

Lesson Plan **Candidate: Beth Kostka**

Strategy: ___Task Rotation_____

Unit Name **Astronomy**

Lesson Name	Time Needed (Hours/Days)
Views of the Solar System and Early Astronomers	2 days

Grade	Subject	Course
6	Earth Space	6th grade Earth Space Science

Essential Question(s)

What should students know when lesson is completed?

QUESTION What does it take for scientific ideas to change?
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Standard

<p>GSE S6E1. Obtain, evaluate, and communicate information about current scientific views of the universe and how those views evolved. a. Ask questions to determine changes in models of Earth’s position in the solar system as evidence that scientific theories change with the addition of new information.</p> <p>Learning Targets:</p> <ul style="list-style-type: none">● I can conduct <u>research</u> to <u>identify</u> early astronomers and their different theories of Earth’s place in our solar system● I can <u>explain</u> how the view of Earth’s position in the solar system has changed over time● I can <u>discuss</u> how scientific theories change with the addition of new information and <u>give an example</u> of when this has happened in history.

Teacher Lesson Preparation

<p><u>Prior Knowledge/Skills:</u> Prior to the task rotation, students will be introduced space and its scale through video clips. In each unit, students discuss scale and patterns (NGSS Cross Cutting Concepts Standards) and this will aid them in understanding why it was hard to accurately observe and infer knowledge of our solar system throughout history.</p> <p><u>Gifted Identification:</u> Students are identified as gifted through CSD testing and qualification. I have 24 students identified as gifted in science plus 16 Gifted in Math and/or Gifted in Reading and 1 twice exceptional (for a total of 41 gifted students in my class).</p> <p><u>Goals/Standards:</u> The goals of the lesson are for students to be able to</p>
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- Conduct their own research into early astronomers and identify their views on the solar system.
- Use their notes to show their understanding of the learning target
- Explain how the view of Earth's position in the solar system has changed over time
- Discuss that scientific theories change with the addition of new information

Pre-assessment:

To pre-assessed whether students have met the learning goals prior to this lesson, they were given a google form pre-test with 30 questions on astronomy. Specifically the 4 questions on the view of the universe will be reviewed.

Misconceptions:

Based on assessment from prior years and from _____ website, I know that students have misconceptions that the view of Earth orbiting around the sun has always been agreed upon.

Additional indirect misconceptions that exist about our solar system include

- The Earth is the center of the **Solar System** about which the other objects revolve.
- The **Solar System** formed during the Big Bang, along with the rest of the Universe.
- The **Solar System** is the same as our Galaxy.

“Grouping strategies”: Students will not be grouped. This is an individual project.

Text Choice:

Attempted to choose the primary reading from NewsELA, but no text was close enough aligned to the topic. As a result, one of the two primary texts for each astronomer to be researched was chosen from **WorldBook**. The second text was written personally by Beth Kostka. The text written by Beth Kostka were leveled for lower lexile reading using the website rewordify.com.

Special Population Consideration:

Texts purposely include female astronomers to connect with the special population of female gifted students. Graphic organizer provides structure for twice gifted students and the self expressive task is provided for creatively identified gifted students.

Activating Strategy (for example: Hook/Mini-Lesson/Warm-Up/Connection to Prior Learning)

Hook/Activating Strategy: Students will watch time-lapse video of a night sky and make observations of what is located in the night sky and how it moves. Students will then be asked to look at a model of the Earth and solar system and explain whether they agree with the model based solely on their observations of the time-lapse photography. By making their own observations of the night sky students will connect with early astronomers to understand why they believed as they did (that the Earth is the center of the solar system) since students will see the stars and planets arcing across the night sky appearing to orbit the Earth.

Instructional Sequence and Activities

The focus of this activity is for students to independently learn about early astronomers and their theories of the solar system, connecting that ideas change over time with new evidence. To achieve this, the lesson is broken into Parts. Part 1: research and take notes using a graphic organizer, Part 2: Synthesize learning and show what you now know by completing a task using their notes, and Part 3: Synthesis wrap up.

Part 1-Research and Notes (to be used in task rotation activity)

After the Activating strategy, students will be introduced to the webquest research activity during which students will read text and watch videos about early astronomers and their theories of Earth's place in the solar system. During the research, students will complete a graphic organizer to focus and facilitate learning. Students have completed this kind of task before so they are familiar with webquest research activity. (See the Notes graphic organizer below). Students will work at their own pace through the research. During the research the teacher will move around the room asking probing questions "Which view of the solar system does that scientist have? What was their evidence? Why did they think that? How is their view different from _____ scientist's?"

