

Saddlebrook Preparatory School
Science Curriculum-4th Grade

A. Major Concepts/Content.

The purpose of this class is to ensure that students understand concepts in the areas below:

- The Nature of Matter
- Energy
- Force and Motion
- Processes that Shape the Earth
- Earth and Space
- Processes of Life
- How Living things Interact with their Environment
- The Nature of Science

B. Course Requirements

These requirements include the benchmarks from the Sunshine State Standards that are most relevant to fourth grade. After successfully completing this grade, the student will be able to demonstrate an understanding of the following:

The Nature of Matter

1. The student knows that the weight of an object always equals the sum of its parts.

SC.A.1.2.3

- Knows that the weight of an object is equal to the sum of the weights of its parts.

2. The student knows that different materials are made by physically combining substances and that different objects can be made by combining different materials.

SC.A.1.2.4

- knows that different materials can be physically combined to produce different substances.
- knows the differences and similarities between mixtures and solutions

3. The student knows that materials made by chemically combining two or more substances may have properties that differ from the original materials.

SC.A.1.2.5:

- knows that materials made by chemically combining two or more substances have properties that differ from the original materials.
- knows the difference between physical and chemical changes.

Energy

4. The student knows how to trace the flow of energy in a system (e.g., as in an ecosystem).

SC.B.1.2.1

- knows that most living things use energy from the Sun to live and grow.
- knows how to trace the flow of energy in a system (for example, in an ecosystem).
- knows how to trace the flow of energy in a system (for example, electricity in a circuit to produce heat, light, sound, or magnetic fields).

5. The student recognizes various forms of energy (e.g., heat, light, and electricity).

SC.B.1.2.2

• knows that there are a variety of sources for electricity (for example, hydroelectric, geothermal, windmills).

- knows the relationship between attributes of all waves (for example, wavelength, frequency)

and attributes of sound waves (for example, pitch, intensity).

- knows that energy can be described as stored energy (potential) or energy of motion (kinetic).

6. The student knows that most things that emit light also emit heat.

SC.B.1.2.3

- knows that the Sun provides energy for the Earth in the form of heat and light.
- 2. knows that most objects that emit light also emit heat.

7. The student knows the many ways in which energy can be transformed from one type to another.

SC.B.1.2.4

• knows ways that energy can be transformed (for example, electricity to light, light to heat, mechanical to heat).

- knows that moving electric charges produce magnetic forces and moving magnets produce electric currents.

8. The student knows ways that heat can move from one object to another.

SC.B.1.2.6

- knows that when a warmer object comes in contact with a cooler one, the warm object loses heat and the cool one gains it until they are both at the same temperature.
- knows that some materials conduct heat better than others.
- understands that convection, radiation, and conduction are methods of heat transfer

9. The student knows that some source of energy is needed for organisms to stay alive and grow.

SC.B.2.2.1

- knows that some source of energy is needed for organisms to stay alive and grow.

10. The student recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy.

SC.B.2.2.2

- knows ways natural resources are important.
- classifies resources as renewable or nonrenewable.
- understands the reasons for energy conservation.
- knows the risk factors associated with the use of nonrenewable energy sources (for example, economic factors and health factors).

Force and Motion

11. The student understands that the motion of an object can be described and measured.

SC.C.1.2.1

- knows that velocity describes a change in distance over time.
- uses scientific tools (for example, stopwatch, meter stick, compass) to measure speed, distance, and direction of an object.

12. The student knows that waves travel at different speeds through different materials.

SC.C.1.2.2

- understands that waves behave differently in different media (for example, water, a wall, the atmosphere, a vacuum).
- knows that waves travel at different speeds through different materials.

13. The student recognizes that forces of gravity, magnetism, and electricity operate simple machines.

SC.C.2.2.1

- understands how simple machines are used to make tasks possible.
- understands the relationship between force and distance as it relates to simple machines (for example, levers and fulcrums working to lift objects).

14. The student knows that an object may move in a straight line at a constant speed, speed up, slow down, or change direction dependent on net force acting on the object.

SC.C.2.2.2

- uses tools to measure changes in position, direction, and speed of an object after a push or pull has been applied.
- knows that objects do not change their motion unless acted upon by an outside force.
- understands how friction affects an object in motion.

15. The student knows that the more massive an object is, the less effect a given force has.

SC.C.2.2.3

- knows the relationship between the strength of a force and its effect on an object (for
- example, the greater the force, the greater the change in motion; the more massive the object, the smaller the effect of a given force).

