Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Advanced Earth Science 8	Unit 2 Title:	Astronomy	Grade Level(s):	8
Assessed Trimester:	Trimester 1	Pacing:	2-5 weeks Students will work through regular material in approximately 3 days per week with additional days for enrichment.	Date Created:	6/17/2013	Last Revision Date:	6/16/2014

Course Understandings: *Students will understand that:*

- The Earth is dependent on the Sun as an energy source, which influences interactions, patterns, and cycles on Earth.
- Observable, predictable patterns of movement in the Sun, Earth, Moon system occur because of gravitational interaction and energy from the Sun and impact life on Earth.
- Many cultures and groups have been and continue to be involved in advancements in engineering, exploration, and inquiry.
- Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations and findings of current investigations will guide future investigations.
- Scientific inquiry is a way of processing information about their world through the interactions among technology, engineering, and mathematics.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Benchmark:

8.3.2.1.1: Explain how the combination of the Earth's tilted axis and revolution around the Sun causes the progression of seasons.
8.3.3.1.5: Use the predictability of the motions of the Earth, Sun, and moon to explain day length, the phases of the moon, and eclipses.
8.3.3.1.1: Recognize that the Sun is a medium-sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth.
8.1.3.2.1: Describe examples of important contributions to the advancement of science, engineering, and technology made by individuals representing different groups and cultures at different times in history.
8.1.3.3.2: Understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data.
For example: Analyze hownewtelescopes have provided newinformation about the universe.
8.3.3.1.2: Describe how gravity and inertia keep most objects in the solar system in regular and predictable motion.
8.3.3.1.3: Recognize that gravity exists between any two objects and describe how the mass and distance between objects affects the force of gravity.
8.3.3.1.4: Compare and contrast the sizes, locations, and compositions of the planets and moons in our solar system.
8.1.3.3.3: Provide examples of how advances in technology have impacted

Literacy Benchmark:

6.13.3.3: Follow precisely a multistep procedure when carrying out experiments, designing solutions, taking measurements, or performing technical tasks.
6.13.4.4: Determine the meaning of symbols, equations, graphical representations, tabular representations, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
6.13.7.7: Compare and integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, table, map).
6.13.1.1: Cite specific textual evidence to support analysis of science and technical texts.
6.13.2.2: Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
6.13.9.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
6.13.10.10: By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.
6.14.2.2: Write informative/explanatory texts, as they apply to each discipline and reporting format, including the narration of historical events, of scientific procedures/ experiments, or description of technical processes.

a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
b. Develop the topic with relevant, credible, sufficient, and well-chosen facts, definitions, concrete details, quotations, or other information and examples.
c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
d. Use precise language and domain-specific vocabulary to inform about or explain the topic.
e. Establish and maintain a formal style and objective tone.
f. Provide a concluding statement or section that follows from and supports the information or explanation presented.

6.14.4.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to discipline, task, purpose, and audience.
6.14.5.5: With some guidance and support from peers and adults, use a writing process to develop and strengthen writing as needed by planning, drafting, revising, editing, rewriting, or trying a new approach, focusing on how well purpose, discipline, and audience have been addressed.
6.14.6.6: Use technology, including, but not limited to, the Internet, to produce and publish writing and multi-media texts, and present the relationships between information and ideas clearly and efficiently.
6.14.7.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
6.14.8.8: Gather relevant information from multiple data, print, physical (e.g., artifacts, objects, images), and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
6.14.9.9: Draw evidence from literary or informational texts to support analysis, reflection, and research.
6.14.10.10: Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes and audiences.

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

- Model the scale of planetary distance, mass, or size to better understand the solar system.
- Research the perspectives of different historical and cultural groups and how they have shaped our understanding of astronomy.
- Use their knowledge of the scientific process to answer testable questions.
- Collect and analyze data to draw scientific conclusions.
- Share research and findings.

Meaning

Unit Understanding(s):

Students will understand that:

- The relative position and motions of the Earth, Moon and Sun create patterns observed in the phases, eclipses, tides and seasons.
- The Earth is just one planet in the solar system, in a galaxy, filled with billions of stars, in a universe of billions of other galaxies.
- The Earth, Moon and Sun interact in ways that affect our planet in predictable ways.
- Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.

Essential Question(s):

Students will keep considering:

- Why do we see differences in the appearance and movements of the Sun and Moon from Earth?
- How does the force of gravity affect all matter in the universe?
- How can the scientific method be used to answer self-generated questions?

