

# Unit 7: The Milky Way and Galaxies

Content Area: **Science**  
Course(s):  
Time Period: **Marking Period 2**  
Length: **9 days**  
Status: **Published**

## Summary

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In this unit, students will learn about our home galaxy as well as other galaxies and how they formed.

**Introduction:** The Milky Way is our home galaxy, but there are many other galaxies with similarities and differences. Students will learn about the shapes of galaxies, how galaxies formed, and how humans' understanding of galaxies has changed over time. Students will also study new topics in astrophysics such as dark matter and dark energy.

**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.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
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-ESS1-2	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
SCI.HS-ESS1-3	Communicate scientific ideas about the way stars, over their life cycle, produce elements.
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-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and

	constraints for solutions that account for societal needs and wants.
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-PS2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
SCI.HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
SCI.HS-PS1-8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
SCI.HS-PS3-1	Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
SCI.HS-PS2-2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
SCI.HS-PS2-4	Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
SCI.HS-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
WRK.9.1.2.CAP.1	Make a list of different types of jobs and describe the skills associated with each job.
9-12.HS-ESS1-2	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
9-12.HS-ESS1-3	Communicate scientific ideas about the way stars, over their life cycle, produce elements.
9-12.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.
9-12.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.
9-12.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.
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9-12.HS-PS2-1	Analyze data to support the claim that Newton's second law of motion describes the

	mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
9-12.HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
9-12.HS-PS2-2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
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.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
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**

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How is our galaxy different from and similar to other galaxies?

## **Objectives**

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Students will know how to calculate the size of the Milky Way.

Students will know how interstellar dust affects our observations of stars and the Milky Way.

Students will know what happens when galaxies collide.

Students will know how to measure the distances to nearby galaxies.

Students will know what Hubble's Law is and what consequences it has for the future of the universe.

Students will know the various shapes of galaxies and their evolutionary stages.

Students will know the parts of our Milky Way galaxy.

Students will be skilled at comparing galactic properties to our Milky Way galaxy.

## **Learning Plan**

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ISLE Cycle - The Milky Way and its shape and size

ISLE Cycle - Dark Matter and Dark Energy

Activity - Classifying galaxies

Math Activity - Measuring Galaxies

## **Assessment**

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Formative Assessment of ISLE Cycle activities

Quizzes

Summative:

Chapter Test

## **Materials**

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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**

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[https://docs.google.com/spreadsheets/d/1243s4Clz7zHx\\_VnPe-hYDP06QSoHb0jKJY2NuNYySSc/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1243s4Clz7zHx_VnPe-hYDP06QSoHb0jKJY2NuNYySSc/edit?usp=sharing)