

Science Curriculum: Friday, October 10, 2014

12:30-1:15: Meet with grade level curriculum groups to discuss Diocesan Science Learning Outcomes. Discuss various teaching methods/activities/experiments utilized to cover the standards for each grade level. The Diocese wants to make sure that every teacher is teaching the standards in new and exciting ways, year to year. There shouldn't be too much repetition between grade levels; however, if this is the case, the depth & methods used should vary based on grade level.

Teachers that will group up are as follows:

Pre-K & K

1 & 2

3,4, 5 & middle school

1:15-2:30: Groups will work in the computer lab; researching new and fresh activities/experiments/demonstrations to cover the learning outcomes for the school year. The goal is to find one new activity for each standard that you will be covering this year.

Some Sites to Get you Started:

Teacherspayteachers.com FREE!

Pinterest.com

Homeschooling web sites

Google.com

Diocese of Fall River Grades PreK-K Science Learning Outcomes: Science instruction will most often be integrated with other subjects, for example, learning to distinguish between living and non-living things (#1 & #2) while reading various stories. Art projects include the use of tools (like scissors) and the differences among materials. These activities along with the use of various manipulatives contribute to achieving age-appropriate technology/engineering standards. Emphasis is placed on encouraging children's natural curiosity while developing their scientific inquiry skills such as making observations and sharing them with others, asking questions, and finding patterns. [The Diocesan Science Curriculum Guidelines and Preface are available at: www.dfrcec.com] *[Additional outcomes from the Diocesan Health Curriculum Guidelines may also be included.]*

The student can (in words and/or pictures):

1. Identify things as living or nonliving
2. Discuss the differences between living and nonliving things
3. Identify different kinds of living things (such as humans, mammals, birds, fish, reptiles, insects, plants)& group like things together
4. State the basic survival needs of plants: such as water, soil, sunlight
5. Name the basic survival needs of animals: food, water, shelter
6. Observe and describe how plants grow and change, especially over seasons

7. Observe and describe how animals grow and change

8. Name and illustrate the 4 seasons

9. Examine & sort objects with similar and/or different properties, such as by their size, color, shape, weight, texture.

10. Sort objects or materials according to their state of matter (liquid, solid, gas).

11. Discuss the different ways objects can move: in a straight line, back and forth, in a circular motion, up and down, fast or slow.

12. Demonstrate how the motion of an object can be changed by applying a force such as push or pull, for example, giving a ball a gentle push versus a hard push

13. Identify things that help plants and animals live in their environment such as using their senses and/or having special characteristics.

14. Describe some of the changes plants and animals go through as the seasons change

15. Recognize fossils as the remains of living things that can tell us about the earth in the past

16. Predict how an object's motion will change if a force is applied

17. Distinguish between the 3 states of matter and describe a solid as having a definite shape, and liquids and gases as taking the shape of their containers

18. Use basic tools including a ruler, thermometer, magnifier and balance (commercial or self-made)

Diocese of Fall River Grades 3-5 Science Learning Outcomes: A school's curriculum will address these outcomes over this 3 year span. In addition to achieving these standards, a student is expected to have developed the grade-level-appropriate skills necessary to do science, i.e. scientific inquiry, including asking and answering questions by conducting investigations or experiments and to have been given the opportunity to experience Technology/Engineering challenges. [The Diocesan Science Curriculum Guidelines and Preface are available at: www.dfrcec.com]

[Additional outcomes from the Diocesan Health Curriculum Guidelines will also be included unless they are addressed in other courses.]

1. Sort into the major groups, based on their physical characteristics: plants (flowering vs. non-flowering) and animals (mammal / bird / fish / reptile / insect)

2. Use a key to sort organisms into their major group.

3. Identify the basic structures of plants (roots, stem, leaves,) the major functions of each, and how plants grow.

4. Recognize that all living things have a predictable life cycle that may or may not include dramatic changes in form.

5. Give examples of inherited characteristics

6. Describe how the needs of an organism must be met by its environment in order for it to survive.

7. Describe how plants and animals respond to changes in their environment.

8. Give examples of how organisms can change their environments and/or impact their ecosystems.

9. Distinguish between learned and instinctive behaviors

10. Describe how the sun's energy is used by plants [to produce sugars (via photosynthesis) and is transferred within a food chain.]

11. Recognize that matter has many observable properties, such as weight, shape, color, temperature; and that these properties can be measured and/or used to sort things.

