# 6th Grade Standard I Rubric

**STANDARD I: Students will understand that the appearance of the Moon changes in a predictable cycle as it orbits Earth and as Earth rotates on its axis.**

- Objective 1: Explain patterns of changes in the appearance of the Moon as it orbits Earth.
  - Identify the pattern of change in the appearance of the Moon during a month.
  - Conduct an investigation using a chart, and collect data depicting the phases of the Moon.
- Objective 2: Demonstrate how the relative positions of Earth, the Moon, and the Sun create the appearance of the Moon's phases.
  - Identify the difference between the motion of an object rotating on its axis and an object revolving in orbit.
  - Compare how objects in the sky (the Moon, planets, stars) change in relative position over the course of the day or night.
  - Model and identify the movement and relative positions of Earth, the Moon, and the Sun.

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br><br>• Display the ability to apply an in-depth understanding of Moon phases to real life situations.<br>• Demonstrate an understanding of different reasons why the Moon might not be visible at certain times of night and/or month. |
| Level 3 | In addition to understanding Levels 2 and 1 concepts, the student will:<br><br>• Looking at a picture of Earth, Moon, and Sun, be able to tell what phase of the Moon would be seen from Earth.<br>• Identify and label Moon phases in the correct order.<br>• Predict what phase of the Moon will occur in a specified amount of time (1 week, 2 weeks, etc.) |

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| Level 2 | In addition to understanding Level 1 concepts, the student will:<br><br>• Name the four major phases of the Moon.<br>• Comprehend that the Moon doesn't actually change shapes during the month.<br>• Understand rotation and revolution. |
| Level 1 | The student will:<br><br>• Identify and label a new Moon and a full Moon.<br>• Understand that the Moon doesn't always look the same. |

# 6th Grade Standard II Rubric

**STANDARD II: Students will understand how Earth's tilt on its axis changes the length of daylight and creates the seasons.**

- Objective 1: Describe the relationship between the tilt of Earth's axis and its yearly orbit around the Sun.
    - Explain that Earth's axis is tilted relative to the season and its yearly orbit around the Sun.
    - Using a drawing and/or model to investigate the relationship between the amount of heat absorbed and the angle to the light source.
- Objective 2: Explain how the relationship between the tilt of Earth's axis and its yearly orbit around the Sun produces the seasons.
    - Compare the hours of daylight and illustrate the angle that the Sun's rays strikes the surface of Earth during summer, fall, winter, and spring in the Northern Hemisphere.
    - Use collected data to compare patterns relating to seasonal daylight changes.
    - Explain why the seasons are reversed in the Northern and Southern Hemispheres.

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br><br>• Infer a city's general location on Earth based on the number of hours of daylight it receives and the month of the year.<br>• Demonstrate the ability to apply an in-depth understanding of Earth's tilt/seasons to real life situations. |

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| Level 3 | In addition to understanding Levels 2 and 1 concepts, the student will:<br><br>• Be able to look at a picture of the Earth's relative position to the Sun and tell what season is represented.<br>• Understand the Earth's tilt and revolution around the Sun cause the seasons.<br>• Recognize the angle of the Sun's rays affects the four seasons due to intensity and length of day.<br>• Explain why the seasons are reversed in the northern and southern hemispheres. |
| Level 2 | In addition to understanding Level 1 concepts, the student will:<br><br>• Know that seasons are reversed in the Northern and Southern Hemispheres.<br>• Understand that Earth's distance from the Sun does not cause seasons. |
| Level 1 | The student will:<br><br>• Name the four seasons in order.<br>• Know the Earth's axis is tilted relative to its orbit around the Sun.<br>• Recognize which months have the longest and shortest daylight hours. |

# 6th Grade Standard III Rubric

**STANDARD III: Students will understand the relationship and attributes of objects in the Solar System.**

- Objective 1: Describe and compare the components of the Solar System.
  - Identify the planets in the Solar System by name and relative location from the sun.
  - Using references, compare the physical properties of the planets (e.g., size, solid or gaseous).

    - Use models and graphs that accurately depict scale to compare the size and distance between objects in the Solar System.
    - Describe the characteristics of comets, asteroids, and meteors.
- Objective 2: Describe the use of technology to observe objects in the Solar System and relate this to science's understanding of the Solar System.
    - Describe the use of instruments to observe and explore the moon and planets.
    - Describe the role of computers in understanding the Solar System (e.g., collecting and interpreting data from observations, predicting motion of objects, operating space probes).
    - Research and report on the use of manmade satellites orbiting Earth and various planets.
- Objective 3: Describe the forces that keep objects in orbit in the Solar System.
    - Describe the forces holding Earth in orbit around the sun, and the moon in orbit around Earth.
    - Relate a celestial object's mass to its gravitational force on other objects.
    - Identify the role gravity plays in the structure of the Solar System.

