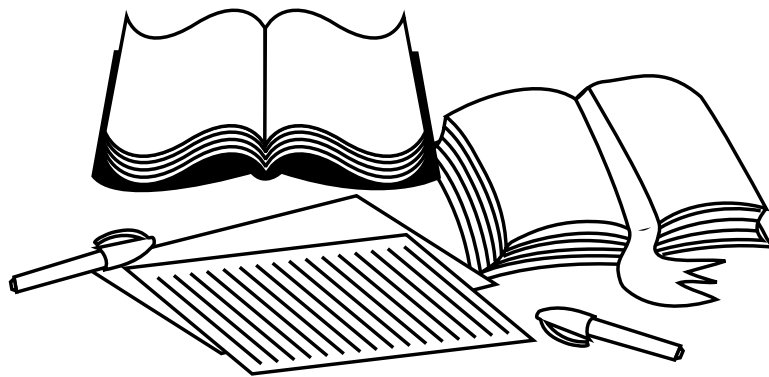


Correlation of

*Astronomy and More:  
A Comprehensive Curriculum and  
User's Guide for the STARLAB  
and Other Planetaria*

to the

National Science Education Standards  
of the National Research Council



## **Introduction**

In 1996, the National Research Council published a document entitled National Science Education Standards, which established a series of goals designed to improve the scientific literacy of American students. In developing the standards, one of the main thrusts of the NRC was to focus in on the inquiry aspects of science education rather than simply look at the content that is taught. Since its inception more than 20 years ago, the main focus of the STARLAB Planetarium System has been just that. Instead of simply being a place where people “see the sky” the various STARLAB curricula were developed with the concept of viewer participation as a central theme. Virtually all of the lesson activities in *Astronomy and More Curriculum Guide* (that comes with the STARLAB Planetarium System) are inquiry based and fall right in line with the goals and objectives of the NRC, even though the development of the STARLAB system pre-dates the publication of the standards by more than 15 years.

Since many state education departments and school districts use the NRC document as a framework for creating their core curricula in science, we offer the following correlation between the individual “Astronomy and More” lessons and the content standards. It is important to note that even though many of the lessons in the guide were written to be grade specific, we recognize that they are often adapted by educators for use with other grade levels. As a result, we have decided to correlate all of the lessons and activities to the content standards for all grades (K-12) regardless of the grade for which they were initially written.

The following pages show how each of the lessons in the main body of the “Astronomy and More” curriculum guide specifically correlates with the standards and specifications laid out in the NRC document. It is important to note that every standard in the NRC document has at least one STARLAB lesson that correlates to it.

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## **From Part 2: K-6 Activities and Lessons for Use in the STARLAB Portable Planetarium**

### **Horizon Lesson for Primary Grades**

#### *Content Standard A: Science As Inquiry*

##### **Grades K-4:**

- Scientific Investigation involve asking a question and comparing the answers with what scientists already know.
- Scientists use different kinds of investigations depending on the questions they are trying to answer.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).

##### **Grades 5-8:**

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, model and theories.
- Scientific investigations sometimes result in new ideas and phenomena for study.

#### *Content Standard B: Physical Science*

##### **Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

##### **Grades 5-8:**

- The motion of an object can be described by its position, direction of motion and speed.

#### *Content Standard D: Earth and Space*

##### **Grades K-4:**

- The sun, moon, stars, clouds, birds, and airplanes all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons.

##### **Grades 5-8:**

- Most objects in the solar system are in regular and predictable motion.

#### *Content Standard E: Science and Technology*

##### **Grades K-4:**

- People have always had questions about their world. Science is one way of answering questions and explaining the natural world.
- Objects can be characterized in two groups, natural and designed.

#### *Content Standard F: Science in Personal and Social Perspectives*

##### **Grades 5-8:**

- Science influences society through its knowledge and world view.

#### *Content Standard G: History and Nature of Science*

##### **Grades 5-8:**

- Scientists formulate and test their explanations of nature using observation, experiments and models.

## **How to Make a Star Clock**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

### *Content Standard D: Earth and Space*

#### Grades K - 4:

- The sun, moon, stars, clouds, birds, and airplanes all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons.