Acquisition

Knowledge - Students will:

- Students will recognize that the Earth is tilted on its axis. (8.3.2.1.1)
- Students will know that the Earth revolves around the sun and takes about one year to complete one revolution. (8.3.2.1.1)
- Students will recognize that the Sun is a medium sized star composed of multiple layers producing energy by fusion. (8.3.3.1.1)
- Students will recognize that the Sun is one of billions of stars in the Milky Way Galaxy. (8.3.3.1.1)
- Students will know that the Sun is the closest star to Earth. (8.3.3.1.1)
- Students will know that the solar system is sun centered (heliocentric) (8.3.3.1.1).
- Students will understand that orbits have predictable and regular motion. (8.3.3.1.2)
- Students will recognize that gravitational force exists between any two objects. (8.3.3.1.3)
- Students will describe how the masses of the objects and distance between them affect the force. (8.3.3.1.3)
- Students will understand that one day is about one rotation of the Earth on its axis. (8.3.3.1.5)
- Students will understand that one year is about one revolution of the Earth around the sun. (8.3.3.1.5)
- Students will explain and name moon phases. (8.3.3.1.5)

Reasoning - Students will:

- Students will distinguish between indirect and direct rays (angle of solar radiation). (8.3.2.1.1)
- Students will analyze how indirect and direct rays (angle of solar radiation) contribute to the changing of the seasons. (8.3.2.1.1)
- Students will interpret a diagram showing Earth's tilt and revolution around the sun. (8.3.2.1.1)
- Students may compare and contrast Earth's weather at various positions within its orbit using computer simulations. (8.3.2.1.1)
- Students will compare and contrast inner planets and outer planets in terms of size, location and composition. (8.3.3.1.4)
- Students will compare and contrast solar and lunar eclipses. (8.3.3.1.5)
- Students will recognize how advances in technology have impacted how people live, work, and interact. (8.1.3.3.3)
- Students will analyze an example of changing technology that enhances science. (8.1.3.3.2)
- Students will analyze how individuals have made contributions to the advancement of science. (8.1.3.2.1)
- Students will present research on scientific contributions. (8.1.3.2.1)

- Students will use the positions of the Earth and moon to explain tides. (8.3.3.1.5)
- Students will use the positions of the Earth and sun to identify seasons. (8.3.3.1.5)
  **Riverside Scientific Technology may be used.
- Students will describe examples of important contributions to the advancement of science, engineering and technology made by individual representing different groups and cultures at different times in history. (8.1.3.2.1)
- Students will understand how Copernicus and Galileo contributed to our understanding of the heliocentric model of the solar system. (8.1.3.2.1)
- Students will understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data. (8.1.3.3.2)
- Students will explain how advances in technology have impacted how people live, work, and interact. (8.1.3.3.3)
- Students will know the basic procedures to carry out a controlled experiment.

- Students will compare/contrast the Sun to other stars. (8.3.3.1.1)
- Students will predict the tides based on the Moon and Sun's placement around the Earth, in terms of mass and distance. (8.3.3.1.5)

Skills - Students will:

- Students may use measurements of planetary distance. (8.3.3.1.4)
- Students will observe polar orbit animation using computer technology, such as Riverside Scientific Technology or Google Earth to predict day length, moon phases, and eclipses. (8.3.3.1.5)
- Students will measure using Vernier probes, the difference in temperature due to direct and indirect rays. (8.3.2.1.1)
- Students will use measurements of planetary mass, distance, and/or size. (8.3.3.1.4)
- Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables (STEM project).

Common Misunderstandings

- Earth is larger than the Sun
- Astrology is the same thing as Astronomy
- There is no gravity in space
- Changing distance between the Earth and Sun causes the changes in season
- All stars are the same distance from Earth
- The Sun is not the same thing as a star
- The Moon can only be seen at night
- The solar system only contains the Sun, the planets, and the Moon

Essential NEW vocabulary

- Galaxy
- Star
- Astronomical Unit
- Heliocentric
- Geocentric
- Galileo
- Copernicus
- Orbit
- Rotation
- Revolution
- Axis
- Direct rays
- Indirect rays
- Waxing
- Waning
- Gibbous moon
- Crescent moon
- Quarter moon
- Full moon
- New moon
- Solar eclipse
- Lunar eclipse
- Tides (high and low)