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br><br>• Explain why our knowledge and description of the Solar System changes.<br>• Describe how exploration of the Solar System affects peoples' lives on Earth. |
| Level 3 | In addition to understanding Level 2 and 1 concepts, the student will:<br><br>• Name and identify characteristics of objects in the Solar System.<br>• Identify the different technologies used to study and understand the Solar System.<br>• Explain the difference between manmade and natural satellites.<br>• Understand how gravity and mass affect objects in the Solar System. |
| Level 2 | In addition to understanding Level 1 concepts, the student will:<br><br>• Identify gas and rocky planets.<br>• Name the eight planets in order of distance from the Sun,<br>• Understand that gravity holds the Solar System together.<br>• Explain how telescopes and space probes help scientists understand the Solar System. |

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| Level 1 | The student will:<br><br>• Know that the Sun is the center of the Solar System.<br>• Understand that distant stars are not part of the Solar System.<br>• Recognize technology must be used to observe the Solar System. |

# 6th Grade Standard IV Rubric

**STANDARD IV: Students will understand the scale of size, distance between objects, movement, and apparent motion (due to Earth's rotation) of objects in the Universe and how cultures have understood, related to, and used these objects in the night sky.**

- Objective 1: Compare the size and distance of objects within systems in the Universe.
  - Compare distances between objects in the solar system.
  - Compare the size of the Solar System to the size of the Milky Way galaxy and the size of the Milky Way galaxy to the size of the Universe (e.g., light years).
- Objective 2: Describe the appearance and apparent motion of groups of stars in the night sky relative to Earth and how various cultures have understood and used them.
  - Locate and identify stars that are grouped in patterns in the night sky.
  - Identify ways people have historically grouped stars in the night sky.
  - Recognize that stars in a constellation are not all the same distance from Earth.
  - Relate the seasonal change in the appearance of the night sky to Earth's position.
  - Describe ways that familiar groups of stars may be used for navigation and calendars.

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br><br>• Describe why Polaris does not seem to move in the night sky.<br>• Explain how constellations can be used to find other constellations.<br>• Demonstrate an understanding of the vastness of the Universe.<br>• Show why we cannot see all the constellations of the Zodiac at any one time from Earth. |

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| Level 3 | In addition to understanding Level 2 and 1 concepts, the student will:<br><br>• Comprehend that everything is part of an ordered Universe.<br>• Order objects found in the Universe according to size.<br>• Be able to identify well-known constellations.<br>• Explain the reasons why stars appear to change position both during the night and throughout the year.<br>• Know the historical significance of constellations.<br>• Describe why stars in a constellation appear to be the same distance from Earth, but in reality are not.<br>• Tell how stars can be used for navigation and making calendars.<br>• Understand that the Universe is mostly empty space. |
| Level 2 | In addition to understanding Level 1 concepts, the student will:<br><br>• Appreciate objects in the Universe are different sizes,<br>• Know that stars appear to change position both during the night and throughout the year.<br>• Be able to identify the Big Dipper and the Little Dipper,<br>• Comprehend that stars can be used for navigation and making calendars.<br>• Understand distances outside the Solar System are measured in light years. |
| Level 1 | The student will:<br><br>• Understand that stars are grouped into patterns, which are called constellations.<br>• Know that our Solar System is part of the Milky Way Galaxy,<br>• Realize that the Milky Way Galaxy is one of many galaxies in the Universe. |

# 6th Grade Standard V Rubric

**STANDARD V: Students will understand that microorganisms range from simple to complex, are found almost everywhere, and are both helpful and harmful.**

- Objective 1: Observe and summarize information about microorganisms.
  - Compare characteristics of microorganisms (i.e., bacteria, protists, fungi) (e.g., color, movement, appendages, shape) and infer their function (e.g., green color found in organisms that are producers, appendages help movement).
  - Explain a microorganism's requirements (i.e., food, water, air, waste disposal, temperature of environment, reproduction).
- Objective 2: Identify positive and negative effects of microorganisms and how science has developed positive uses for some microorganisms and overcome the negative effects of others.
  - Identify how microorganisms are used as food or in the production of food (e.g., yeast helps bread rise, fungi flavor cheese, algae are used in ice cream, bacteria are used to make cheese and yogurt).
  - Identify helpful uses of microorganisms (e.g., clean up oil spills, purify water, digest food in digestive tract, antibiotics, decomposers) and the role of science in the development of understanding that led to positive uses (i.e., Pasteur established the existence, growth, and control of bacteria; Fleming isolated and developed penicillin).
  - Relate several diseases caused by microorganisms to the organism causing the disease (e.g., athlete's foot - fungi, streptococcus throat - bacteria, giardia - protozoa).
  - Explain microorganisms' harmful effects on food (e.g., causes fruits and vegetables to rot, destroys food bearing plants, makes milk sour).