16. The student knows that the motion of an object is determined by the overall effect of all of the forces acting on the object.

SC.C.2.2.4

- knows that motion in space is different from motion on Earth due to changes in gravitational force and friction.
- understands how inertia, gravity, friction, mass, and force affect motion.

Processes that Shape the Earth

17. The student knows that larger rocks can be broken down into smaller rocks, which in turn can be broken down to combine with organic material to form soil.

SC.D.1.2.1

- understands the stages of the rock cycle.
- knows the properties of different types of soil.
- knows that rocks are constantly being formed and worn away.

18. The student knows that 75 percent of the surface of the Earth is covered by water.

SC.D.1.2.2

- knows that approximately 75 percent of the surface of the Earth is covered by water.

19. The student knows that the water cycle is influenced by temperature,

pressure, and the topography of the land.

SC.D.1.2.3

- understands how the water cycle is influenced by temperature and land features.
- understands how atmospheric pressure affects the water cycle.

20. The student knows that the surface of the Earth is in a continuous state of change as waves, weather, and shifts of the land constantly change and produce many new features.

SC.D.1.2.4

- understands how processes of weathering and erosion constantly change the surface of the Earth.
- understands how eroded materials are transported and deposited over time in new areas to form new features (for example, deltas, beaches, dunes).
- understands that geological features result from the movement of the crust of the Earth (for example, mountains, volcanic islands).

21. The student knows that some changes in the Earth's surface are due to slow processes and some changes are due to rapid processes.

SC.D.1.2.5

- knows that land forms change over time (for example, earthquakes, volcanoes).
- understands how the surface of the Earth is shaped by both slow processes (for example, weathering, erosion, deposition) and rapid, cataclysmic events (for example, earthquakes, tsunamis, volcanoes).

22. The student knows that reusing, recycling, and reducing the use of natural resources improve and protect the quality of life.

SC.D.2.2.1

- knows ways in which people can conserve natural resources.
- knows ways misuse of natural resources affects the quality of life for all species.
- extends and refines knowledge of ways people can reuse, recycle, and reduce the use of resources to improve and protect the quality of life.

Earth and Space

23. The student knows that the tilt of the Earth on its own axis as it rotates and revolves around the Sun causes changes in season, length of day, and energy available.

SC.E.1.2.1

- knows that the tilt of the Earth causes the change of seasons, length of day, and the amount of energy available.
- knows the orbit of the Earth is slightly elliptical and the Earth is closest to the Sun in the Northern Hemisphere in winter.

- 3. knows that the angle that the rays of the Sun strike the surface of the Earth determines the amount of energy received and thus the season of the year.
- knows the effect of the tilt of the Earth on polar climates.

24. The student knows that the combination of the Earth's movement and the Moon's own orbit around the Earth results in the appearance of cyclical phases of the Moon.

SC.E.1.2.2

- understands the cause of the phases of the Moon (for example, the movement patterns of the Earth and Moon relative to the Sun).
- knows the relative positions of the Moon, Earth, and Sun during each of the phases of the Moon.

25. The student knows that the Sun is a star and that its energy can be captured or concentrated to generate heat and light for work on Earth..

SC.E.1.2.3

- knows the Sun is a star that is much nearer to the Earth than the other stars
- knows how the energy of the Sun can be captured as a source of heat and light on Earth (for example, plants, solar panels).

26. The student knows that the planets differ in size, characteristics, and composition and that they orbit the Sun in our Solar System

SC.E.1.2.4

- knows characteristics of Mercury, Venus, Earth, and Mars.
- knows characteristics of Jupiter, Saturn, Uranus, Neptune, and Pluto.
- knows that the planets differ in size, characteristics, and composition and that they orbit the Sun in our Solar System.

27. The student understands the arrangement of planets in our Solar System.

SC.E.1.2.5

- knows that gravity is the one of the forces that keeps planets arranged in orbits around the Sun and the Moon in orbit around the Earth.
- knows the arrangement of the planets and the asteroid belt in our Solar System.

28. The student knows that, in addition to the Sun, there are many other stars that are far away.

SC.E.2.2.1

- understands that the Sun is a medium-sized star located near the edge of a galaxy containing billions of other stars, which in turn is one of innumerable galaxies in the Universe.

Processes of Life

29. The student knows that the human body is made of systems with structures and functions that are related.

SC.F.1.2.1

- knows that complex animals have specialized organs to carry out life processes.
- knows the major organ systems of the human body.
- understands the functions of various body systems.
- understands how body systems interact (for example, how bones and muscles work together for movement).