Part 2: Synthesize learning and show what you now know

When finished with the research and note taking activity, students will then read the four choices provided and choose one based on their preferred learning style (Mastery, Understanding, Interpersonal, Self Expressive) to show they have achieved the learning goal (" I can explain how the view of Earth's position in the solar system has changed over time and that scientific theories change with the addition of new information.)

Choice Assignment: Choose one of the four tasks below to show your understanding of the learning target. Hand your final product into the bin by the door. Follow the rubric and directions when completing your task.

Mastery Learning Style	Understanding Learning Style	Interpersonal Learning Style	Expressive Learning Style
<p>Create a timeline showing how the views of the solar system have changed over time. For each point on the timeline, be sure to include</p> <ul style="list-style-type: none"> • Date • Astronomer • View of universe • Why think this 	<p>Create a chart to Compare and contrast the two main views of the solar system by early astronomers either in a chart or a double bubble graphic organizer. Be sure to include</p> <ul style="list-style-type: none"> • Name of view • Similarities • Difference • Who believed in it • Drawing of it 	<p>What is your view of the universe? Draw a picture (model) of it and include labels and what evidence <u>rom</u> your reading that convinces you that you are right?</p>	<p>Create a poster of a famous early Astronomer. Be sure to include for each scientist</p> <ul style="list-style-type: none"> • Name • Picture of scientist • Years alive • View of the Universe • Draw a model of their view of the Solar System • What makes this scientist famous • 2 interesting facts

Part 3: Synthesis Wrap Up

When finished with task, students will share their understanding and finished products in groups of four. Grouping will be made to have all four learning styles represented in a single group. Each student in a group will have 5 minutes to present their product. At the end of the presentations, students will work as a group to complete a CER (Claim Evidence Reasoning statement) ticket out the door that answers the question “**How have scientific theories changed with the addition of new information and give an example of when this has happened in history.**” All products and CER statements will be hung around the room and in the science hallway to show learning and student engagement.

Part 4: Survey:

Students will be asked in a google form 1) Why they chose the task they did, 2) Which learning style do they prefer, 3) would they choose that learning style again, and 4) Which learning style they would like to complete the least and why.

Assessment Strategies

Evidence of Learning

- Students will be able to identify early astronomers and their different theories of Earth’s place in our solar system
- Students will be able to explain how the view of Earth’s position in the solar system has changed over time
- Students will be able to discuss how scientific theories change with the addition of new information and give an example of when this has happened in history.

Assessment: Students will be formatively assessed based on teacher observations and question responses during independent research and product work. Their responses to the CER will also be formatively assessed. The summative assessment will be graded based on a rubric provided to students (see below).

Differentiation

Scaffolds/ Interventions/Extensions/Enrichment/Adaptations for Special Pops students

This lesson differentiates by process (types of scaffolding-graphic organizer vs none) and product (choice for learning style). In addition, it differentiates by content where students who struggle to focus or have other reasons for not completing tasks receive fewer scientists (3) to research verses seven.

Specifically, scaffolds (graphic organizers and timeline checklist) are provided to gifted students needing help with organizational skills. Gifted students who are quick to grasp content and motivated to complete assignments have acceleration options of additional/expanded text sources (see materials section). Gifted students who are struggling writers will be provided with graphic organizer with sentence starters and if completely necessary, “flipgrid” to aid them in verbally articulating their understandings. Struggling readers will receive differentiation with tiered lexile

text, a video, sentence starters, and checklist. Finally, creatively gifted students are planned for by including tasks across all learning styles including self-expressive.

Special populations are planned for through text extensions-Women astronomers and minority astronomers (see materials below).