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br><br>• Describe why microorganisms are classified as living.<br>• Make clear the difference between a viral and bacterial infection.<br>• Explain the benefits of regular hand washing.<br>• Give details why an understanding of microorganisms would be important for food handlers. |

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| Level 3 | In addition to understanding Level 2 and 1 concepts, the student will:<br><br>• Compare characteristics of microorganisms.<br>• Infer how the microorganism functions (e.g., cilia, etc.).<br>• Explain what a microorganism requires to survive.<br>• List five ways microorganisms are involved in the production of food.<br>• Name five ways microorganisms are helpful.<br>• List three discoveries that led to our current understanding of microorganisms.<br>• Identify one disease caused by each of the following: bacteria, fungi, protists.<br>• Understand the harmful effects microorganisms can have on food. |
| Level 2 | In addition to understanding Level 1 concepts, the student will:<br><br>• Identify three kingdoms into which microorganisms are classified.<br>• Recognize that microorganisms are living.<br>• List two ways microorganisms are involved in the production of food.<br>• Tell two ways microorganisms are helpful.<br>• Identify one discovery that led to our current understanding of microorganisms. |
| Level 1 | The student will:<br><br>• Explain what a microorganism is.<br>• Recognize that microorganisms are both helpful and harmful.<br>• Understand that microorganisms are found nearly everywhere. |

# 6th Grade Standard V Rubric – Heat

**STANDARD VI: Students will understand properties and behavior of heat, light, and sound.**

- Objective 1: Investigate the movement of heat between objects by conduction, convection, and radiation.
    - Compare materials that conduct heat to materials that insulate the transfer of heat energy.
    - Describe the movement of heat from warmer objects to cooler objects by conduction, convection, and radiation.

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br>• Explain why an object with more mass has more heat energy than an object with less mass.<br>• Tell why cooking utensils are designed the way they are. |
| Level 3 | In addition to understanding Level 2 and 1 concepts, the student will:<br>• Explain how heat is transferred by conduction, convection, and radiation.<br>• Give an example of conduction, convection, and radiation.<br>• Provide two examples of conductors and insulators. |
| Level 2 | In addition to understanding Level 1 concepts, the student will:<br>• Understand that heat moves from hotter to cooler objects.<br>• Name the three ways heat is transferred.<br>• Know the difference between an insulator and a conductor. |
| Level 1 | The student will:<br>• Understand that heat transfers.<br>• Comprehend that insulators slow the movement of heat. |

# 6th Grade Standard V Rubric - Light

**STANDARD VI: Students will understand properties and behavior of heat, light, and sound.**

- Objective 2: Describe how light can be produced, reflected, refracted, and separated into visible light of various colors.
    - Compare light from various sources (e.g., intensity, direction, color).
    - Compare the reflection of light from various surfaces (e.g., loss of light, angle of reflection, reflected color, transparent, translucent, opaque).
    - Investigate and describe the refraction of light passing through various materials (e.g., prisms, water).
    - Describe the appearance of various materials when light of different colors is shone on the material.

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br><br>• Explain why light changes speed when it hits a new medium.<br>• Demonstrate the ability to apply an in-depth understanding of light to real life situations. |
| Level 3 | In addition to understanding Level 2 and 1 concepts, the student will:<br><br>• Explain the difference between a source and a reflector of light.<br>• Compare and contrast reflection and refraction.<br>• Explain and illustrate the law of reflection.<br>• Give three examples of transparent, translucent, and opaque objects.<br>• Understand that light waves do not need a medium through which to travel.<br>• Know that white light is a combination of all the colors.<br>• |

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| Level 2 | In addition to understanding Level 1 concepts, the student will:<br><br>• Explain that the color of an object is the color it reflects.<br>• Recognize a prism and know what it does.<br>• Label picture examples of reflection and refraction.<br>• Give one example each of transparent, translucent, and opaque objects. |
| Level 1 | The student will:<br><br>• Identify the colors of the spectrum (i.e., ROY G BIV).<br>• Understand there must be a light source in order for us to see.<br>• Know the difference between a source of light and a reflector of light. |

# 6th Grade Standard V Rubric – Sound

**STANDARD VI: Students will understand properties and behavior of heat, light, and sound.**

- Objective 3: Describe the production of sound in terms of vibration of objects that create vibrations in other materials.
    - Describe how sound is made from vibration and moves in all directions from the source in waves.
    - Explain the relationship of the size and shape of a vibrating object to the pitch of the sound produced.
    - Relate the volume of a sound to the amount of energy used to create the vibration of the object producing the sound.

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| Level 4 | In addition to understanding Level 3.0 concepts, the student will:<br><br>• Explain what must change in order for the pitch of a sound to change.<br>• Clarify why loud sounds can damage hearing, |

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| Level 3 | In addition to understanding Level 2 and 1 concepts, the student will:<br><br>• Understand why sound needs a medium through which to travel.<br>• Describe how the size of an object affects its pitch.<br>• Explain how energy and volume are related. |
| Level 2 | In addition to understanding Level 1 concepts, the student will:<br><br>• Know that sound must have a medium through which to travel.<br>• Recognize that pitch is how high or low a sound is.<br>• Understand that intensity is how loud or soft a sound is |
| Level 1 | The student will:<br><br>• Understand that sound is produced by vibrations moving through a medium.<br>• Recognize that pitch and intensity are properties of sound. |