## **How to Make a Moon Phaser**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

#### Grades 5-8:

- Most objects in the solar system are in regular, predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

## **Solar System Mobile**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

#### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.

#### Grades 5-8:

- The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons. The sun, an average star, is the central and largest body in the solar system.

## **How to Make Constellation Pictures**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

#### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### *Content Standard G: History and Nature of Science*

#### Grades K-4:

- Science and technology have been practiced by people for a long time.

## **Grades 5-8:**

- Many individuals have contributed to the traditions of science.

## **How to Use a Star Finder**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

#### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, stars, clouds, birds, and airplanes all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **How to Use a Dipper Finder**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

#### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **Stars and Constellations**

### *Content Standard B: Physical Science*

#### Grades K-4:

- Objects have many observable properties including size, color and temperature. Those properties can be measured.

#### Grades 5-8:

- Heat moves in predictable ways, flowing from warmer objects to cooler ones.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

#### Grades 5-8

- The sun, an average star, is the central and largest body in the solar system.

#### Grades 9-12

- Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium. These and other processes in stars have led to the formation of all the other elements.

## **The Motion of Stars and Constellations**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

#### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### *From Part 2: section entitled “Stars & Skies, STARLAB Activities for Grades 4-6”*

## **Cardinal Directions, Activity 4-1**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **Celestial Movement, Activity 4-2**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

#### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **Apparent Motion, Activity 4-3**

### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

#### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **Stars and Light Pollution, Activity 4-4**

### *Content Standard B: Physical Science*

#### Grades K-4:

- Light travels in a straight line until it strikes an object. Light can be reflected, refracted or absorbed by an object.

#### Grades 5-8:

- Light interacts with matter by transmission, absorption, or scattering. To see an object, light must enter the eye.

#### Grades 9-12:

- Light waves have energy and can transfer energy when they interact with matter.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations, and movements that can be observed and described.

### *Content Standard E: Science and Technology*

#### Grades 5-8:

- Perfectly designed solutions do not exist. All technological solutions have trade-offs.
- Technological solutions have intended benefits and unintended consequences.

### *Content Standard F: Science in Personal and Social Perspectives*

#### Grades K-4:

- Changes in environments can be natural or influenced by humans. Pollution is a change in the environment that can influence the activities of organisms including humans.

Grades 9-12:

- Many factors influence environmental quality.

### **East-West Constellation Movement, Activity 4-5**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **Star Groupings, Activity 4-6**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **Circumpolar Constellations, Activity 4-7**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **Early Astronomers, Activity 5-1**

*Content Standard A: Science As Inquiry*

Grades K- 4:

- Scientific Investigation involve asking a question and comparing the answers with what scientists already know.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).



#### Grades 5-8:

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Scientific investigations sometimes result in new ideas and phenomena for study.

#### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, stars, clouds, birds, and airplanes all have properties, locations and movements that can be observed and described.

#### Grades 5-8:

- The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons. The sun, an average star, is the central and largest body in the solar system.
- Most objects in the solar system are in regular predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon and eclipses.

#### *Content Standard G: History and Nature of Science*

#### Grades K-4:

- Science and technology have been practiced by people for a long time.
- Although men and women using scientific inquiry have learned much about the objects, events and phenomena in nature, much more remains to be understood. Science will never be finished.

#### Grades 5-8:

- Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science and the relationships between science and society.
- Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of the time to reach the conclusions that we currently take for granted.

#### Grades 9-12:

- Usually, changes in science occur as small modifications in extant knowledge.
- Occasionally, there are advances in science and technology that have important and long-lasting effects on science and society. Examples include the Copernican Revolution
- The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.

## **Phases of the Moon, Activity 5-2**

#### *Content Standard B: Physical Science*

#### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

#### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

### **Constellation Location, Activity 5-3**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **Nightly Position of Constellations, Activity 5-4**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **Seasonal Position of Constellations, Activity 5-5**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **The Ecliptic, Activity 5-7**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

#### Grades 5-8:

- Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon and eclipses.

### **Studying Early Astronomers, Activity 6-1**

#### *Content Standard A: Science As Inquiry*

##### Grades K- 4:

- Scientific investigation involves asking a question and comparing the answers with what scientists already know.
- Scientists use different kinds of investigations depending on the questions they are trying to answer.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).