Materials/Links/Text References/Resources

Texts

Ptolomy

- https://drive.google.com/a/csdecaur.net/file/d/0B4BDKk_Cf5vUZGZ1WmFLOWRra0U/view?usp=sharing
- https://docs.google.com/a/csdecaur.net/document/d/1zE1S6pHOR7GE1nc-zRj_FjGRdE-m_aYMCQMrdPfNd1Q/edit?usp=sharing

Copernicus

- https://drive.google.com/a/csdecaur.net/file/d/0B4BDKk_Cf5vUb2wydjlGM2xzcUE/view?usp=sharing
- <https://docs.google.com/a/csdecaur.net/document/d/1Z5S9E4C3AThj6bvKhOM5nXJdMY1-IE1i3UOpsR3AGSE/edit?usp=sharing>

Galileo and Newton

- Brainpop
- https://drive.google.com/a/csdecaur.net/file/d/0B4BDKk_Cf5vUN2RPdjdfMmMtMDA/view?usp=sharing
- https://docs.google.com/a/csdecaur.net/document/d/1XG9JgCnmXAxQ3xPcthUN4q59EB-ZWKMUsjOf_1qU-xQ/edit?usp=sharing
- https://drive.google.com/a/csdecaur.net/file/d/0B4BDKk_Cf5vUejFZd2o5RENpVIE/view?usp=sharing

Kepler

- https://drive.google.com/a/csdecaur.net/file/d/0B4BDKk_Cf5vUNG84SExIcG9FdDg/view?usp=sharing
- <https://docs.google.com/a/csdecaur.net/document/d/18d-dVoefziaSSecXxq3k-1ENdKoD-lhYDScuRzCshWY/edit?usp=sharing>

Aristerchus

- https://drive.google.com/a/csdecaur.net/file/d/0B4BDKk_Cf5vUSENESmhxaDcwa0U/view?usp=sharing

Female Astronomers

- <https://armaghplanet.com/3-female-astronomers-who-struggled-for-the-stars.html>
- <https://www.mnn.com/leaderboard/stories/10-female-astronomers-everyone-should-know>

Minority Astronomers

- <http://www.math.buffalo.edu/mad/physics/astronomy-peeps.html>

ATTACHED DOCUMENTS

Handout

MEET THE EARLY ASTRONOMERS

And their views of the sky

TASK: At the end of today's learning you will use your notes below to either create a timeline, draw a double bubble map, create a poster, or explain your own view of the universe to show your understanding of the learning target

- I can explain how the view of Earth's position in the solar system has changed over time and that scientific theories change with the addition of new information.

Directions: TAKE NOTES IN ALL OF THE BOXES BELOW. First read, watch or view the resources provided in the left column below. For each scientist take notes on place of birth, year, his/her view of solar system, why they had this view and other interesting facts. You will then use these notes to complete a choice assignment at the bottom of the page to show what you have learned.

Text/Media to teach me:	I learned/Makes me think:
Ptolemy - Read this Ptolemy article from WorldBook. Read this Ptolemy article.	<ul style="list-style-type: none">• Place of birth:• Birth Year:• He believed that the _____ was the center of our solar system.• Why did he believe this?• At least 2 other interesting facts:
Copernicus- Read this Copernicus article from WorldBook. Read this Copernicus article.	<ul style="list-style-type: none">• Place of birth:• Birth Year:• He believed that the _____ was the center of our solar system.• Why did he believe this?• At least 2 other interesting facts:•
Galileo - 1. Watch BrainPop User name: decaturga Password: decatur 2. Read this Galileo article from WorldBook. 3. Read this Galileo article.	<ul style="list-style-type: none">• Place of birth:• Birth Year:• He believed that the _____ was the center of our solar system.• Why did he believe this?• At least 2 other interesting facts:
Kepler -	<ul style="list-style-type: none">• Place of birth:

<p>Read this Kepler article from WorldBook.</p> <p>Read this Kepler Article</p>	<ul style="list-style-type: none"> ● Birth Year: ● He believed that the _____ was the center of our solar system. ● Why did he believe this? ● At least 2 other interesting facts:
<p>Newton - Watch this Newton BrainPop.</p> <p>User name: decaturga Password: decatur</p> <p>Read this Newton article from WorldBook.</p>	<ul style="list-style-type: none"> ● Place of birth: Birth Year: ● He believed that the _____ was the center of our solar system. ● Why did he believe this? ● ● At least 2 other interesting facts:
<p>Aristarchus -</p> <p>Read this Aristarchus article from WorldBook.</p>	<ul style="list-style-type: none"> ● Place of birth: ● Birth Year: ● He believed that the _____ was the center of our solar system. ● Why did he believe this?
<p>Early female astronomers</p> <p>Look at this website to find out more about female astronomers who struggled for the stars</p> <p>Extra: more female astronomers at this website</p>	<p>Name of female astronomer:</p> <p>Place of birth:</p> <p>Birth Year:</p> <p>At least 2 other interesting facts:</p>

Choice Assignment: Choose one of the four tasks below to show your understanding of the learning target. Hand your final product into the bin by the door.