12. Compare and contrast the basic properties of solids, liquids and gases [definite shape or not, takes up certain amount of space or not.]

13. Describe how water can change from one state to another

14. Identify the basic forms of energy (light, sound, heat, electrical, magnetic)

15. Give examples of how one form of energy can be changed to another form

16. Construct an electrical circuit using a battery with a light bulb or bell and explain the requirements for a working circuit.

17. Test materials and determine if they are conductors or insulators

18. Construct and use an electromagnet

19. Recognize that magnets have poles that attract or repel each other.

20. Test materials and formulate conclusions about what type(s) of materials are magnetic

21. Recognize that sound is produced by vibrating objects and requires a medium through which to travel. Relate the rate of vibration to the pitch of the sound.

22. Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, or absorbed.

23. Categorize minerals based on their physical properties

24. Distinguish between the 3 categories of rocks (igneous, metamorphic & sedimentary.)

25. Explain what soil is and how it is formed.

26. Describe the weather in terms of measurable quantities such as air temperature, wind speed and direction, and precipitation.

27. Describe how global patterns such as the jet stream and water currents influence local weather.

28. Differentiate between weather and climate.

29. Describe/illustrate the water cycle.

30. Give examples of how the surface of the earth changes by such processes as erosion and weathering; landslides, volcanoes and earthquakes.

31. Describe the solar system in the most basic terms.

32. Describe the movements of the earth and relate its rotation to day/night and the apparent movement of objects in the sky.

33. Describe the changes in the observable shape of the moon over the course of a month.

34. Use basic tools with increasing accuracy & precision (including a ruler, thermometer and balance) to make metric measurements.

Diocese of Fall River Grades 6-8 Science Learning Outcomes: These learning outcomes are organized into 3 sections: Earth & Space Science, Life Science and Physical Science. A school's curriculum may address each section in a separate year, or it may include parts of each for the 3 years. In addition to achieving these standards, a student is expected to have developed the skills necessary to do science, i.e. scientific inquiry, including designing and conducting experiments, and to have been given the opportunity to experience Technology/Engineering challenges.

[The Diocesan Science Curriculum Guidelines and Preface are available at: www.dfrcec.com]

EARTH & SPACE SCIENCE

1. Construct and interpret various 2- and 3-dimensional models of the earth's common physical features, including contour maps.

6th: Models with landforms & layers labeled, presented to the class, fill in the blank worksheet with correct labels

2. Describe the layers of the solid earth as the lithosphere; the hot, convecting mantle; and the dense, metallic core.

6th: Make models: video showing layers, worksheet with labels

3. Describe how the movement of the earth's crustal plates causes major geological events (e.g. earthquakes, volcanic eruptions and the formation of mountains and ocean basins.)

6th: Use clay to represent types of land collisions, use fruit rollups and graham crackers and frosting to demonstrate land collisions.

4. Explain how landforms are the result of both constructive and destructive forces.

6th: Discuss wind, volcanoes, tornadoes, natural disasters. Discuss/show with blocks hanging wall/footwall. Etc.

5. Explain the relationship among the energy provided by the sun, the global patterns of atmospheric movement, and the temperature differences among water, land, and atmosphere.

6th: Pangea: Evidence from different climates: fossils, animals, soil samples, rock samples

6. Define & explain how radiation, conduction and convection are the mechanisms to transfer heat in the earth's systems.

6th: Examples with lithosphere/asthenosphere, sea-floor spreading, video clips

7th: Heat Transfer: convection, conduction and radiation

7. Describe how processes we can still see today, such as erosion, movement of lithospheric plates, and changes in atmospheric composition, have caused changes to the earth over geologic time.

6th : Pangea & movements over time. Study maps

8. Explain and give examples of how physical evidence, including fossils, demonstrates that the earth has evolved over time.

6th: Pangea and evidence: read, research, pictures

9. Predict possible effects of a catastrophic event such as the impact of an asteroid or comet on the earth's geology and/or ecology.

6th: Earthquake safe houses unit.

10. Describe gravity as a force that pulls all things on or near the surface toward the center.

6th: When explaining the metric system

7th: with Newton's laws and experiments

11. Briefly explain the relationship between differences in gravity on the moon and/or various planets and an object's weight

6th: When describing the metric system weight vs. mass

Also when study planets. Planet Map, online weight conversions

12. Explain the role of gravity on the formation of the solar system and the movements of its components.

6th: Metric System and with planets

7th: Gravity and Newton's Laws

13. Explain how gravity and the relative positions of the sun, moon and earth cause ocean tides

6th: Studying Planets and movement of planets

14. Explain how the relative positions of the earth, moon, and sun cause lunar and solar eclipses

6th: Studying Planets and movement of planets

LIFE SCIENCE

[Additional outcomes from the Diocesan Health Curriculum Guidelines will also be included unless they are addressed in other courses.]

