Marietta City Schools
2023-2024 District Unit Planner

Fourth Grade

Topic Title:	*#4 Characteristics of and Interactions Among Celestial Bodies*	**Unit Duration**	*3 weeks*

Mastering content and skills through KNOWLEDGE-BUILDING (establishing the purpose of the unit):

What enduring understandings will students gain from this unit? Earth's celestial neighbors have observable and theoretical characteristics, some of which have tangible effects on humans and one another.

GSE Standards

ELA

ELAGSE4RI2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

ELAGSE4RI3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

ELAGSE4RI4 Determine the meaning of general academic language and domain specific words or phrases in a text relevant to a grade 4 topic or subject area.

ELAGSE4RI7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Science

S4E1. Obtain, evaluate, and communicate information to compare and contrast the physical attributes of stars and planets.

a. Ask questions to compare and contrast technological advances that have changed the amount and type of information on distant objects in the sky.

b. Construct an argument on why some stars (including the Earth's sun) appear to be larger or brighter than others.

c. Construct an explanation of the differences between stars and planets.

d. Evaluate strengths and limitations of models of our solar system in describing relative size, order, appearance and composition of planets and the sun.

S4E2. Obtain, evaluate, and communicate information to model the effects of the position and motion of the Earth and the moon in relation to the sun as observed from the Earth.

a. Develop a model to support an explanation of why the length of day and night change throughout the year.

b. Develop a model based on observations to describe the repeating pattern of the phases of the moon (new, crescent, quarter, gibbous, and full).

c. Construct an explanation of how the Earth's orbit, with its consistent tilt, affects seasonal changes.

Essential Questions

Factual—

What type of space objects are the Earth, the Sun, and the Moon?

How do the Earth and the Moon move through space?

What happens during a solar and lunar eclipse?

What is the order of the eight planets in our solar system?

Inferential—

Which planets in our solar system are most and least like one another?

How does a planet's atmosphere and distance from the Sun affect its physical features?

Critical Thinking-

Why is the Sun not part of any named constellation?

Which planets in our solar system might best and least support establishing a human colony?

Tier II Words- High Frequency Multiple Meaning	**Tier III Words-** Subject/ Content Related Words
relative, phase, moon, quarter, full, new, tilt, composition, planet, stars	crescent, gibbous, orbit, satellite, refraction
Assessments- 3rd-5th Social Studies and Science assessments are available through AMP. Please see your instructional coach for support if needed.	

Transfer of Integrated Skills:

- What? Pair Share

  Asking questions after a read-aloud is one way to see how much everyone has learned. Think of a question you can ask your neighbor about the read-aloud that starts with the word what. For example, you could ask, “What is the difference between a meteoroid, a meteor, and a meteorite?” Turn to your neighbor and ask your what question. Listen to your neighbor’s response. Then your neighbor will ask a new “what” question, and you will get a chance to respond.

  ELAGSE4RI1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
  ELAGSE4RI3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
  ELAGSE4RI7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

- Interpreting Passages and Diagrams adapted from district mini assessments

  ELAGSE4RI1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
  ELAGSE4RI2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.
  ELAGSE4RI3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
  ELAGSE4RI4 Determine the meaning of general academic language and domain specific words or phrases in a text relevant to a grade 4 topic or subject area.
  ELAGSE4RI7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Content-Specific GSE/Skills:

- MCS 4 Stars, Planets, Moon Summative Assessment
- DE Our Sun the Star Summative Assessment
- DE Constellations Summative Assessment
- DE The Seasons Summative Assessment

Writing Task and Rubric:

Provide students with the following prompt and any available resources generated during this unit: *Compare and contrast the "sister" planets Earth and Venus. How are they similar? How are they different?* Provide students with an Information Writing Checklist to guide their work and score the final products using an Information Writing Rubric.

