets are spherical; all orbit the Sun; all are thousands of kilometers in diameter.)

Explore the Panel: "Other Planetary Systems"

6. Astronomers now know that most stars have planets orbiting them. Thousands of planets have been discovered around distant stars. With a partner, discuss what you'd like to know about these newly discovered planets. Record some notes from your discussion. *(Answers may include: How large are they? Are they mostly solid or gas? Could these planets support life? How long would it take a spacecraft to reach them? How much would I weigh there? What would a "sunset" look like?)*

Further Exploration

7. Explore the rest of the Planets section. Use the back of this page to record new information or sketch interesting things that you see.

ANSWER KEY

Student Worksheet: Investigate STARS

Find the "STARS" wall (in large yellow letters). Near the wall, look for a circular table titled "Our Star – The Sun". Your investigation will start here.

Explore: "Our Star – The Sun"

1. Walk around this ring-shaped station, and watch the video in the middle. What does the Sun look like in the video?

(Answers may include: The Sun is rotating, and looks huge. The surface is constantly changing. Some parts are darker than others. It looks different in different colors [wavelengths of light].)

2. Discuss with a partner what the Sun looks like to the human eye. Does it ever change? Why are the images in this exhibit so different? Record some notes from your discussion.

(Answers may include: The Sun is too bright to look at for long. In the sky it appears small and perfectly round. With powerful telescopes and cameras, the Sun will look larger and more details will be visible. When observed in X-ray or ultraviolet, the Sun looks very different from its appearance in visible light.)

Explore "Stars" Wall

3. Look at the diagram located on the left side of the panel. Mark the Sun's location on this diagram.

4. Look into the oval window called "Our Stellar Neighborhood."

Sketch and label what you see.

5. Explore the rest of this wall. What is a star?

(Answers may include: Stars are large balls of gas. They're more massive than planets. Stars, including the Sun, emit light. Nuclear fusion provides the energy for them to burn.)

6. Describe how stars change over time.

(Answers may include: Stars change constantly. Over millions or billions of years, stars go through dramatic changes.)

7. Our Sun is an intermediate-mass star. Describe what will happen to the Sun as it ages.

(Answers may include: When it reaches the end of its life, the Sun will quickly swell, turning into a red giant. It will lose its outer layers and eventually, only its hot core, a white dwarf star, will remain.)

Further Exploration

8. Use the back of this page to record and sketch other interesting facts about stars.

ANSWER KEY

Student Worksheet: Investigate GALAXIES

Find the "GALAXY" wall (in large blue letters). Your investigation will start on the first panel on the left.

Explore the Panel: "Galaxy"

1. Look at the diagram located on the left side of the panel. Mark the Milky Way Galaxy's location on this diagram.

2. Look through the oval window called "Our Galactic Neighborhood."

Sketch and label what you see.

What's the name of the universal force that holds the galaxy together?

(Answers may include: Gravity holds the parts of a galaxy together. Most stars, including the Sun, orbit the center of a galaxy.)

Explore the Panel: "What is a Galaxy?"

3. What is the name of our galaxy?

(Answer: Milky Way Galaxy)

4. Record some data about our galaxy. *(Answers may include: Our galaxy contains hundreds of billions of stars. It's a spiral galaxy. It's more than 100,000 light years across.)*

Sketch and label the Milky Way Galaxy.

100,000 light years across

Explore the Remaining Panels

5. On the back of this page, sketch the different types of galaxies.

6. What do the different types of galaxies have in common? How do they differ?

(Answers may include: All galaxies are collections of stars, gas, and dark matter. They differ in their shape, size, mass, and in the distribution of stars.)

Explore "Interacting Galaxies"

7. Turn around, and walk towards the "Interacting galaxies" station (near the green signs "Neptune" and "Uranus"). Watch the video of two galaxies colliding. With a partner, take turns narrating what happens in the video. Record some notes from your narration on the back of this page.

Further Exploration

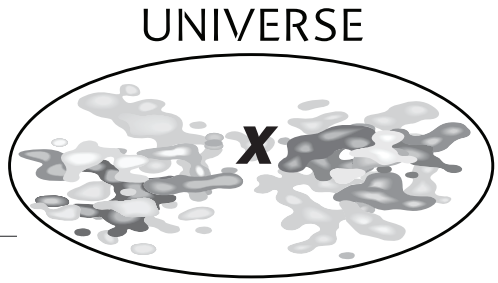
8. Use the back of this page to record and sketch other interesting facts about galaxies.

ANSWER KEY

Student Worksheet: Investigate the UNIVERSE

Find the "UNIVERSE" wall (in large white letters). Your investigation will start on the first panel on the left.

Explore the Panel: "Universe"



1. Look at the diagram located on the left side of the panel. Mark the Virgo Supercluster's location on this diagram.

2. Why do astronomers use light years instead of kilometers or miles to measure very large distances? *(Answers may include: The light year allows astronomers to express large distances with reasonably small numbers; with smaller units of measure there would be too many zeroes.)*

3. About how many galaxies are in the observable universe? *(Answer: Many billions)*

Explore the Panel: "What Is the Universe?"