Mastery Learning Style	Understanding Learning Style	Interpersonal Learning Style	Expressive Learning Style
<p>Create a timeline showing how the views of the universe have changed over time. For each point on the timeline, be sure to include</p> <ul style="list-style-type: none"> ● Date ● Astronomer ● View of universe ● Why think this 	<p>Compare and contrast the two main views of the solar system by early astronomers either in a chart or a double bubble graphic organizer. Be sure to include</p> <ul style="list-style-type: none"> ● Name of view ● Similarities 	<p>What is your view of the solar system? Which of the views you researched do you agree with. Draw a picture (model) of it and include what evidence convinces you that you are right?</p>	<p>Create a poster for one of the famous Astronomers be sure to include</p> <ul style="list-style-type: none"> ● Name ● Years alive ● View of the Universe ● Draw a model of their view of the Universe

	<ul style="list-style-type: none"> • Difference • Who believed in it 		<ul style="list-style-type: none"> • What makes this scientist famous • 2 interesting facts
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RUBRIC for Task Rotation (Total 50 points)

Criteria	Full Credit 10 Points	Half Credit 8 points	Partial Credit 6 points	Grade:
Content: Is the content of the product well chosen?	Content or model chosen represents the best choice for the product. Graphics are well chosen and related to content.	Information, model or graphics are related to content, but are not the best choice for the product	Information, model or graphics presented does not appear to be related to topic or tasks.	
Completeness: Is everything included in the product?	All information needed is included . Product meets the product criteria and the criteria of the task as stated.	Includes most important information. Product meets the product criteria and the criteria of the task as stated.	Includes less than 50% of the important information. The product does not meet the task, or does not meet the product	
Creativity: Is the product original?	Presentation and Graphics are original. Product includes an element of fun, interest, or creativity.	Presentation of information is from a new perspective. Graphics are not original. Product has elements of fun and interest.	There is no evidence of new thoughts or perspectives in the product.	
Correctness: Is all the information included correct?	All the information presented in the product is correct and accurate	N/A	Any portion of the information presented in the product is incorrect.	
Communication: Is the information in the product well communicated?	Everything is neat & easy to read. It is in appropriate format & shows significant effort. Presentations are easy to	Most of the product is neat and easy to read. Product is in appropriate format and show	The product is not neat and easy to read or the product is not the appropriate format. It does not	

	understand and presented with fluency. NO COPY AND PASTED INFO!	significant effort. Oral presentations are easy to understand, with some fluency.	show significant effort. Oral presentation was not fluent or easy to understand.	
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Power point Part 1: https://drive.google.com/open?id=1muEoQqY5I_klNwep5Eb-tsIj7UG4XQm


Early Space Study (prior to 1609)

- Prior to telescope technology
- Observations were made by the naked eye

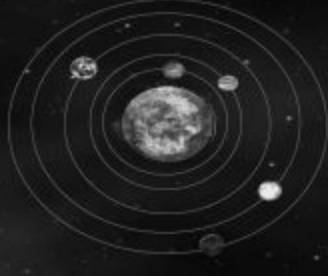
Click on photo for time-lapse video of night sky
<https://www.youtube.com/watch?v=xTvVQ65jWVs>



You weigh in: turn to a partner to complete the following discussion question.



Is the model of the solar system to the right correct?



If you think the answer is no, what is wrong with it?

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And their views of the sky

3550: At the end of today's learning you will either create a timeline, draw a double bubble map, create a poster or explain your own view of the universe to show your understanding of the learning target

- I can explain how the view of Earth's position in the solar system has changed over time and that scientific theories change with the addition of new information.

Directions: First read, watch or view the resources provided in the left column below. For each scientist take notes on place of birth, year, his/her view of solar system, why they had this view and other interesting facts. You will then use these notes to complete a double engagement at the bottom of the page to show what you have learned.

Text/Video to teach me:	Notes/Map/Poster to think:
Ptolemy: Read this Ptolemy article from StudyDrive. Read this Ptolemy article.	<ul style="list-style-type: none"> • Place of birth: • Birth Year: • He believed that the _____ was the center of our solar system. • Why did he believe this? • At least 2 other interesting facts:

Ticket out the Door....

