Tamaqua/Shenandoah Educational Consortium

Science Standards: Grade 7

STANDARD 3.1 – Unifying Themes

CS 3.1.7A Explain the parts of a simple system and their relationship to each other

1. *Describe a system as a group of related parts that work together to achieve a desired result (e.g. digestive system.*
    a. *Identify related parts of an organ system and/or an ecosystem*
    b. *Identify related parts of simple machines and/or electrical systems*
2. *Explain the importance of order in a system*
    a. *Sequential order in a system makes it work*
    b. *Homeostasis, balance, stability keeps the system in order*
3. *Distinguish between system inputs, system processes and system outputs*
    a. *Define a system input*
    b. *Define a system process*
    c. *Define a system output*
4. *Distinguish between open loop and closed loop systems*
    a. *Identify an open loop system (infra-red; cell phone; satellite system)*
    b. *Identify a closed loop system (water system; cable TV; "regular" phone)*
5. *Apply systems analysis (problem solving; checking components) to solve problems*
    a. *Analyze the failure of an electrical system, mechanical system, biological system*
    b. *Synthesize the information gained to make corrections*

CS 3.7.1B Describe the use of models as an application of scientific or technological concepts

1. *Identify and describe different types of models and their functions*
2. *Apply models to predict specific results and observations (e.g. population growth, effects of infectious organisms)*

3. *Explain systems by outlining a system's relevant parts and its purpose and/or designing a model that illustrates its function*
    a. *Identify the relevant parts of a certain system*
    b. *Construct or draw an example*

CS 3.1.7C Identify patterns as repeated processes or recurring elements in science and technology

1. *Identify different forms of patterns and use them to group and classify specific objects*
2. *Identify repeating structure patterns*
3. *Identify and describe patterns that occur in physical systems (e.g., construction, manufacturing, transportation), informational systems and biochemical-related systems*

CS 3.1.7D Explain scale as a way of relating concepts and ideas to one another by some measure

1. *Apply various applications of size and dimensions of scale to scientific, mathematical, and technological applications*
2. *Describe scale as a form of ratio and apply to a life situation*

CS 3.7.1E Identify change as a variable in describing natural and physical systems

1. *Describe fundamental science and technology concepts that could solve practical problems*
2. *Explain how ratio is used to describe change*
3. *Describe the effect of making a change in one part of a system on the system as a whole*

STANDARD 3.2 Inquiry and Design

CS 3.2.7A Explain and apply scientific and technological knowledge

1. *Distinguish between a scientific facts and a belief*
2. *Answer "What if" questions based on observations, inference or prior knowledge or experience*
3. *Explain how skepticism about an accepted scientific explanation led to a new understanding (e.g., Historical changes to Darwin, Mendel, Copernicus)*

a. *Understand and apply relevance of theories on real-life situations and technologies*

4. *Explain how new information may change existing theories and practice*

CS 3.2.7B Apply process knowledge to make and interpret observations

1. *Measure materials using a variety of scales*
    a. *Measure materials in different states (gas, liquid, solid)*
2. *Describe relationships by making inference and predictions*
    a. *Utilize prior knowledge to formulate hypothesis*
3. *Communicate, use space/time relationships, define operationally, raise questions, formulate hypotheses test and experiment*
    a. *Author pertinent written reports*
4. *Design controlled experiments, recognize variables, manipulate variables*
5. *Interpret data, formulate models, design models, and produce solutions*
    a. *Research and apply existing models*
    b. *Use and create models to brainstorm solutions to a problem*

CS 3.2.7C Identify and use the elements of scientific inquiry to solve problems

1. *Generate questions about objects, organisms and/or events that can be answered through scientific investigations*
    a. *Participate*
2. *Evaluate the appropriateness of questions*
3. *Design an investigation with limited variables to investigate a question*
4. *Conduct a two-part experiment*
5. *Judge the significance of experimental information in answering the questions*
6. *Communicate appropriate conclusions from the experiment*.
    a. *List and revise research questions*

CS 3.2.7D Know and use the technological design process to solve problems

1. *Define different types of problems*
2. *Define all aspects of the problem, necessary information and questions that must be answered*
    a. *Identify/analyze key components of the problem*
    b. *List needed information*
    c. *Consider relevant back ground information*

3. *Propose the best solution*
    a. *Discuss multiple solutions*
    b. *Evaluate and select the most effective solution*
4. *Design and propose alternative methods to achieve solutions*
    a. *Create a procedure and gather materials*
    b. *Select a solution*
5. *Apply a solution*
    a. *Utilize appropriate methods to achieve the chose solution*
6. *Explain the results, present improvements, identify and infer the impacts of the solution*
    a. *Observe and record outcome*
    b. *Clarify outcomes, report orally, or written*
    c. *Determine and cause effect relationships and outcome*
    d. *Effectively communicate a proposal*

STANDARD 3.3 Biological Sciences

CS 3.3.7A Describe the similarities and differences that characterize diverse living things (differentiate among the five kingdoms (moneran, protista, fungi, plantae, animalia)

