



Program Transfer Goals

- Ask questions, recognize and define problems, and propose solutions.
- Safely and ethically collect, analyze, and evaluate appropriate data.
- Utilize (create/analyze) models to make predictions and understand the world around them.
- Make valid claims and informed decisions based on scientific evidence.
- Effectively communicate scientific principles and reasoning to a target audience.

PACING

First Nine Weeks	Second Nine Weeks	Third Nine Weeks	Fourth Nine Weeks
Units 1-2	Units 2-3	Units 3-5	Units 5-6

Assurances for a Guaranteed and Viable Curriculum

Adherence to this scope and sequence affords every member of the learning community clarity on the knowledge and skills on which each learner should demonstrate proficiency. In order to deliver a guaranteed and viable curriculum, our team commits to and ensures the following understandings:

Shared Accountability: Responding to the Needs of All Learners

- High levels of learning for all students.
- The district and course formative assessments aligned to the standards for this course support educators and learners in monitoring academic achievement and leveraging interventions.

Shared Understanding: Curriculum Design

- The district curriculum design weaves together the elements of content, skills and assessments in order to adhere to curriculum design at the macro and micro level, ensuring vertical alignment.
- The district curriculum incorporates standards, scope and sequence, enduring understandings, essential questions, performance assessments, and recommended resources.

Interdependence: Curriculum Units

Members of the learning community utilize the curriculum units, plan collaboratively, and reflect on results for continuous improvement.

The district curriculum units may be found: <http://tinyurl.com/Coppell-Curriculum>

UNIT 1: HISTORY OF ASTRONOMY/OBSERVING THE NIGHT SKY

TIMELINE: 7-8 WEEKS

Unit Summary: The night sky has been observed for thousands of years and interpreted by other civilizations, including ours, in different ways.

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Students will know...

- *Ancient civilizations such as the Egyptians, Mayans, Aztecs, Europeans, and the native Americans have contributed to the study of Astronomy*
- *Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, Newton, Einstein, and Hubble have contributed to the collection of knowledge of space*
- *Celestial objects move from East to West across the sky, and students will be able to identify constellations such as Ursa Major, Ursa Minor, Orion, Cassiopeia, and constellations of the zodiac*
- *Earth's seasons are caused by the tilt of the planet and there is a relationship between the seasons to equinoxes, solstices, the tropics, and the equator*

Students will be skilled at...

- *Demonstrating an understanding that science is based upon observations of the universe and apply the scientific method as a research tool*
- *Using the scientific method in collecting data, formulating and testing a hypothesis then reaching a conclusion*
- *Reading, analyzing, and interpreting data to draw valid scientific conclusions and communicate those conclusions in a clear and articulate manner*

UNIT 2: LIGHT AND TELESCOPES/REMOTE SENSING

TIMELINE: 7-8 WEEKS

Unit Summary: Challenges and benefits arise from the exploration of space through the use of various telescopes, satellites, and probes. Modern use of technology is also used in understanding the dynamics of Earth and humans' impact on it.

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Students will know...

- *Captured light from Earth-based and space-based telescopes is stored and analyzed to give scientists an*

understanding of various celestial bodies

- *Light from stars can give us an understanding of the distance they are from Earth*
- *The universe is vast, and to understand its vastness, extremely large Astronomical distance units are necessary*
- *Modern scientists of different minority groups and cultural backgrounds have helped shape our current understanding of the cosmos*
- *Remote sensing of Earth is used by NASA's Astromaterials Research and Exploration Science Division to focus on the climate science of Earth, and to study and address natural disasters and other dynamic changes on Earth.*

Students will be skilled at...

- *Applying scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations.*
- *Discussing how light is used by astronomers to learn about the universe.*
- *Demonstrating an understanding that science is based upon observations of the universe and how that is used to understand some basic phenomenon of our world.*
- *Developing and implementing solutions designed to help the UN solve global environmental goals through NASA and other organizations.*

UNIT 3: FORMATION OF THE SOLAR SYSTEM/SOLAR SYSTEM BODIES

TIMELINE: 4-5 WEEKS

Unit Summary: Challenges and benefits arise from the exploration of space through the use of various telescopes, satellites, and probes. Modern use of technology is also used in understanding the dynamics of Earth and humans' impact on it.

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Students will know...

