# Science
# Unit 1: Astronomy

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| **Essential Understandings** | ▪ The Earth is part of a vast universe.<br>▪ People have gathered data and formulated explanations for phenomena in space. |
| **Essential Questions** | ▪ What is an orbit?<br>▪ What is gravity?<br>▪ What causes the seasons?<br>▪ What is a solar system?<br>▪ What is a star?<br>▪ What is a galaxy?<br>▪ What is a universe?<br>▪ How have we learned about the universe? |
| **Essential Knowledge** | ▪ An orbit is the path an object takes around another object.<br>▪ Gravity is the invisible force that attracts all objects.<br>▪ The Earth's tilt on its axis, combined with its yearly orbit around the sun, results in the seasons.<br>▪ A solar system is a group of planets and their moons, all orbiting around one or more stars.<br>▪ A star is a brilliantly glowing sphere of hot gas whose energy is produced by atoms colliding in its center (nuclear reactions).<br>▪ The sun is a medium sized star in our galaxy.<br>▪ A galaxy is a collection of billions of stars, planets, and other matter.<br>▪ Our universe consists of all matter and energy, including the earth and the galaxies.<br>▪ People have been curious about the universe since the beginning of time.<br>▪ There are many theories, myths and legends about how the universe began.<br>▪ The sun appears to move across the sky in the same way every day, but its path changes slowly over the seasons.<br>▪ Many people have made important discoveries and contributions in astronomy such as: Aristotle, Galileo, and Newton.<br>▪ Fractions and multiples can be used to compare sizes of the moon, earth, sun, and other stars.<br>▪ Scientists use tools to conduct investigations, gather data, and answer questions.<br>▪ Scientists use evidence to develop and communicate theories and understandings. |

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| **Vocabulary** | ▪ <u>Terms</u>:<br>o astronomy, universe, star, galaxy, constellation, theory, rotation, revolution, orbit, gravity, matter, solar system, season, energy, matter, Aristotle, Galileo, Newton, nuclear reaction, telescope, nebula, protostar, red giant, super nova, neutron star, black hole |
| **Essential Skills** | ▪ Describe what causes the seasons.<br>▪ Define solar system.<br>▪ Describe the life cycle of a star.<br>▪ Identify the properties of a galaxy.<br>▪ Identify some discoveries or contributions people have made in astronomy.<br>▪ Use fractions and multiples to compare sizes of moon, earth, sun, and other stars.<br>▪ Describe how scientists answer questions based on observations, evidence, and knowledge of the natural world.<br>▪ Describe how scientists make their explanations public.<br>▪ Observe and record the sun's apparent movement across the sky over the seasons.<br>▪ Ask questions and seek answers from reliable sources.<br>▪ Plan and conduct an investigation using appropriate tools.<br>▪ Use data to develop and communicate outcome. |
| **Related Maine Learning Results** | <u>Science</u><br>A. Unifying Themes<br>A4.Scale<br>Students use mathematics to describe the scale for man-made and natural things.<br>b. Use fractions and multiples to make comparisons of scale. |

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| **Related Maine Learning Results** | B. The Skills and Traits of Scientific Inquiry and Technological Design<br>B1.Skills and Traits of Scientific Inquiry<br>Students plan, conduct, analyze data from, and communicate results of investigations including fair tests.<br>a. Pose investigable questions and seek answers from reliable sources of scientific information and from their own investigations.<br>b. Plan and safely conduct investigations including simple experiments that involve a fair test.<br>c. Use simple equipment, tools, and appropriate metric units of measurement to gather data and extend the senses.<br>d. Use data to construct and support a reasonable explanation.<br>e. Communicate scientific procedures and explanations.<br>C. The Scientific and Technological Enterprise<br>C1.Understandings of Inquiry<br>Students describe how scientific investigations result in explanations that are communicated to other scientists.<br>a. Describe how scientists answer questions by developing explanations based on observations, evidence, and knowledge of the natural world.<br>b. Describe how scientists make their explanations public.<br>C2.Understandings About Science and Technology<br>Students describe why people use science and technology and how scientists and engineers work.<br>a. Describe how scientists seek to answer questions and explain the natural world.<br>b. Describe how engineers seek solutions to problems through the design and production of products. |

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| **Related Maine Learning Results** | D. The Physical Setting<br>D1. Universe and Solar System<br>Students describe the positions and apparent motions of different objects in and beyond our solar system and how these objects can be viewed on Earth.<br>a. Show the locations of the sun, Earth, moon, and planets and their orbits.<br>b. Observe and report on observations that the sun appears to move across the sky in the same way every day, but its path changes slowly over the seasons.<br>c. Recognize that the sun is a star and is similar to other stars in the universe.<br>D2. Earth<br>Students describe the properties of Earth's surface materials, the processes that change them, and cycles that affect the Earth.<br>a. Explain the effects of the rotation of Earth on the day/night cycle, and how that cycle affects local temperature.<br>D4. Force and Motion<br>Students summarize how various forces affect the motion of objects.<br>c. Describe the path of an object.<br>d. Give examples of how gravity, magnets, and electrically charged materials push and pull objects. |
| **Sample Lessons And Activities** | ▪ Use the newspaper or a current periodical to research a topic in astronomy.<br>▪ Create your own astronomy related myth.<br>▪ Organize a star gazing evening using local experts.<br>▪ Research a famous astronomer.<br>▪ Identify a well-known constellation and summarize its history |
| **Sample Classroom Assessment Methods** | ▪ Develop a timeline of major events from early astronomers to present.<br>▪ Complete end of the unit test. |

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| **Sample Resources** | ▪ Publications:<br>o Birth and Death of Stars – Isaac Asimov<br>o Black Holes and Supernovae – David Newton<br>o DK Guide To Space – Peter Bond<br>o Find The Constellations - H.A. Rey<br>o Folklore and Legends of the Universe – Isaac Asimov<br>o Janice VanCleave's Astonomy For Every Kid – Janice VanCleave<br>o Probing Deep Space – Terrance Dolan<br>o Ranger Rick: Nature Scope, "Astronomy Adventures Sky and Telescope<br>o A Stargazer's Guide Isaac Asimov<br>▪ Videos:<br>o Outer Space Way Out There – Bill Nye<br>o Seasons - Bill Nye<br>o Sun, Earth, Moon - National Geographic Society<br>▪ Other Resources:<br>o 3-D model of sun, earth, and moon<br>o USM planetarium |