1. *Describe how the structures of living things help them function in unique ways*
    a. *Identify basic animal structures*
    b. *Identify basic plant structures*
    c. *Describe the functions of basic animal structures*
    d. *Describe the functions of basic plant structures*
2. *Define and explain a dichotomous key*
3. *Account for adaptations among organisms that live in a particular environment*
    a. *Define and give examples of adaptations*
    b. *Explain how adaptations enable an organism to survive in a particular environment*

CS 3.3.7B Describe the cell as the basic structural and functional unit of living things, Define tissues, cell, organ organism

1. *Identify the levels of organization from cell to organism*
    a. *Identify the interrelationships among cells, tissues and organs*

b. *Show how life processes of growing, responding to the environment, obtaining energy, releasing and using energy, releasing wastes, and reproducing occur not only at the organism level but at the cellular level*

2. *Compare life processes at the organism level with life processes at the cell*
    a. *Show how the structure of cells and organisms are related to their functions*
3. *Explain that cells and organisms have particular structures that underlie their functions*
    a. *Define and explain photosynthesis*
4. *Describe and distinguish among cell cycles, reproductive cycles and life cycles*
    a. *Identify stages in a life cycle*
    b. *Explain the difference between sexual and asexual cycles*
5. *Explain disease effects on structure or functions of an organisms*

CS 3.3.7C Know that every organism has a set or genetic instructions that determines its inherited traits.

1. *Identify and explain inheritable characteristics*
2. *Identify that the gene is the basic unit of inheritance*
3. *Identify basic patterns of inheritance (e.g., dominance, recessive, co-dominance)*
4. *Describe how traits are inherited*
5. *Distinguish how different living things reproduce (e.g., vegetative budding, asexual, sexual)*
6. *Describe how selective breeding and genetic technologies can change genetic makeup of organisms*

STANDARD 3.4 Physical Science, Chemistry Physics

CS 3.4.7A Describe concepts about the structure and properties of matter

1. *Identify elements as basic building blocks of matter that cannot be broken down chemically*
2. *Distinguish compounds from mixtures*
3. *Describe and conduct experiments that identify chemical and physical properties*
4. *Describe the reactants and products of simple chemical reactions*

CS 3.4.7B Relate energy sources and transfers to heat and temperature

CS 3.4.7C Identify and explain the principles of force and motion

CS 3.4.7D Describe essential ideas about the composition and structure of the universe and the earth's place on it.

STANDARD 3.5 Earth Science

CS 3.5.7A Describe Earth features and processes

CS 3.5.7B Recognize Earth resources and how they affect everyday life

CS 3.5.7C Describe basic elements of meteorology

CS 3.5.7D Explain the behavior and impact of the Earth's water system

1. *Explain the water cycle using the processes of evaporation and condensation*
2. *Describe factors that affect evaporation and condensation (temperature and wind)*
3. *Distinguish salt from fresh water (e.g. density, electrical conduction)*
4. *Compare the effect of water type (e.g. polluted, fresh, salt water) and the life contained in them*
    a. *Know what plants and animals that live in the water need for survival*
5. *Identify ocean and shoreline features, (e.g., bays, inlets, spit, tidal marshes)*
    a. *Know the characteristics/descriptions for shoreline features*
    b. *Know the descriptions of ocean biomes*

STANDARD 3.6 Technology Education

CS 3.6.7A Explain biotechnologies that relate to related technologies of propagating growing, maintaining, adapting, treating and converting

CS 3.6.7B Explain information technologies of encoding, transmitting, receiving, storing retrieving, and decoding

CS 3.6.7C Explain physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design

STANDARD 3.7 Technological Devices

CS 3.7.7A Describe the safe and appropriate use of tools, materials and techniques to answer questions and solve problems

CS3.7.7B Use appropriate instruments and apparatus to study materials

1. *Select appropriate instruments to measure the size, weight, shape and temperature of living and non-living objects*
    a. *Meter stick*
    b. *Pan balance*
    c. *Spring scales*
    d. *Magnifiers/microscopes*
    e. *Graduated cylinders/beakers*
    f. *Thermometers*
2. *Apply knowledge of different measurement systems to measure and record objects' properties*
    a. *Metric/English*
    b. *Celsius/Fahrenheit*

CS 3.7.7C Explain and demonstrate basic computer operations concepts

CS 3.7.7D Apply computer software to solve specific problems

CS 3.7.7E Explain basic computer communications system

STANDARD 3.8 Science, Technology and Human Endeavors

CS 3.8.7A Explain how sciences and technologies are limited to their effects and influences on society

CS.3.8.7C Identify the pros and cons of applying technological and scientific solutions to address problems and the effect upon society

1. Describe the positive and negative expected and unexpected effects of specific technological developments
    a. Funding
    b. Time
    c. Refining
2. Describe ways technology extends and enhances human abilities

a. Transportation/mobility
b. Job opportunities
c. Ethical issues/implications
d. Lifestyles