##### Grades 5-8:

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Scientific investigations sometimes result in new ideas and phenomena for study.

#### *Content Standard D: Earth and Space*

##### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.

##### Grades 5-8:

- The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons. The sun, an average star, is the central and largest body in the solar system.
- Most objects in the solar system are in regular predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon and eclipses.

#### *Content Standard G: History and Nature of Science*

##### Grades K-4:

- Science and technology have been practiced by people for a long time.
- Although men and women using scientific inquiry have learned much about the objects, events and phenomena in nature, much more remains to be understood. Science will never be finished.

##### Grades 5-8:

- Many individuals have contributed to the traditions of science. Studying some of these individuals provides further understanding of scientific inquiry, science as a human endeavor, the nature of science and the relationships between science and society.
- Tracing the history of science can show how difficult it was for scientific innovators to break through the accepted ideas of the time to reach the conclusions that we currently take for granted.

##### Grades 9-12:

- Usually, changes in science occur as small modifications in extant knowledge.
- Occasionally, there are advances in science and technology that have important and long-lasting effects on science and society. Examples include the Copernican Revolution
- The historical perspective of scientific explanations demonstrates how scientific knowledge changes by evolving over time, almost always building on earlier knowledge.

### **Sunrise and Sunset Position, Activity 6-2**

#### *Content Standard B: Physical Science*

##### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

Grades 5-8:

- Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon and eclipses.

### **Apparent Motion, Activity 6-3**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **Seasonal Changes, Activity 6-4**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

### **Stellar Position - Poles vs. Equator, Activity 6-5**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **Stellar Reference Points, Activity 6-6**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **Greek Mythological Constellations, Activity 6-7**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

*Content Standard G: History and Nature of Science*

Grades K-4:

- Science and technology have been practiced by people for a long time.

Grades 5-8:

- Many individuals have contributed to the traditions of science.

## **Native American and Greek Myths, Activity 6-8**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

*Content Standard G: History and Nature of Science*

Grades K-4:

- Science and technology have been practiced by people for a long time.

**Grades 5-8:**

- Women and men of various social and ethnic backgrounds, interests, talents, qualities and motivations engage in activities of science.
- Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, and creativity.
- Many individuals have contributed to the traditions of science.

**Using a Star Finder, Activity 6-9**

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

*From Part 2: section entitled “Grade 4-6 Supplemental Activities”*

**Comparing the Size of the Planets**

*Content Standard B: Physical Science*

**Grades K-4:**

- Objects have many observable properties including size.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, stars, and planets all have properties, locations and movements that can be observed and described.

**Grades 5-8:**

- The Earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and many smaller objects.

**Making Constellation Slides**

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

## **Lost In Space**

### *Content Standard B: Physical Science*

#### Grades K-4:

- Objects have many observable properties including size.

### *Content Standard D: Earth and Space*

#### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.

#### Grades 5-8:

- The Earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and many smaller objects.

## **Lost on the Moon**

### *Content Standard C: Life Science*

#### Grades K-4:

- Organisms have basic needs . For example, animals need air, water and food.

#### Grades 5-8:

- All organisms must be able to obtain and use resources and maintain stable internal conditions while living in a constantly changing external environment.
- Behavior is one kind of response an organism can make to an internal or environmental stimulus.
- Organisms have behavioral responses to internal changes and external stimuli. Responses to external stimuli can result from interactions with the organism's own species and others, as well as environmental changes.

### *Content Standard F: Science in Personal and Social Perspectives*

#### Grades K-4:

- Environments are the space, conditions, and factors that affect and individual's and a population's ability to survive.
- People continue inventing new ways of doing things, solving problems, and getting work done.

#### Grades 5-8:

- Risk analysis considers the type of hazard and estimates the number of people that might be exposed and are likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks.
- Individuals can use a systematic approach to thinking critically about risks and benefits.
- Important personal and social decisions are made on perceptions of benefits and risks.

#### Grades 9-12:

- Hazards exist. Regardless of the environment, the possibility of injury, illness, disability, or death may be present. Humans have a variety of mechanisms that can reduce or modify hazards.
- Humans use resources in the environment in order to maintain and improve their existence.
- Natural and human-induced hazards present the need for humans to assess potential danger and risk. Students should understand the costs and trade-offs of various hazards.