What is one thing you learned today?

What is one questions you now have?

Webquest (research day)

Day 2

Task: Finish your research & notes.
Choose one task to show what you learned.

Class Assignment: Choose one of the four tasks below to show your understanding of the learning target. Hand your final product into the bin by the door.

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<p>Create a timeline showing how the views of the universe have changed over time. For each point on the timeline, be sure to include:</p> <ul style="list-style-type: none"> • Date • Astronomer • view of universe • Why think this 	<p>Compare and contrast the two main views of the solar system by early astronomers either in a chart or a double bubble graphic organizer. Be sure to include:</p> <ul style="list-style-type: none"> • name or view • Similarities • Difference • Who believed in it 	<p>What is your view of the universe? Draw a picture (model) of it and include what evidence convinces you that you are right?</p>	<p>Create a poster for one of the famous Astronomers be sure to include:</p> <ul style="list-style-type: none"> • Name • Years alive • View of the Universe • Draw a model of their view of the Universe • What makes this scientist famous • 2 interesting facts

Homework if not finished. Due Tuesday

RUBRIC for Task Rotation (Total 56 points)

Criteria	Full Credit: 10 points	Half Credit: 8 points	Partial Credit: 6 points	Grade:
Content: Is the content of the product well chosen?	Content or model chosen represents the best choice for the product. Graphics are well chosen and related to content.	Information, model or graphics are related to content, but are not the best choice for the product.	Information, model or graphics presented does not appear to be related to topic or tasks.	
Completeness: Is everything included in the product?	All information needed is included. Product meets the criteria and the criteria of the task as stated.	Includes most important information. Product meets the product criteria and the criteria of the task as stated.	Includes less than 50% of the important information. The product does not meet the task, or does not meet the product.	
Creativity: Is the product original?	Presentation and Graphics are original. Product includes an element of fun, interest, or creativity.	Presentation of information is from a new perspective. Graphics are not original. Product has elements of fun and interest.	There is no evidence of new thoughts or perspectives in the product.	

Formative Questions

1. **What was Ptolemy's view of the solar system called? (M)**
2. **What were problems with this view? (M)**
3. **What was Copernicus' view of the solar system called? (M)**

PPT Part 2

Statement of Inquiry

Innovation helps us explore our Universe

- I can **explain** how scientific theories change over time and **give an example** of when this has happened in history.

1

How do we meet this learning target?

I can **explain** how scientific theories change over time and **give an example** of when this has happened in history.

- communicate ideas
- Explain the importance of
 - new information/data,
 - new technologies
 - more labs or investigation
- **Must include** to show understanding
 - Answer to question
 - comparison
 - example
 - data/specifics

2

Task:

1. Get into assigned groups when told
2. Choose a time-keeper and choose a scribe
3. Present what you chose to create (2 minutes per person)
4. **each person takes notes for CER**
5. When finished, as a group write a CER on poster paper to answer the question

"What causes scientific theories to change over and why?" Use evidence from each of the four types of learning presented in your group and include an example of when this has happened in history."

3

C **Claim:** Answers the question asked
What causes scientific theories to change over time and why?

E **EVIDENCE:** ideas or observations that support the answer in general PLUS an example

R **REASONING:** Explain WHY each idea or observation is important and supports the claim

R **THIS explains THAT because.....**

Formative Post Lesson Survey

Which learning task did you choose? *

- Timeline (Mastery Learner)
- Compare and Contrast (Understanding Learner)
- Draw MY model (connecting to me- Interpersonal learner)
- Draw a poster (Creative Learner)

Why did you chose this task? *

Your answer

Would you choose this task again? *

- Yes
- No
- Maybe

Why or why not? *

Which learning style do you prefer? *

- Learning with FACTS (Mastery)
- Learning with big ideas or connections (Understanding)
- Learning by connecting to SELF (Interpersonal)
- Learning by doing something creative (Self-Expressive)

Which learning style do you like the least? *

- Learning with FACTS (Mastery)
- Learning with big ideas or connections (Understanding)
- Learning by connecting to SELF (Interpersonal)
- Learning by doing something creative (Self-Expressive)

Why do you like that learning style the least? *

Your answer