30. The student knows how all animals depend on plants.

SC.F.1.2.2u

- understands the various ways that animals depend on plants for survival (for example, food, shelter, oxygen).

31. The student knows that living things are different but share similar structures.

SC.F.1.2.3

- knows the common and distinguishing characteristics of groups of vertebrate animals (mammals, birds, fish, reptiles, amphibians).
- understands similarities and differences among plants.
- understands that although plants and animals are different, they also share common
- characteristics (for example, they both have structures for reproduction, respiration, and growth).

32. The student knows that similar cells form different kinds of structures.

SC.F.1.2.4

- knows that living things are composed of cells.
- knows that processes needed for life are carried out by the cells.
- uses magnifying tools to identify similar cells and different kinds of structures.
- knows the parts of plants and animal cells.
- understands how similar cells are organized to form structures (for example, tissue, organs) in plants and animals.
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How Living Things Interact with Their Environment

33. The student knows ways that plants, animals, and protists interact.

SC.G.1.2.

- knows how plants and animals interact with one another in an ecosystem (for example,
- organization of communities, flow of energy through food webs).
- understands the relationship among organisms in aquatic and terrestrial food chains (for example, the role of producers, consumers, and decomposers).
- understands the various roles of single-celled organisms in the environment.
- knows ways in which protists interact with plants and animals in the environment.

34. The student knows that living things compete in a climatic region with other living things and that structural adaptations make them fit for an environment.

- knows how organisms with similar needs in a climatic region compete with one another for resources such as food, water, oxygen, or space.
- knows behavioral and structural adaptations that allow plants and animals to survive in an environment.
- understands how changes in the environment affect organisms (for example, some organisms move in, others move out; some organisms survive and reproduce, others die).
- understands how changes in the environment affect organisms (for example, some organisms move in, others move out; some organisms survive and reproduce, others die).

35. The student knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.

SC.G.1.2.3

- knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.

36. The student knows that animals eat plants or other animals to acquire the energy they need for survival.

SC.G.1.2.5

- understands that energy is transferred to living organisms through the food they eat.
- knows examples of living things that are classified as producers, consumers, carnivores, herbivores, and omnivores.

37. The student knows that variations in light, water, temperature, and soil content are largely responsible for the existence of different kinds of organisms and population densities in an ecosystem.

SC.G.1.2.7

- knows that variations in light, water, temperature, and soil content are largely responsible for the existence of different kinds of organisms and population densities in an ecosystem.

38. The student knows that the size of a population is dependent upon the available resources within its community.

SC.G.2.2.2

- knows that the size of a population is dependent upon the available resources within its community.

39. The student understands that changes in the habitat of an organism may be beneficial or harmful.

SC.G.2.2.3

- understands patterns of interdependency in ecological systems.
- understands that what benefits one organism may be harmful to other organisms.
- understands that changes in an ecological system usually affect the whole system.

The Nature of Science

40. The student knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

SC.H.1.2.2

- plans and investigates experiments in which hypotheses are formulated based on cause and effect relationships; distinctions are made among observations, conclusions/inferences and predictions; a limited number of variables are controlled; and numerical data that are contradictory or unusual in experimental results are recognized.
- understands that scientists use different kinds of investigations (for example, observations of events in nature, controlled experiments) depending on the questions they are trying to answer.
- understands the importance of accuracy in conducting measurements, and uses estimation when exact measurements are not possible.

41. The student knows that to compare and contrast observations and results is an essential skill in science.

SC.H.1.2.

- knows that comparisons between experiments can be made when conditions are the same.
- uses strategies to review, compare and contrast, and critique scientific investigations.
- knows that an experiment must be repeated many times and yield consistent results before the results are accepted.

42. The student knows that a model of something is different from the real thing, but can be used to learn something about the real thing.

SC.H.1.2.5

- knows that a model of something is different from the real thing, but can be used to learn something about the real thing.
- uses sketches and diagrams to propose scientific solutions to problems.
- constructs models to compare objects in science.

43. The student knows that natural events are often predictable and logical.

SC.H.2.2.1

- makes predictions based on data from picture graphs, bar graphs, and line graphs.
- knows basic patterns, sequences, and cycles occurring in nature.
- makes a prediction for a new investigation using the data from a previous investigation.
- understands that change is constantly occurring and uses strategies to analyze different patterns of change.

44. The student knows that, through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

SC.H.3.2.4

- knows ways that, through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.
- extends and refines knowledge of ways that, through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