## **From Part 3: Grades 7-12 Activities and Lessons for Use in the STARLAB Portable Planetarium.**

*From Part 3: section entitled “Curriculum Guide for Astronomy and Interdisciplinary Topics in Grades 7-12 — Sciences: Earth, Life, Physical and Space”*

### **Topic of Study 1: The Earth as an Astronomical Object**

*Content Standard D: Earth and Space Science*

Grades 5-8:

- Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day and the year.

### **Topic of Study 2: Latitude and Longitude**

*Content Standard D: Earth and Space Science*

Grades 9-12:

- Global climate is determined by energy transfer from the sun at and near the earth’s surface.

### **Topic of Study 3: The Earth’s Atmosphere**

*Content Standard D: Earth and Space Science*

Grades K-4:

- Weather changes from day to day and over the seasons.

Grades 5-8:

- The sun is the major source of energy for phenomena on the earth’s surface such as growth of plants, winds, ocean currents, and the water cycle.
- Water, which covers the majority of the earth’s surface, circulates through the crust, oceans and atmosphere in what is known as the “water cycle”.
- The atmosphere is a mixture of gases. It has different properties at different elevations.
- Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.

Grades 9-12:

- Heating of earth’s surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.
- Global climate is determined by energy transfer from the sun at and near the earth’s surface. This energy transfer is influenced by dynamic processes such as cloud cover and the earth’s rotation.

### **Topic of Study 4: The Sun and Its Energy**

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object’s motion can be described by tracing and measuring its position over time.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.
- The sun is a major source of energy for changes on the earth’s surface. The sun loses energy by emitting light. A tiny fraction of that light reaches the earth, transferring energy from the sun to the earth.



### *Content Standard D: Earth and Space Science*

#### **Grades K-4:**

- The sun and moon have properties, locations and movements that can be observed and described.
- The sun provides the light and heat necessary to maintain the temperature of the earth.
- Objects in the sky have patterns of movement. The sun for example, appears to move across the sky in the same way everyday, but its path changes slowly over the seasons.

#### **Grades 5-8:**

- The sun, an average star, is the central and largest body in the solar system.
- Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, and eclipses.
- The sun is the major source of energy for phenomena on the earth's surface such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.

#### **Grades 9-12:**

- Earth systems have internal and external sources of energy.

The sun is the major source of external energy.

- Heating of earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.
- Global climate is determined by energy transfer from the sun at and near the earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and the earth's rotation.

### **Topic of Study 5: The Stars**

#### *Content Standard A: Science as Inquiry*

##### **Grades 5-8:**

- Different kinds of questions suggest different kinds of scientific investigations.
- Mathematics is important in all aspects of science inquiry.

##### **Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

#### *Content Standard B: Physical Science*

##### **Grades K-4:**

- Objects have many observable properties, including size, weight, shape, color, and temperature. Those properties can be measured using tools.
- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

##### **Grades 5-8:**

- The motion of an object can be described by its position, direction of motion and speed. That motion can be measured and represented on a graph.
- Energy is a property of many substances and is associated with heat and light.
- Heat moves in predictable ways, flowing from warmer objects to cooler ones.

##### **Grades 9-12:**

- Heat consists of random motion and the vibrations of atoms, molecules, and ions. The higher the temperature, the greater the atomic or molecular motion.

#### *Content Standard D: Earth and Space Science Grades K-4:*

- The sun, moon and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.

#### Grades 9-12:

- The sun, the earth, and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.
- Early in the history of the universe, matter clumped together by gravitational attraction to form countless trillions of stars.
- Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium. These and other processes in stars have led to the formation of all the other elements.

### **Topic of Study 6: The Physical Universe**

#### *Content Standard B: Physical Science*

##### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

##### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

##### Grades 9-12:

- Gravitation is a universal force that each mass exerts on any other mass.

#### *Content Standard D: Earth and Space Science*

##### Grades K-4:

- The sun, moon and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.

##### Grades 9-12:

- The origin of the universe remains one of the greatest questions in science. The "big bang" theory places the origin between 10 and 20 billion years ago. According to this theory, the universe has been expanding ever since.
- Early in the history of the universe, matter clumped together by gravitational attraction to form countless trillions of stars.