1. Explain the development of the Cell Theory emphasizing how the body of science builds over time.

6th: Living things are made of cells

8th: Cells build up our body systems

2. Describe the interrelationship between science and technology through the study of the evolution of the microscope and/or other technologies.

6th: Study microscopes (electron, compound light, SEMS, X-Rays, etc.) and tools: Use microscopes for research as well as the other scientific tools

3. Create and interpret diagrams or models of plant and animal cells, identifying the major organelles and the function of each (nucleus, cytoplasm, cell membrane, cell wall.)

6th: Create own creative demonstration of plant and/or animal cell, make own models with chalk outside, worksheets to label and study, make our own booklets/pamphlets on cells and organelles.

4. Arrange and give examples of the five levels of organization within a multicellular organism (cell, tissue, organ, system, organism).

6th: Relate to a whole school functioning as one

8th: Relate to a whole school function as one and builds to make a complete working human.

5. Classify living organisms by similarities in structure according to the currently accepted classification system.

6th: Scientists need organization to all be on the same page across the world
Kingdom, phylum, class, order, family, genus, species
Genus is like our family name, species is like our first name

6. Describe the relationship between cellular respiration and photosynthesis.

6th: When studying plants: the process of photosynthesis and respiration, and how they're related
(song: Everybody was Kung Fu fighting)
8th: Need respiration to survive (humans/animals)

7. Illustrate how producers, consumers and decomposers interact with each other to cause energy, beginning with sunlight via photosynthesis, to be transferred through a food web.

6th: Sunlight begins ALL life, food webs
7th: When discussing energy transfer and how energy is created

8. Analyze the interrelationships between organisms including competitive, mutually beneficial, predator/prey and parasite/host relationships.

6th: When discussing how all life needs energy, and survives off of other organisms or plants,
Kingdom, phylum, class, etc.
8th: Parasitic/host relationships when discussing viruses (colds, flu, etc.)

9. Predict how populations respond to changes in conditions and/or interactions among organisms (including the actions of humans).

8th: When discussing gene mutations, DNA replication, hereditary and recessive traits.

10. Relate genetic variation to a species' survival.

8th: When discussing gene mutations, DNA replication, hereditary and recessive traits. Genetic research projects

11. Explain the theory of evolution using data from the fossil record and other evidence.

6th: Pangea & other theories scientists have.

12. Recognize the structure, function and replication of DNA.

8th: DNA & genetics; Finger prints, passed down traits, recessive vs. dominant traits

6th: Cellular Mitosis: Worksheets to label and study, make models with oreos and sprinkles

13. Explain the fundamental connections among heredity, DNA, genes, and chromosomes.

6th: Cellular mitosis: phases

8th: Genetics: coin-flip babies projects

14. Design an investigation to study genetic variation within the classroom population (such as

Tongue rolling, attached earlobes, etc.)

8th: Genetics: Class polls and graphs

15. Construct a family tree (of actual or hypothetical people) to demonstrate the inheritance of a specific trait.

8th: Pedigrees of particular traits passed down in a particular side of a family.

16. Explain the differences between sexual and asexual reproduction.

6th: Cells reproducing (mitosis), plants reproducing (seeds)

8th: Endocrine system and reproductive system

17. Debate some of the pros and cons of genetically engineered food.

6th: When studying plants

8th: Genetics: investigate organic foods

18. Describe the history of genetics.

8th: Mendel's work with peas, other scientists' experiments

19. Describe the difference between innate and learned behavior.

8th: Genetics & reproduction, Pedigrees and class surveys/polls

20. Explain, using examples, how behavioral changes help organisms survive changes in the environment.

6th: Plant Adaptations

21. Link behavioral changes to evolutionary adaptations

6th: Plant Adaptations

8th: Genetics

22. Analyze the advantages and disadvantages of social behaviors.

8th: Pedigrees and class surveys

23. Give examples of how organisms maintain internal conditions while being exposed to changing external environments (maintain homeostasis.)

6th: Living things: Homeostasis

8th: Homeostasis: blood pressure, sugar levels, sweating, etc.