ELAGSE4W2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
ELAGSE4RI3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

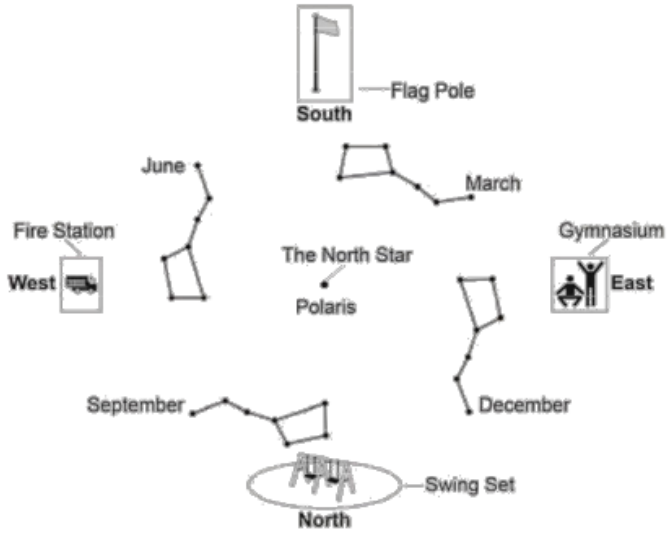
Objective or Content	Learning Experiences	Differentiation Considerations
Daily Lessons for Text Comprehension	*Characters of and Interactions Among Celestial Bodies: 15-Day Plan*	
Connected SS/Sci Experiences *(omit this row if KBU does not contain SS or Sci connections)*	***Exploration I*** Materials List (per group) • Construction paper • Pencils • Scissors • Clear tape • Tube, cardboard, toilet paper roll Explain to students that they are going to make a constellation that they can see any time they wish. First they need to choose a constellation. Students should use DE Science resources, Internet sites, and books to select a constellation. Advise students not to choose a constellation that is too complex or has very many stars, as it will be hard for them to recreate it on the small space of a toilet-paper roll. Once students have selected their constellation, they should draw a diagram of it in their notebooks and write down notes about where it is located in the sky, what stars make it up, when it can be seen, and how it is used. Next they should cut out a circle of black construction paper about four inches (ten cm) in diameter. Wrap the circle over one end of the toilet paper roll, and fold the edges over the end so that the paper completely covers the end. Tape the paper in place. Use a pencil to mark where the stars of the constellation should be on the outside of the paper-covered end. Then use the pencil to	

	poke small holes into the paper, making each “star” of the constellation. Students should be careful not to poke too hard or make the holes too large. Hold the tube up to a light source and look through it to see the constellation. ***Communicating and Evaluating*** Put students into small groups so that they can take turns looking at each other’s constellations. Each student should share what he or she found out about the constellation with the rest of the group.	
	Exploration II In this activity, students will use star charts to compare the locations of a group of stars in the night sky throughout several months. They will develop an understanding of how Earth’s orbit around the sun causes observable patterns, including the different apparent positions of the stars at different times during the year. Materials Per Group: • construction paper, black • white colored pencil or crayon • drawing compass • monthly star charts • pencil • Student Investigation Sheet • directional compass To introduce the activity, give students time to look at their star charts and decide which group of stars they would like to chart over the course of four months during the year. Have students decide which group of months they would like to chart: • January/April/July/October • February/May/August/November • March/June/September/December Encourage students to choose one of the following constellations, which are viewable in the Northern Hemisphere in every season: Cassiopeia (the Queen), Cepheus (the King), Draco (the Dragon), Ursa Minor (the Little Dipper). Work with the students to help orient them and understand what the star chart is showing. Model how to use the star charts. Say: If we are facing north, rotate the star chart so north is at the bottom. Then, raise the chart over your head. Now we can see the different star groups in the sky. Part 1: Charting a Constellation	