### **Topic of Study 7: The Solar System**

#### *Content Standard D: Earth and Space*

##### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.

##### Grades 5-8:

- The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons. The sun, an average star, is the central and largest body in the solar system.
- Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

##### Grades 9-12:

- The sun, the earth, and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.

### **Topic of Study 8: Constellations**

#### *Content Standard B: Physical Science*

##### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

**Grades 5-8:**

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movement.

*Content Standard E: Science and Technology*

**Grades 5-8:**

- Many different people in different cultures have made and continue to make contributions to science and technology.

*Content Standard G: History and Nature of Science*

**Grades K-4:**

- Science and technology have been practiced by people for a long time.

**Grades 5-8:**

- Many individuals have contributed to the traditions of science.

**Topic of Study 9: Astronomy and Cultures**

*Content Standard A: Science As Inquiry Grades K- 4:*

- Scientific Investigation involve asking a question and comparing the answers with what scientists already know.
- Scientists use different kinds of investigations depending on the questions they are trying to answer.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).

**Grades 5-8:**

- Scientific investigations sometimes result in new ideas and phenomena for study.

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

**Grades 5-8:**

- The motion of an object can be described by its position, direction of motion and speed.

*Content Standard E: Science and Technology*

**Grades 5-8:**

- Many different people in different cultures have made and continue to make contributions to science and technology.

*Content Standard G: History and Nature of Science*

**Grades K-4:**

- Science and technology have been practiced by people for a long time.

**Grades 5-8:**

- Many individuals have contributed to the traditions of science.

**Grades 9-12:**

- Scientists are influenced by societal, cultural, and personal beliefs and ways of viewing the world. Science is not separate from society but rather science is a part of society.
- In history, diverse cultures have contributed scientific knowledge and technologic inventions.

## **Topic of Study 10: Astronomers and Their Tools**

### *Content Standard A: Science As Inquiry*

#### **Grades K- 4:**

- Scientific Investigation involve asking a question and comparing the answers with what scientists already know.
- Scientists use different kinds of investigations depending on the questions they are trying to answer.
- Simple instruments provide more information than scientists obtain using only their senses.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).

#### **Grades 5-8:**

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Scientific investigations sometimes result in new ideas and phenomena for study.
- Mathematics is important in all aspects of science inquiry.

#### **Grades 9-12:**

- Scientists rely on technology to enhance the gathering and manipulation of data. New techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science.
- The accuracy and precision of the data, and therefore, the quality of the exploration, depends on the technology used.
- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

### *Content Standard E: Science and Technology*

#### **Grades K-4:**

- Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise do.

#### **Grades 5-8:**

- Technology is essential to science because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable. Technology also provides tools for investigations, inquiry, and analysis.

#### **Grades 9-12:**

- Science often advances with the introduction of new technologies. Solving technological problems often results in new scientific knowledge.

### *Content Standard G: History and Nature of Science*

#### **Grades K-4:**

- Science and technology have been practiced by people for a long time.

#### **Grades 5-8:**

- Many individuals have contributed to the traditions of science.

#### **Grades 9-12:**

- Scientists are influenced by societal, cultural, and personal beliefs and ways of viewing the world. Science is not separate from society but rather science is a part of society.
- In history, diverse cultures have contributed scientific knowledge and technologic inventions.

## **Topic of Study 1 1: Space Exploration**

### *Content Standard A: Science As Inquiry*

#### **Grades K- 4:**

- Scientists use different kinds of investigations depending on the questions they are trying to answer.

#### **Grades 5-8:**

- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Scientific investigations sometimes result in new ideas and phenomena for study.

#### **Grades 9-12:**

- Scientists rely on technology to enhance the gathering and manipulation of data. New techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science.

### *Content Standard E: Science and Technology*

#### **Grades K-4:**

- Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise do.

#### **Grades 5-8:**

- Technology is essential to science because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable. Technology also provides tools for investigations, inquiry, and analysis.

#### **Grades 9-12:**

- Science often advances with the introduction of new technologies. Solving technological problems often results in new scientific knowledge.

