

**Science Standards**

**Grade 7**

**Course Overview:** Science 7 is an integrated science course that will study many important science topics including geology, ecology, and engineering. It is intended as a continuation of Science 6 and will prepare students for Science 8 and high school science.

**Bold standards are essential standards that all students will learn as they complete the course.**

**Unit 1: Science Basics**

**Description:** In this unit, students will learn the basics of the scientific method and how to conduct experiments in the science lab.

**Standards**

1. **Students can use lab equipment correctly and safely use common lab equipment**
2. Students understand the importance of safety precautions in science labs
3. Students understand and can use the steps of the scientific method in order to solve problems.
4. Students understand that the scientific method is a repeating process.
5. Students understand how the units of the metric system are related.
6. Students can convert between metric units using a reference sheet.
7. Students can create single-line graphs from scientific data.
8. Students can interpret single-line graphs from scientific experiments

**NGS Standards:** Science and Engineering Practices

**Unit 2: Geology**

**Description:** In this unit, students will learn how the rock cycles works, how it affects their lives, and how to identify common rocks and minerals.

**Standards**

1. Students understand the steps of the rock cycle.
2. Students understand the rock cycle changes the types of rocks without changing the total amount of matter in the system
3. Students can identify the three major rock types
4. Students can explain why different types of rocks and minerals are located in different regions of the earth.
5. Students can show how human use has affected the distribution of rocks and minerals around the earth
6. Students can use a dichotomous key to identify common rock types

**NGS Standards:** ESS2-1, ESS3-1

**Unit 3: Climate**

**Description:** In this unit, students will learn about major aspects of the Earth’s climate, and how humans have affected it.

**Standards**

1. **Students can identify the differences between climate and weather**
2. Students can explain the major causes of climate change.
3. Students can identify human activities that contribute to climate change.
4. Students can explain the importance of the ozone layer
5. Students can identify human activities that affect the ozone layer
6. Students understand how scientists monitor human impacts on climate and weather

**NGS Standards:** ESS2-5, ESS3-3, ESS3-5

**Unit 4: Weather**

**Description:** In this unit, students will learn how energy from the sun is transferred through the Earth and how this energy creates weather.

**Standards**

1. Students understand how energy is transferred through the atmosphere
2. Students can relate energy transfers to changes in the weather.
3. Students can explain how colliding air masses lead to storms.
4. Students can predict the weather using information on the temperature and location of air masses
5. Students can explain how radar works and helps forecast the weather.
6. Students can explain how the uneven heating of the earth leads to colliding air masses.

**NGS Standards:** ESS2-5, ESS2-6

**Unit 5: Engineering**

**Description:** In this unit, students will learn the basics of engineering practices, including iterative design and clearly defining problems.

**Standards**

1. Students can define a problem clearly.
2. Students understand how defining a problem can help solve the problem more easily
3. Students use repeated tests to failure to improve on engineering designs.
4. Students can describe which of several competing solutions to a problem they chose and why they chose it.
5. Students can analyze the results of repeated tests to identify important factors in a design.
6. **Students can design a solution within constraints to best solve a problem.**

**NGS Standards:** PS1-6, PS3-3, ETS1-1, ETS1-2, ETS1-3, ETS1-4

**Unit 6: Ecology**

**Description:** In this unit, students will learn about plants, including plant parts, plant reproduction, and how plants adapt to their environments.

**Standards**

1. Students can identify the major parts of a plant.
2. Students can explain the two major types of plant reproduction
3. Students can identify adaptations plants have made to better survive in their environment.
4. Students can explain the important of plant produced materials in modern life.
5. Students can explain the importance of photosynthesis to life on Earth.
6. Students can identify important factors that limit the growth of plants.

**NGS Standards:** PS1-3, LS1-4, LS1-5, LS1-6

**Unit 7: Chemical Reactions**

**Description:** In this unit, students will learn how to balance chemical reactions, and what separates chemical reactions from physical changes.

**Standards**

1. Students can explain what chemistry studies.
2. **Students understand that chemicals and atoms make up all things.**
3. Students can explain the difference between chemical and physical changes.
4. Students can identify a process as a chemical or physical change.
5. Students can identify the symbols and names for each element.
6. Students can balance chemical equations.

**NGS Standards:** PS1-2, PS1-2, PS1-5

**Unit 8: Applications of Chemistry**

**Description:** In this unit, students will learn how chemical reactions affect their everyday life, including acids, bases, and solubility.

**Standards**

1. Students can correctly use vocabulary related to solubility.
2. Students understand that different chemical compounds have different amounts of solubility.
3. Students will design a procedure to test the solubility of difference chemical compounds.
4. Students understand the differences between acids and bases.
5. Students understand how acids and bases can change and affect chemical reactions.

**NGS Standards:** PS1-2, PS1-2, PS1-5

**Unit 9: Forces and Motion**

**Description:** In this unit, students will be introduced to the physics of forces and motion.

**Standards**

1. Students will understand the applications of Newton's Laws
2. Students will relate the strengths of forces in a system to the direction of motion of an object.
3. Students understand that electric and magnetic forces act without contact.
4. Students understand how the strength of E/M forces change as the distance between objects changes.
5. Students can create graphs showing the relative amounts of energy objects have at different times.
6. Students understand that energy can be transferred between objects.

**NGS Standards:** PS2-1, PS2-2, PS2-3, PS2-5, PS3-1, PS3-2, PS3-5

**Unit 10: Physics in the World**

**Description:** In this unit, students will be introduced to circuits, waves, and how circuits and waves work together to produce digital information and signaling.

**Standards**

1. Students understand the amplitude, wavelength, and frequency of waves.
2. Students understand how amplitude and energy are related.
3. Students understand how frequency and wavelength are related.
4. Students understand that circuits need to be in a complete loop to function.
5. Students can draw the difference between series and parallel circuits.
6. Students understand the difference between current and voltage
7. Students understand how current and voltage behave at junctions in a circuit.
8. Students understand the difference between an analog and digital signal
9. Students understand why digital signals are more reliable than analog signals in most applications.
10. Students understand how waves are reflected, absorbed, or transmitted in different materials.

**NGS Standards:** PS1-4, PS3-3, PS3-4, PS4-1, PS4-2, PS4-3

**Unit 11: Science Fair**

**Description:** In this unit, students will ask a scientific question, design an experiment to answer that question, and present the results.

**Standards**

1. Students can specifically design their experimental question to test a narrow idea.
2. Students can explain the importance of their experimental question to others
3. Students can design a protocol to test their experimental question.
4. Students can clearly describe their protocol to others.
5. Students can list the supplies and resources needed to complete their experiment.
6. Students can consider safety concerns and safely conduct their experiments.
7. **Students can explain the results of their experiment to others in written or oral presentations.**
8. Students can create graphs and other representations of their data that can be clearly understood by others.

**NGS Standards:** Science and Engineering Practices