	1. Have students think about the location of stars in the sky. Have students work in their groups to discuss the location of stars during the day. Ask guiding questions such as: Do stars appear in the same location of the sky at 6pm and 11pm? What makes you think so? [Stars appear to move slowly over the course of a night. The sky rotates around the area of the sky where the North Star is found. The stars are not really moving, but Earth's rotation on its axis causes this effect.] 2. Before charting their constellations, have students form a prediction about the way stars appear to move over the months. Ask guiding questions, such as: Do stars appear in the same location of the sky in January and July? What makes you think so? [No, stars appear to be in different locations over the months. Earth revolves around the sun, so at different times of the year we have a view of different constellations.] 3. Have students use a drawing compass to draw a circle with a diameter of 12" (30cm) on the black construction paper. Have students draw a white star at the center point and label it Polaris or the North Star. 4. Have each group of students bring their circle of construction paper, white crayon, and a compass out to the school yard. 5. Explain to students that they will be labeling compass directions on their charts. Model the process for students. Say: First, I am going to use my compass to find north. Remember, a compass always points north, so I can move the directions of the compass so they are correct. Now, I know each direction, and I am going to write them on my star chart. Sometimes remembering directions is difficult, so I'm going to draw a landmark to help me. I see [the swing set] to the north, so I'll draw a swing set on the north direction of my star chart. 6. Continue modeling the remaining directions and landmarks. Have students work with their groups to label directions and draw landmarks on their own star charts. 7. Have students put their pencils down and watch as you use the think-aloud strategy to model the process of drawing your constellation in each season. Say: I am going to chart Ursa Major (the Big Dipper). First, I will chart its location in May. I can see on my star chart where the Big Dipper is located in relation to the compass points and the North Star. 8. Remind students to label each month while completing their charts. 9. Explain to students that they will then complete the same process while charting three remaining months. 10. Have students begin plotting the constellation of their choice. While they are working, circle the room to check for understanding and offer support when needed. Ask students if they notice a pattern forming, and what this tells us.	

	11. Note for the Teacher: Depending on your students' level, you may want to go deeper into the discussion of why the constellations appear in different parts of the sky at different times of year and why some are visible at some times and not at others. The reason has to do with the position of Earth with respect to the sun and the fact that stars are visible only at night, on the side of Earth facing away from the sun. In the summer, our view at night is from the other side of Earth's axis from our view at night during the winter. So a group of stars that appears to be on one side of Polaris in the summer appears to be on the other side of Polaris in the winter. Some constellations are not visible at all during some times of year, because they are on the sun side of Earth—we are facing those constellations only during the day and, therefore, cannot see them. Students can understand this best when modeled with pictures or with their bodies. 12. To model the above discussion, have a student volunteer be the sun and stand in the center of the room. Have another student be Earth and stand close to the wall. Say: Pretend this location of Earth is January. During the day, which direction is Earth facing? Have Earth face the sun. Say: Can we see stars during the day? So everything you see from this spot is not visible during the day. Now turn around. At night we are facing away from the sun. Can you see the same parts of the room you saw when you were facing the sun? [No.] Have Earth revolve around the sun and stop on the other side of the sun. Say: Now, it is July. Put your back to the sun. At night you can see only this area. Is it the same area of the sky you could see when you were standing on the other side of the room? [No.] As Earth revolves around the sun, we get a different view of the sky based on our position. Some constellations would only be visible if we could see them during the day in certain months. Others we can see during the night because they are facing away from the sun.	

Sample Constellation Chart: Ursa Major (The Big Dipper)



Part 2: Discuss Findings

Divide students into small groups to discuss their findings. If possible, each group should contain students that charted different constellations. Students should take a turn explaining their constellation and how it changed over the seasons. Remind students to show their chart to the group while explaining their constellation. Once each student has presented to the group, have the group discuss their findings and what they now know about Earth's orbit around the sun.

Communicating and Evaluating

1. In what ways did your constellation appear to change from month to month? In what ways did it appear to stay the same? Explain. Student answers will vary. Sample answer: The constellation I charted appeared to move counterclockwise around Polaris (the North Star). It stayed the same shape, but it moved to different places in the sky. When I started charting April, I was not sure if it would be predictable, but I quickly saw a pattern develop as I charted the other seasons.

