8th Grade Science Essential Questions

Standard 1: Physical Science

? **Do things ever really disappear?**
? **What is it that we can't see that makes things move?**

Standard 2: Life Science

? **How are limited resources affected by human activity?**
? **How do an organism's adaptations get passed from generation to generation?**

Standard 3: Earth Systems Science

? **How do Earth's external systems affect Earth's surface and inhabitants?**
? **What is Earth's role in the solar system and how is it affected by the solar system?**

Durango School District 9-R

8th Grade Science Curriculum Dashboard

Colorado Science Standard #1: Physical Science

K-12 Students Understand …

- Newton's laws describe motion.
- Atoms combine or decay to form new substances
- Energy exists in various forms, is transformed, and conserved.

8th Grade Students Understand …

- ☑ The direction and magnitude of forces that act on an object explain the results in the object's change of motion.
- ☑ There are different forms of energy, and those forms of energy can be changed and are conserved.
- ☑ Mass is conserved during any physical or chemical change.
- ☑ Waves have common characteristics and unique properties.

Colorado Science Standard #2: Life Science

K-12 Students Understand …

- A relationship exists between structure and function in living systems at a variety of organizational levels, and living systems depend on natural selection.
- Living things interact with the environment.
- Genetics and the environment affect how organisms grow, develop, and change.
- Changes in species (biological evolution) explain the diversity of life.

8th Grade Students Understand …

- ☑ Human activities can deliberately or inadvertently alter ecosystems and their resiliency.
- ☑ Organisms reproduce and transmit genetic information (genes) to offspring, which influences individuals' traits in the next generation.

Colorado Science Standard #3: Earth Science Systems

K-12 Students Understand …

- Earth's geologic history and place in space are relevant to the processes that have shaped our planet
- Earth's geosphere, atmosphere, hydrosphere, and biosphere interact as a complex system
- Humans are dependent on the diversity of resources provided by Earth and Sun.

8th Grade Students Understand …

- ☑ Weather is a result of complex interactions of Earth's atmosphere, land and water, that are driven by energy from the sun, and can be predicted and described through complex models.
- ☑ Earth has a variety of climates defined by average temperature, precipitation, humidity, air pressure, and wind that have changed over time in a particular location.
- ☑ The solar system is comprised of various objects that orbit the Sun and are classified based on their characteristics
- ☑ The relative positions and motions of Earth, Moon, and Sun can be used to explain observable effects such as seasons, eclipses, and Moon phases

What's the Intended Learning? 8th Grade Learning Targets (◆) and Supporting Evidence Outcomes

8 = Grade Level
S = Science
1 = Refers to Learning Target #
a = Refers to specific Evidence Outcome

Essential to Know or Safety Net (E): Knowledge and skills that are essential for all 8th Graders to master, with non-mastery leading to intervention
Important to Know (I): Knowledge and skills that are important for all 8th Graders to know and mastered by most students
Nice to Know (N): Knowledge and skills that are introduced to all 8th Graders and mastered by advanced students

DOK =Depth of Knowledge
1 = Recall of facts or a simple task
2 = Skills and Concepts require students to make decisions or question
3 = Strategic Thinking requires students to explain or generalize information
4 = Extended Thinking requires developing & thinking over time or complex analysis

Standard 1: Physical Science

◆ **LT1. I can identify and calculate the direction and magnitude of forces that act on an object to explain the change in motion. (DOK 1-2)**
- **8S-1a.** Predict and evaluate the movement of an object by examining the forces applied to it (DOK 1-2) **(E)**
- **8S-1b.** Use mathematical expressions to describe the movement of an object (DOK 1-2) **(I)**
- **8S-1c.** Develop and design a scientific investigation to collect and analyze speed and acceleration data to determine the net forces acting on a moving object (DOK 2-4) **(I)**

◆ **LT2. I can identify and describe different forms of energy and how energy can change forms while conserving total energy. (DOK 1-2)**
- **8S-2a.** Gather, analyze, and interpret data to describe the different forms of energy and energy transfer (DOK 1-2) **(I)**
- **8S-2b.** Develop a research-based analysis of different forms of energy and energy transfer (DOK 1-3) **(E)**
- **8S-2c.** Use research-based models to describe energy transfer mechanisms, and predict amounts of energy transferred (DOK 1-2) **(N)**

◆ **LT3. I can distinguish between physical and chemical changes, and identify that mass is conserved during any change. (DOK 1-2)**
- **8S-3a.** Identify the distinguishing characteristics between a chemical and a physical change (DOK 1) **(E)**
- **8S-3b.** Gather, analyze, and interpret data on physical and chemical changes (DOK 1-2) **(E)**
- **8S-3c.** Gather, analyze, and interpret data that show mass is conserved in a given chemical or physical change (DOK 1-2) **(I)**
- **8S-3d.** Identify evidence that suggests that matter is always conserved in physical and chemical changes (DOK 1) **(I)**
- **8S-3e.** Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate physical and chemical changes (DOK 1-2) **(I)**