4. The universe is all the matter, energy, and space that exist. Describe these three components.

(Answers may include: Matter is the physical substance of things — of stars, planets, and people. Light is a form of energy that travels through space in waves. We learn about the universe by observing different kinds of light.)

5. Stars, planets, and many other objects are made out of matter. Even the chemicals in the human body are composed of elements including hydrogen, oxygen, and carbon. These elements are the same ones found in stars and planets because all the elements other than hydrogen in our bodies were created within stars, before Earth formed. Record the percentage of elements in the universe in the data table on the right.

Element	Percentage
Hydrogen	*(74%)*
Helium	*(24%)*
Other	*(2%)*

Explore the Panel: "Our View of the Universe"

6. What is the observable universe? *(Answers may include: The observable universe is the part of the universe that we can see. Other parts of the universe are not visible because light does not travel instantaneously from them to observers on Earth.)*

Explore the "Formation and Evolution of the Universe"

Walk back to the beginning and find the panel to the left of the Universe wall.

7. How is the universe changing over time? *(Answers may include: The universe is constantly expanding. The rate of expansion is increasing.)*

What will the universe be like billions of years in the future? *(Answers may include: Because it is expanding, the universe will become much more immense. Most galaxies will be farther apart from each other. Most stars will have burned out.)*

Further Exploration

8. Explore the rest of the Universe section. Use the back of this page to record new information or sketch interesting things that you see. (If you have time, also visit the Planets, Stars, and Galaxies sections and record your observations.)

Student Writing Guidelines

Based on your reading, your visit to the Cullman Hall of the Universe, and your discussions, write an essay in which you describe at least three kinds of objects found in the universe.

Be sure to include:
- information about planets, stars, and galaxies
- a description of the distances between objects
- specific examples of planets, stars, and galaxies

Support your discussion with evidence from the reading and the Cullman Hall of the Universe.

Use this checklist to ensure that you have included all of the required elements in your essay.

- ☐ I introduced planets, stars, and galaxies.
- ☐ I defined planets, stars, and galaxies.
- ☐ I clearly named three different astronomical objects and described them.
- ☐ I only included relevant information about planets, stars, and galaxies.
- ☐ I used information from "The Space Between Stars: Scale Models of Our Universe" to explain planets, stars, and galaxies.
- ☐ I used information from the Cullman Hall of the Universe to explain planets, stars, and galaxies.
- ☐ I used academic, non-conversational tone and language.
- ☐ I included a conclusion at the end.
- ☐ I proofread my essay for grammar and spelling errors.

Assessment Rubric

	Scoring Elements	1 Below Expectations	2 Approaches Expectations	3 Meets Expectations	4 Exceeds Expectations
RESEARCH	**Reading**	Attempts to present information in response to the prompt, but lacks connections to the texts or relevance to the purpose of the prompt.	Presents information from the text relevant to the purpose of the prompt with minor lapses in accuracy or completeness.	Presents information from the text relevant to the prompt with accuracy and sufficient detail.	Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the text.
	AMNH Exhibit	Attempts to present information in response to the prompt, but lacks connections to the Museum exhibit content or relevance to the purpose of the prompt.	Presents information from the Museum exhibit relevant to the purpose of the prompt with minor lapses in accuracy or completeness.	Presents information from the Museum exhibit relevant to the prompt with accuracy and sufficient detail.	Accurately presents information relevant to all parts of the prompt with effective paraphrased details from the Museum exhibit.
WRITING	**Focus**	Attempts to address the prompt, but lacks focus or is off-task.	Addresses the prompt appropriately, but with a weak or uneven focus.	Addresses the prompt appropriately and maintains a clear, steady focus.	Addresses all aspects of the prompt appropriately and maintains a strongly developed focus.
	Development	Attempts to provide details in response to the prompt, including retelling, but lacks sufficient development or relevancy.	Presents appropriate details to support the focus and controlling idea.	Presents appropriate and sufficient details to support the focus and controlling idea.	Presents thorough and detailed information to strongly support the focus and controlling idea.
	Conventions	Attempts to demonstrate standard English conventions, but lacks cohesion and control of grammar, usage, and mechanics.	Demonstrates an uneven command of standard English conventions and cohesion. Uses language and tone with some inaccurate, inappropriate, or uneven features.	Demonstrates a command of standard English conventions and cohesion, with few errors. Response includes language and tone appropriate to the purpose and specific requirements of the prompt.	Demonstrates and maintains a well-developed command of standard English conventions and cohesion, with few errors. Response includes language and tone consistently appropriate to the purpose and specific requirements of the prompt.
SCIENCE	**Content Understanding**	Attempts to include science content in explanations, but understanding of the topic is weak; content is irrelevant, inappropriate, or inaccurate.	Briefly notes science content relevant to the prompt; shows basic or uneven understanding of the topic; minor errors in explanation.	Accurately presents science content relevant to the prompt with sufficient explanations that demonstrate understanding of the topic.	Integrates relevant and accurate science content with thorough explanations that demonstrate in-depth understanding of the topic.