2. How was the pattern that you observed similar and different from the pattern that your classmates observed? Student answers will vary. Sample answer: When comparing charts with my classmates, I observed that we all had similar findings; the

	constellation appeared to rotate around Polaris in a counterclockwise direction. Every constellation appeared to move in the same direction, even though they were located at different distances from Polaris. They all stayed the same shape as they moved. 3. Choose one of the months that you charted the position of the constellation. Where do you think the constellation will be in the sky in the next month? How can you make this prediction? Plot the location on your chart, and use a monthly star chart to check your prediction. Students should predict that the constellation would be about 1/3 of the way between the month they chose and the next month they charted. (If they choose January, in February the constellation will be about 1/3 of the way from January toward April.) 4. Why do the constellations appear to move in the sky throughout the year? Why do they move in a predictable pattern? The constellations appear to move because Earth is orbiting the sun. The changes are predictable and regular because the way the Earth revolves around the sun is also predictable and regular. 5. If Earth orbited around the sun in the opposite direction, how would the pattern made by the constellations be different? If Earth orbited the sun in the opposite direction, the constellations would appear to move in the opposite direction around Polaris. Since the constellations are really staying in the same spot, the pattern would follow the way Earth orbits the sun. 6. Look carefully at your chart. In which part of the sky do you think your constellation will be tonight? Check your prediction on the next clear night. Student responses should be consistent with their charts and with the date of the activity.	
	Exploration III Students will investigate the relationship between how bright a light source appears to be and the distance from the light source. Safety Precautions: Advise students not to look at the light, but rather to aim the light meter at the light to measure the brightness, Materials: Per Class: • access to a very dark room Per group: • flashlight • light meter, or light meter app for a smartphone device • meter stick or tape measure Per Student: • Student Investigation Sheet (Optional) Teacher Preparation and Notes	

• Gather materials in advance of students performing the lab.
• If possible, cover windows and any other sources of light in the room to make it as dark as possible.
• If students do not have access to a dark room, students can use a very large cardboard box instead.
• Consider giving each group a different type of flashlight so that they can compare results.
• As students are carrying out their investigation, discuss with the groups the possible sources of error and ways to reduce the error (for example, their readings may be affected by light from other groups.) Scientists describe the brightness of stars as seen from Earth as apparent brightness.
Before beginning the activity, explain that the flashlight in this lab will serve as a model of a star. Ask: How will the flashlight be similar to stars? How will the flashlight not be a good model of a star?

Also, discuss light meters, a tool students may not have used before. Light meters measure the brightness of light in an area. Photographers use light meters to determine if the amount of light in an area is correct for the type of photograph they are trying to take.

Procedure
1. Divide class into groups of 3-4 students.
2. Ask students to predict how the apparent brightness of a light source is affected by how far you are from the light.
3. Instruct students to choose a position in the room where they can observe the lit flashlight near to them, somewhat far away from them, and far away from them.
4. Have students choose at least the three locations to place the lit flashlight and measure the distance from where they will stand and observe the flashlight.
5. Have students place the lit flashlight at each location and measure the brightness with the light meter.
6. Have students complete a data table with the distances and readings from the light meter.

Trial	Distance	Light Meter Reading
1		
2		
3		

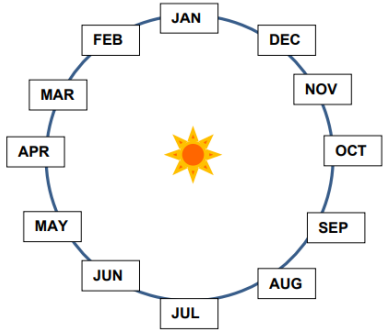
7. As an extension, students may
• repeat steps 5-6 with flashlights of different brightness, colors, or flashlight locations
• graph the data to try to determine the relationship between brightness and distance