## **Topic of Study 1 2: Exobiology**

### *Content Standard C: Life Science*

#### **Grades K-4:**

- Organisms have basic needs. Organisms can survive only in environments in which their needs can be met. Distinct environments support the life of different types of organisms.
- Each organism has different structures that serve different functions in growth, survival, and reproduction.

#### **Grades 5-8:**

- All organisms are composed of cells.
- Cells carry on the many functions needed to sustain life. Specialized cells perform specialized functions in multicellular organisms
- All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
- Species acquire many of their unique characteristics through biological adaptation which include changes in structures, behaviors, or physiology that enhance survival in a particular environment.

#### **Grades 9-12:**

- Cells have particular structures that underlie their functions.
- Cell functions are regulated.

*From Part 3: section entitled “Curriculum Guide for Astronomy and Interdisciplinary Topics in Grades 7-12 — Mathematics”*

**Topic of Study: Mathematics Used in Earth and Space Science Applications**

*Content Standard A: Science As Inquiry*

Grades 5-8:

- Mathematics is important in all aspects of science inquiry.

Grades 9-12:

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

*From Part 3: section entitled “Curriculum Guide for Astronomy and Interdisciplinary Topics in Grades 7-12 — Social Studies/History”*

**Topic of Study: Earth**

*Content Standard D: Earth and Space Science*

Grades K-4:

- The surface of the earth changes. Some changes are due to slow processes and some changes are rapid.
- Objects in the sky have patterns of movement. The sun, for example, appears to move across the sky in the same way every day, but it’s path changes slowly over the seasons.

Grades 5-8:

- The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.
- Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle.
- Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate, because water in the oceans hold a large amount of heat.
- The earth processes we see today are similar to those that occurred in the past.

Grades 9-12:

- Earth systems have internal and external sources of energy. The sun is the major source of external energy.
- Heating of earth’s surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.
- Global climate is determined by energy transfer from the sun at and near the earth’s surface. This energy transfer is influenced by dynamic processes such as cloud cover and the earth’s rotation.

## *From Part 3: section entitled “Extension Activities for Grade 7 and Beyond”*

### **Naming the Stars in Constellations**

#### *Content Standard A: Science As Inquiry*

##### Grades K-4:

- Scientists develop explanations using observations and what they already know about the world.

##### Grades 5-8:

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.

##### Grades 9-12:

- Conceptual principles and knowledge guide scientific inquiries.

#### *Content Standard B: Physical Science*

##### Grades K-4:

- Objects have many observable properties including size, color and temperature. Those properties can be measured.
- The position of an object can be described by locating it relative to another object or the background.

### **Shifting Addresses for Stars**

#### *Content Standard A: Science As Inquiry*

##### Grades K- 4:

- Simple instruments provide more information than scientists obtain using only their senses.

##### Grades 5-8:

- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Scientific investigations sometimes result in new ideas and phenomena for study.
- Mathematics is important in all aspects of science inquiry.

##### Grades 9-12:

- Scientists rely on technology to enhance the gathering and manipulation of data. New techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science.
- The accuracy and precision of the data, and therefore, the quality of the exploration, depends on the technology used.
- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

#### *Content Standard B: Physical Science*

##### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object’s motion can be described by tracing and measuring its position over time.

##### Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### **Examining Spheres and Spherical Angles**

#### *Content Standard A: Science As Inquiry*

##### Grades 5-8:

- Mathematics is important in all aspects of science inquiry.

Grades 9-12:

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

### **Steering By the Stars**

*Content Standard A: Science As Inquiry*

Grades 5-8:

- Mathematics is important in all aspects of science inquiry.

Grades 9-12:

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

*Content Standard B: Physical Science*

Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### **Meteor Observation: Getting The Facts**

*Content Standard A: Science As Inquiry*

Grades K-4:

- Scientists develop explanations using observations and what they already know about the world.

Grades 5-8:

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Mathematics is important in all aspects of science inquiry. Draft Starlab Standards Correlation - Page 28

Grades 9-12:

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.
- Conceptual principles and knowledge guide scientific inquiries.

*Content Standard B: Physical Science*

Grades K-4:

- Objects have many observable properties including size, color and temperature. Those properties can be measured.
- The position of an object can be described by locating it relative to another object or the background.