- *The Solar System is made up of thousands of objects, including a Sun, eight planets, asteroids, and very distant objects in the Kuiper belt, and the Oort Cloud*
- *The planets of the solar system differ, sometimes dramatically, in terms of their orbital distance from the Sun, their size, their compositions, and their unique surface features*
- *Smaller solar system bodies such as asteroids, comets, and dwarf planets, like Pluto, provide clues to how the solar system was formed*
- *Earth is the only place in the universe, that we know of today, that is home to living things*
- *Earth has unique characteristics which make it suitable to support both simple and advanced life*
- *The planets of the Solar System rotate and revolve, governed by Newton's law of universal gravitation*

Students will be skilled at...

- *Demonstrating an understanding that science is based upon observations of the universe and apply the scientific method as a research tool.*
- *Discussing how gravity is related to the formation, interaction, and evolution of the solar system*

- *Using the scientific method in collecting data, formulating and testing a hypothesis then reaching a conclusion.*
- *Reading, analyzing, and interpreting data to draw valid scientific conclusions and communicate those conclusions in a clear and articulate manner.*

UNIT 4: EXOPLANETS AND ATOMIC SPECTRA

TIMELINE: 4-5 WEEKS

Unit Summary: Spectroscopy, the study of electromagnetic spectra, provides important information about the chemical composition of remote astronomical objects.

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Students will know...

- *Spectroscopy is used in obtaining several types of physical data on stars and planets*
- *The use of spectrosopes will allow students to determine the types of gasses in various vacuumed sealed tubes*
- *Each gas has its own unique set of spectral lines that identify it*
- *Gasses can emit either absorption or emission spectral lines*
- *Spectroscopy can be used to determine the makeup of stars and the planets that orbit those stars*
- *The atmospheres of exoplanets can be determined as habitable or not to life as we know if using spectroscopy*
- *There are several ways that space exploration can help us learn more about exoplanets in our galaxy*

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- *Using the scientific method in collecting data, formulating and testing a hypothesis then reaching a conclusion*
- *Reading, analyzing, and interpreting data to draw valid scientific conclusions and communicate those conclusions in a clear and articulate manner*
- *Applying scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations*

UNIT 5: LIFE CYCLES OF STARS/COSMOLOGY

TIMELINE: 7-9 WEEKS

Unit Summary: Stars found in different stages of development and death can be categorized by their brightness and surface temperature and plotted on a Hertzsprung-Russell diagram. The Big Bang is the current working theory of the formation of the universe.

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Students will know...

- The Sun is a star in our solar system with unique characteristics, and how these characteristics compare to other stars
- The Sun releases energy as heat and light due to the process of nuclear fusion occurring in its core
- Gravity contracts nebulae into protostars and finally into main-sequence stars
- The initial amount of mass found in a star will determine how it ultimately dies when it runs out of fuel
- Stars found in different stages of development and death can be categorized by their brightness and surface temperature and plotted on a Hertzsprung-Russell diagram
- The Big Bang is the current working theory of the formation of the universe

Students will be skilled at...

- Apply scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations.
- Discuss how light is used by astronomers to learn about the universe.
- Discuss how gravity is related to the formation, interaction, and evolution of the solar system, stars, galaxies, and the universe
- Discuss how empirical observations have served to change scientific ideas regarding cosmology.
- Demonstrate a thorough understanding of current accepted theories for the origin of the universe.

UNIT 6: QUANTUM THEORY AND SPACE EXPLORATION

TIMELINE: 4-5 WEEKS

Unit Summary: Quantum theory is the theoretical basis of modern physics that explains the nature and behavior of matter and energy on the atomic and subatomic level.

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Students will know...

- Although scientists throughout the past century have balked at the implications of quantum theory - Planck and Einstein among them - the theory's principles have repeatedly been supported by experimentation, even when the scientists were trying to disprove them
- Quantum theory and Einstein's theory of relativity form the basis for modern physics
- The principles of quantum physics are being applied in an increasing number of areas, including quantum optics, quantum chemistry, quantum computing, and quantum cryptography

Students will be skilled at...

- Apply scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations.

- Discuss how light is used by astronomers to learn about the universe.
- Creating and presenting a team study of a Quantum Theory experiment or equation and its importance to the study and current understanding of the quantum world by scientists today.