Communicating and Evaluating

	1. What relationship did you find between the distance from the light and the brightness? The closer the light was to us, the brighter it appeared. 2. Explain why the sun is the brightest star in the sky. Because the sun is so close to Earth compared to other stars. 3. Does this mean that closer stars are brighter stars? Explain your answer. No. This experiment only shows that, if two stars are the same size but different distances, the closer star will appear brighter. 4. Scientists describe the brightness of stars from Earth as apparent brightness. Describe what this means in your own words. Apparent brightness is how bright a star appears to be. For example, the flashlight appeared to be less bright when it was farther away. But in reality, it had the same brightness. 5. This lab only took distance into account when thinking about the apparent brightness of a star in the sky. What other factors might affect the apparent brightness of a star? The size and amount of energy a star has affects its apparent brightness. The actual brightness of the star affects how bright it appears in the sky.	
	Exploration IV In this activity, students will use graphical displays to model the changing seasonal appearance of constellations in the night sky. Materials globe to represent Earth light source to represent the sun (a bare light bulb would be ideal, however use caution not to let students touch the hot bulb) 12 placards or large pieces of paper (at least 11 in. x 18 in.), each labeled with the 12 months of the year at the top 12 student-drawn imaginary constellations on construction paper Procedures Arrange students into no more than 12 groups. Have each group imagine, draw, and name at least one constellation on construction paper. In total, the class should create 12 new constellations. (Note that students will be using imaginary constellations so that you do not have to worry about the accuracy of relative positions of actual constellations in the sky.) Arrange the room so a light source can be placed, or held, in the middle of the room. Assign students to attach one constellation image to each monthly placard. (You may want to identify each constellation with a single letter to make data collection easier.) 12 students standing in a circle around the light source should hold the 12 placards. There should be enough space between the light source and the placards for a person to be able to see more than one placard at	

a time. The months should be arranged counterclockwise, with February to the left of January, following the counterclockwise direction Earth takes around the sun.

Your setup may look something like this, as viewed from above:



1. Walk slowly around the sun carrying the globe, keeping the axis tilted in the same direction. Pause at one or two placards, then point out and discuss the geometry of the relative positions of the sun, Earth, and constellations. Students should understand and appreciate that the side of the globe away from the sun represents the dark, or night, side of Earth and that a person looking up into the night sky will see only those constellations that are in that particular direction.

2. Working in small groups, have students, with their worksheets and pencils, arrange themselves in a circle with their backs to the sun. Each student should be directly opposite one placard. Ask students to note which constellations they can see from left to right without looking over their shoulders. Have them write down the constellations in their line of sight from left to right on their charts.

3. Now ask them to move so they are directly facing the placard that is two places to the left of the one they previously faced. Have them repeat the process of writing down which constellations they can see.

4. Continue until all students have had a chance to make three observations. Have students who have completed their charts change places with those holding the placards as necessary.

5. Depending on the size of the circle, the number of constellations students can see will range from three to five. The data in their table should look something like this (where letters represent names of constellations):

Month	Constellation 1 (far left)	Constellation 2	Constellation 3	Constellation 4	Constellation 5 (far right)
Jan	A	B	C	D	E
Feb	L	A	B	C	D
Mar	K	L	A	B	C

Communicating and Evaluating

1. What pattern do you see in your table? Students should note that the constellations they could see shifted to the right. A constellation in a middle position moves to the right in the next position and may not be seen at all in the third position.

2. How does the pattern suggest how Earth's view of constellations changes from season to season? Students should note that the constellations that can be seen change as Earth orbits the sun for 12 months. As Earth changes its position, some constellations can no longer be seen because the daylight side of Earth faces them and other constellations come into view.

3. Why was there a limit to the number of constellation cards you could see at one time? How is this similar to looking at the night sky? Students should note they were standing on a curve. This prevents them from seeing beyond a certain point without looking over their shoulders. Outside, they cannot see what's in the sky past the horizon.

4. If the pattern continued, in what month would you be able to start to just see the constellation that was on the far right in your first position? Answers will vary depending on the data.

Connected Tier 1 Unit

Connected Structured Literacy Activities	**Use the Fluency Grids** to practice various groups of vocabulary related to this unit: • *lunar, solar, Sun, Moon, Earth, orbit* • *crescent, gibbous, waxing, waning, new, full* **Use the Flex the Vowel** strategy to discuss using multiple known phonics rules when encountering a new word rather than consistently using one rule without monitoring the outcomes. For example: *planet* starts with a CVC *plăn/ĕt* not Silent e *plānt* *gibbous* starts with a CVC *gĭb/ŭs* not Open Syllable *gī/bŭs*	
Connected Writing Activities		

Additional Planning Resources				
MCS K-5 KBU Overview	KBU as a 15-day Plan (Template)	MCS Structured Literacy Repository	Berger Framework for Comprehension (Template)	The Writing Revolution (Templates)

Additional Instructional Resources
Suggested High Quality Complex Texts **Suggested Experiential Resources**