Grades 5-8:

- The motion of an object can be described by its position, direction of motion and speed.

### **Parallax: Finding Stellar Distances**

*Content Standard A: Science As Inquiry*

Grades K-4:

- Scientists develop explanations using observations and what they already know about the world.



**Grades 5-8:**

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Mathematics is important in all aspects of science inquiry.

**Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.
- Conceptual principles and knowledge guide scientific inquiries.

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

**Grades 5-8:**

- The motion of an object can be described by its position, direction of motion and speed.

**Building Astronomical Observing Tools (Planetarium Hand Sextant, Student-made Astrolabes, Student-Made Sextant, Apparatus for Observing Temperature-Color Relationships, Equatorial Coordinate Star Finder, Safety Devices for Viewing the Sun)**

*Content Standard A: Science As Inquiry*

**Grades K- 4:**

- Scientific Investigation involve asking a question and comparing the answers with what scientists already know.
- Scientists use different kinds of investigations depending on the questions they are trying to answer.
- Simple instruments provide more information than scientists obtain using only their senses.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).

**Grades 5-8:**

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Scientific investigations sometimes result in new ideas and phenomena for study.
- Mathematics is important in all aspects of science inquiry.

**Grades 9-12:**

- Scientists rely on technology to enhance the gathering and manipulation of data. New techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science.
- The accuracy and precision of the data, and therefore, the quality of the exploration, depends on the technology used.
- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

*Content Standard E: Science and Technology*

**Grades K-4:**

- Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise do.

**Grades 5-8:**

- Technology is essential to science because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable. Technology also provides tools for investigations, inquiry, and analysis.

**Grades 9-12:**

- Science often advances with the introduction of new technologies. Solving technological problems often results in new scientific knowledge.

*From Part 3: section entitled “Stars & Skies, STARLAB Activities for Grades 7 to 9”*

**Moon Phase Identification, Activity 1**

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object’s motion can be described by tracing and measuring its position over time.

**Grades 5-8:**

- The motion of an object can be described by its position, direction of motion, and speed.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, stars, clouds, birds, and airplanes all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

**Grades 5-8:**

- Most objects in the solar system are in regular, predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

**Moon Phase Position, Activity 2**

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object’s motion can be described by tracing and measuring its position over time.

**Grades 5-8:**

- The motion of an object can be described by its position, direction of motion, and speed.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

**Grades 5-8:**

- Most objects in the solar system are in regular, predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

### **Time of Day, Activity 3**

#### *Content Standard B: Physical Science*

##### Grades K-4:

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

##### Grades 5-8:

- The motion of an object can be described by its position, direction of motion, and speed.

#### *Content Standard D: Earth and Space*

##### Grades K-4:

- The sun, moon, and stars all have properties, locations and movements that can be observed and described.
- Objects in the sky have patterns of movements. The observable shape of the moon changes from day to day in a cycle that lasts about a month.

##### Grades 5-8:

- Most objects in the solar system are in regular, predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

### **Surface of the Moon, Activity 4**

#### *Content Standard B: Physical Science*

##### Grades K-4:

- Objects have many observable properties. Those properties can be measured using tools.

#### *Content Standard D: Earth and Space Science*

##### Grades K-4:

- The Sun, moon, and stars all have properties, locations, and movements that can be observed and described.

##### Grades 9-12:

- The sun, earth, moon and rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.

### **Moon Features, Activity 5**

#### *Content Standard B: Physical Science*

##### Grades K-4:

- Objects have many observable properties. Those properties can be measured using tools.

#### *Content Standard D: Earth and Space Science*

##### Grades K-4:

- The Sun, moon, and stars all have properties, locations, and movements that can be observed and described.

### **The Magnitude of Stars, Activity 6**

#### *Content Standard A: Science As Inquiry*

##### Grades K-4:

- Scientists develop explanations using observations and what they already know about the world.

##### Grades 5-8:

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Mathematics is important in all aspects of science inquiry.

**Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.
- Conceptual principles and knowledge guide scientific inquiries.

*Content Standard B: Physical Science*

**Grades K-4:**

- Objects have many observable properties. Those properties can be measured using tools.