◆ **LT4. I can identify and compare the common characteristics and properties of waves. (DOK 1)**
- **8S-4a.** Compare and contrast different types of waves (DOK 1-2) **(E)**
- **8S-4b.** Describe for various waves the amplitude, frequency, wavelength, and speed (DOK 1) **(E)**
- **8S-4c.** Describe the relationship between pitch and frequency in sound (DOK 1) **(E)**
- **8S-4d.** Develop and design a scientific investigation regarding absorption, reflection, and refraction of light (DOK 2-4) **(N)**

Standard 2: Life Science

◆ **LT5. I can describe how human activities can purposefully or accidentally change ecosystems and their ability to recover. (DOK 1-3)**
- **8S-5a.** Develop, communicate, and justify an evidence-based scientific example of how humans can alter ecosystems (DOK 1-3) **(E)**
- **8S-5b.** Analyze and interpret data about human impact on local ecosystems (DOK 1-3) **(E)**
- **8S-5c.** Recognize and infer bias in print and digital resources while researching an environmental issue (DOK 1-3) **(I)**
- **8S-5d.** Use technology resources such as online encyclopedias, online databases, and credible websites to locate, organize, analyze, evaluate, and synthesize information about human impact on local ecosystems (DOK 1-2) **(I)**
- **8S-5e.** Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate an environmental issue (DOK 1-2) **(I)**

◆ **LT6. I can apply concepts of reproduction and transmission of genetic information (genes) to offspring, to show how it influences individuals' traits in the next generation. (DOK 1-3)**
- **8S-6a.** Develop, communicate, and justify an evidence-based scientific explanation for how genetic information is passed to the next generation (DOK 1-3) **(E)**
- **8S-6b.** Use direct and indirect observations, evidence, and data to support claims about genetic reproduction and traits of individuals (DOK 1-3) **(E)**
- **8S-6c.** Gather, analyze, and interpret data on transmitting genetic information (DOK 1-2) **(E)**
- **8S-6d.** Use models and diagrams to predict the phenotype and genotype of offspring based on the genotype of the parents (DOK 1-2) **(E)**
- **8S-6e.** Use computer simulations to model and predict phenotype and genotype of offspring based on the genotype of the parents (DOK 1-2) **(I)**

Standard 3: Earth Systems Science

◆ **LT7. I can predict and describe models of weather showing the interactions of Earth's atmosphere with land and water, which are driven by energy from the Sun.(DOK 1-2)**
- **8S-7a**. Differentiate between basic and severe weather conditions, and develop an appropriate action plan for personal safety and the safety of others (DOK 1-3) **(E)**
- **8S-7b.** Observe and gather data for various weather conditions and compare to historical data for that date and location (DOK 1-2) **(E)**
- **8S-7c**. Use models to develop and communicate a weather prediction (DOK 1-2)

8S-7b. Observe and gather data for various weather conditions and compare to historical data for that date and location (DOK 1-2) **(E)**
- **8S-7c**. Use models to develop and communicate a weather prediction (DOK 1-2) **(I)**

◆ **LT8. I can analyze weather data to describe a climate and identify how a climate has changed over time. (DOK 1-3)**
- **8S-8a.** Develop, communicate and justify an evidence-based scientific explanation to account for Earth's different climates (DOK 1-3) **(I)**
- **8S-8b.** Research and evaluate direct and indirect evidence to explain how climates vary from one location to another on Earth (DOK 2-3) **(E)**
- **8S-8c.** Examine, evaluate, and question information from a variety of sources and media to investigate how climates vary from one location to another on Earth (DOK 1-3) **(E)**

◆ **LT9. I can design models to describe and classify the characteristics of the solar system and the objects within it. (DOK 1-3)**
- **8S-9a.** Construct a scale model of the solar system, and use it to explain the motion of objects in the system such as planets, Sun, Moons, asteroids, comets, and dwarf planets (DOK 2-3) **(E)**
- **8S-9b.** Recognize that mathematical models are used to predict orbital paths and events (DOK 1) **(E)**
- **8S-9c.** Research, critique, and communicate scientific theories that explain how the solar system was formed (DOK 1-3) **(I)**

◆ **LT10. I can describe the different types of technologies used to explore the solar system. (DOK 1-3)**
- **8S-10a.** Describe methods and equipment used to explore the solar system and beyond (DOK 1) **(I)**
- **8S-10b.** Design an investigation that involves direct observation of objects in the sky, and analyze and explain results (DOK 2-4) **(I)**
- **8S-10c.** Use computer data sets and simulations to explore objects in the solar system (DOK 1-2) **(E)**

◆ **LT11. I can use the relative positions and motions of Earth, Moon, and Sun to explain observable effects such as seasons, eclipses, and Moon phases. (DOK 1-2)**
- **8S-11a.** Develop, communicate, and justify an evidence-based explanation using relative positions of Earth, Moon, and Sun to explain the following natural phenomenon: (DOK 1-3) **(E)**
  1. Tides
  2. Eclipses of the Sun and Moon
  3. Different shapes of the Moon as viewed from Earth
- **8S-11b.** Analyze and interpret data to explain why we have seasons (DOK 1-2)
- **8S-11c**. Use models to explain the relative motions of Earth, Moon, and Sun over time (DOK 1-2) **(E)**