Unit 2: The Rise of Astronomy

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **10 days**
Status: **Published**

Summary

In this unit, students will learn the history of astronomy from ancient astronomy through Galileo's work during the Renaissance.

Introduction: Students have been told for many years of school that the Earth is round and goes around the sun, but how do humans know that? In this unit, students will learn about early beliefs ancient peoples had of Earth and the heavens and how those beliefs changed over time. Two major turning points will be emphasized: Copernicus' heliocentric model and Galileo's discoveries regarding motion.

Revision Date: July 2019

LA.RST.9-10	Reading Science and Technical Subjects
LA.WHST.9-10	Writing History, Science and Technical Subjects
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
SCI.HS-ESS1-4	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
SCI.HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
SCI.HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more

	manageable problems that can be solved through engineering.
SCI.HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
WRK.9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
TECH.9.4.2.GCA.1	Articulate the role of culture in everyday life by describing one's own culture and comparing it to the cultures of other individuals (e.g., 1.5.2.C2a, 7.1.NL.IPERS.5, 7.1.NL.IPERS.6).
TECH.9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).
TECH.9.4.2.IML.4	Compare and contrast the way information is shared in a variety of contexts (e.g., social, academic, athletic) (e.g., 2.2.2.MSC.5, RL.2.9).

Essential Questions/Enduring Understandings

How has human understanding of the structure of the solar system changed throughout human history?

Objectives

Students will know key terms: parallax, geocentric, heliocentric.
Students will be skilled at comparing ancient beliefs and theories of archaeoastronomy to modern astronomy.
Students will know the contributions of selected Greek astronomers, mathematicians, and philosophers.
Students will know the contributions of Tycho Brache and Johannes Kepler to astronomy.
Students will be skilled at differentiating a geocentric model of the universe with a heliocentric model.
Students will be skilled at applying epicycles and deferents to explain retrograde motion.
Students will know Galileo's evidence supporting Copernicus' model and subsequent struggle with the Roman Catholic Church.
Students will know how to apply Kepler's laws of planetary motion via investigation and calculation.
Students will know how to calculate the orbital periods and distances of the planets using Kepler's 3rd law.

Learning Plan

How big is Earth? Using Eratosthenes' method for calculating the size of Earth.

Explaining the motions of the night sky using ISLE.

Read about Aristotle's view of the universe.

PhET Lab: Worlds of Wonder

Use ISLE to study inertia and discuss what consequences that has for planetary instead of solar motion.

Storytelling: Galileo.

Use 3D objects to model the solar system as hypothesized by different ancient and Renaissance astronomers.

Engineering Project: Build a telescope.

Write a defense for Galileo.

Assessment

Formative Assessment:

Checks of historical knowledge through discussion, use of ISLE cycle to determine the structure of the solar system.

Telescope project assessment

Quizzes throughout chapter

Summative Assessment:

End of Chapter Test

Benchmark: Final Exam

Materials

quantitative/qualitative lab equipment for activities, experiments
related astronomy maps, charts
supplementary interactive multimedia, internet websites, videos

Foundations of Astronomy Textbook

Integrated Accommodation and Modifications

https://docs.google.com/spreadsheets/d/1243s4Clz7zHx_VnPe-hYDP06QSohB0jKJY2NuNYySSc/edit?usp=sharing