*Content Standard D: Earth and Space Science*

**Grades K-4:**

- The Sun, moon, and stars all have properties, locations, and movements that can be observed and described.

**Star Color and Temperature, Activity 7**

*Content Standard A: Science As Inquiry*

**Grades K-4:**

- Scientists develop explanations using observations and what they already know about the world.

**Grades 5-8:**

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Mathematics is important in all aspects of science inquiry.

**Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.
- Conceptual principles and knowledge guide scientific inquiries.

*Content Standard B: Physical Science*

**Grades K-4:**

- Objects have many observable properties including color and temperature. Those properties can be measured using tools.
- Heat can be produced in many ways.

**Grades 5-8:**

- Energy is a property of many substances and is associated with heat and light. Energy is transferred in many ways.
- In most chemical and nuclear reactions, energy is transferred into or out of the system. Heat and light might be involved in such transfers.

**Grades 9-12:**

- Heat consists of random motion of the vibrations of atoms, molecules, and ions. The higher the temperature, the greater the atomic or molecular motion.
- Waves, including light waves, have energy and can transfer energy when they interact with matter.

*Content Standard D: Earth and Space Science*

**Grades K-4:**

- The sun, moon and stars all have properties that can be observed and described.

**Grades 9-12:**

- Stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium.

## **Apparent Stellar Motion, Activity 8**

### *Content Standard A: Science As Inquiry*

#### **Grades K-4:**

- Scientists develop explanations using observations and what they already know about the world.

#### **Grades 5-8:**

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Mathematics is important in all aspects of science inquiry.

#### **Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.
- Conceptual principles and knowledge guide scientific inquiries.

### *Content Standard B: Physical Science*

#### **Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

#### **Grades 5-8:**

- The motion of an object can be described by its position, direction of motion, and speed.

### *Content Standard D: Earth and Space*

#### **Grades K-4:**

- The sun, moon, and stars have locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.

## **Star Drift, Activity 9**

### *Content Standard A: Science As Inquiry*

#### **Grades K-4:**

- Scientists develop explanations using observations and what they already know about the world.

#### **Grades 5-8:**

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models and theories.
- Mathematics is important in all aspects of science inquiry.

#### **Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.
- Conceptual principles and knowledge guide scientific inquiries.

### *Content Standard B: Physical Science*

#### **Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time.

#### **Grades 5-8:**

- The motion of an object can be described by its position, direction of motion, and speed.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars have locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.

**Season Identification, Activity 10**

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.
- An object's motion can be described by tracing and measuring its position over time. Grades 5-8:
- The motion of an object can be described by its position, direction of motion, and speed.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars have locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.

**Grades 5-8:**

- Most objects in the solar system are in regular, predictable motion. Those motions explain such phenomena as the day and the year.

**Star Brightness 1, Activity 11**

*Content Standard A: Science As Inquiry*

**Grades K-4:**

- Scientists develop explanations using observations and what they already know about the world.

**Grades 5-8:**

- Mathematics is important in all aspects of science inquiry.

**Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

*Content Standard B: Physical Science*

**Grades K-4:**

- Objects have many observable properties including color and temperature. Those properties can be measured using tools.
- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars have locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.

**Star Brightness 2, Activity 12**

*Content Standard A: Science As Inquiry*

**Grades K-4:**

- Scientists develop explanations using observations and what they already know about the world.

**Grades 5-8:**

- Mathematics is important in all aspects of science inquiry.

**Grades 9-12:**

- Mathematics is essential in scientific inquiry. Mathematical tools and models guide and improve the posing of questions, gathering of data, and constructing explanations.

*Content Standard B: Physical Science*

**Grades K-4:**

- Objects have many observable properties including color and temperature. Those properties can be measured using tools.
- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, moon, and stars have locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.

**The Planet, Venus, Activity 13**

*Content Standard A: Science As Inquiry*

**Grades K-4:**

- Scientists develop explanations using observations and what they already know about the world.

*Content Standard B: Physical Science*

**Grades K-4:**

- The position of an object can be described by locating it relative to another object or the background.

*Content Standard D: Earth and Space*

**Grades K-4:**

- The sun, planets, moon, and stars have locations and movements that can be observed and described.
- Objects in the sky have patterns of movements.