24. List and give the function of the different human body systems.

8th: Analyze ALL the human body systems, one by one.

25. Explain the importance of interactions between systems.

8th: As we go, build & continue to discuss previous body systems

26. Relate diseases to the malfunction of organ systems.

8th: Diabetes, eating disorders, hypertension. Potential disease in each body system, as we go.

27. Explain the importance of a healthy lifestyle to the prevention of disease. (topics could include exercise, nutrition, drugs/alcohol, environmental health.)

8th: Digestive system; healthy eating, Endocrine system: drugs/alcohol abuse, etc. Monitor calorie intake and exercise routines, create meal plans

PHYSICAL SCIENCE

1. Use appropriate equipment to measure mass, volume, distance and temperature using the metric system.

6th: Intro to metric system, practice with tools (Graduated cylinder, triple beam balance, metric rulers, beakers etc.)

7th: Practice with tools in stations/groups

8th: On-going, all experiments must be done using the metric system when reporting data.

2. Differentiate between mass and weight.

6th: Intro to metric system, When studying planets

7th: Gravity and motion, metric system, using scales and balances.

3. Define and calculate density using appropriate units.

6th: Practice with volume, density, mass, temperature stations, when learning about the metric system.

7th: Find density of various items, class-wide, create a classroom data graph

4. Use the physical properties of a given substance to distinguish it from others

7th: Classify items as solid, liquid, gas. Demonstrate phase changes: Ooblik, slime, ice, etc. Homogenous, heterogeneous mixtures.

5. Differentiate between elements, compounds and mixtures.

7th: Know that the elements make up the periodic table, one or more elements make a compound. Know the difference between a chemical change and a physical change.

6. Given the Periodic Table, briefly describe how it is arranged and read basic information about atoms/elements from it.

7th: Know that the elements make up the periodic table, one or more elements make a compound. Analyze the atomic #, Atomic Weight, atomic mass of elements and what they mean.

7. Recognize that all substances consist of one or more of the 100+ known elements.

7th: Know that the elements make up the periodic table, one or more elements make a compound
Everything is made of elements.

8. Compare and contrast physical and chemical changes.

7th: Physical; Make the mixture (dough), Chemical: change the mixture (bake the dough)

9. Explain the conservation of mass in chemical reactions (for example, when an Alka-seltzer dissolves and the gas is collected.)

7th: Study the law of conservation of mass when discussing the periodic table of elements.

10. Describe the forces acting on an object in motion and one at rest.

7th: Gravity and friction, types of friction. Experiments with rates of gravity and different types of friction.

11. Explain inertia.

7th: Newton's 3 laws, Make cars using balloons as an engine. Balloon rockets on a string across the room, ball hitting the wall.

12. State Newton's Laws of motion and give examples.

7th: Make cars, Use the Newton's cradle, etc.

13. Describe an object's motion in terms of its position, direction and speed.

7th: Reference point, velocity, speed, acceleration, Know how to use formula for each.

14. Predict how a change in at least one of the forces acting on an object will affect its motion.

6th: Pressure: Osmosis

7th: Friction, mass, weight (gravity), air resistance, gravity experiments, web site with space launch games, see how to calculate the changes with formulas

15. Assemble simple machines and explain the relationship between the distance an object moves and the force needed to move it.

7th: Find “real-life” examples of how we use/find simple machines.

16. Construct and interpret graphs of distance vs. time.

7th: Predict type of motion (constant, accelerating, still, etc.) from a given graph.

17. Give examples of the change of energy from one form to another (for example: heat to light, electricity, mechanical motion, sound, nuclei, and chemical.)

7th: Explain how electricity gets to our houses. Video clips and songs from online.

18. Describe situations where kinetic energy is transformed into potential energy and vice versa.

7th: Use bouncy balls and snappers to demonstrate elastic energy, changing from potential to kinetic. Web sites with energy games, balloons, etc.

19. Explain what happens to particles during a phase change.

7th: Changes from a solid to a liquid & vice versa, Make ice cream, ice cream floats, ice cubes in water, etc.

20. Predict how heat will move by conduction, convection and/or radiation until equilibrium is reached and relate this to temperature

6th: When studying plate tectonics: how the mantle constantly moves and keeps the convection heat cycle constantly working.

Also when studying diffusion and osmosis, Perfume in the air, water molecules spreading out.

7th: When studying heat transfer, know how heat travels, from hot to cold, etc.