

MIDLAND PARK SCHOOLS
MIDLAND PARK, NEW JERSEY 07432
Science – Grade 5

I. COURSE PREREQUISITES

Enrollment in Science Grade 5 presumes mastery of Science Grade 4 objectives. They will be able to safely use equipment found in the lab, use the metric system, and use the scientific method for problem solving.

II. COURSE DESCRIPTION

Following their accomplishments in Science -Grade 4, fifth graders will study biology, physics, astronomy, and oceanography. One unit of each of these studies is offered to expose the students to a variety of content in all the domains of science. The basic skills of reading, writing, observing, thinking, communicating, researching, and drawing conclusions will also be part of science in the fifth grade.

III. COURSE PERFORMANCE OBJECTIVES

Upon successful completion of the requirements for this course, the student will demonstrate proficiency in the knowledge and skills objectives listed below. Each Core Curriculum Content Standard as established by the New Jersey state Board of Education is addressed. The number(s) of the Core Curriculum content Standard(s) addressed is/are shown in parentheses following the Major Concepts.

A. Biology

Major knowledge concepts

The students will understand the following:

1. Complex organisms undergo processes that enable them to survive and reproduce.
2. Organisms grow and reproduce through the process of cell division.

Skills

The student will be able to:

1. Observe cells, tissues, organs, and systems in a variety of plants and animals.
2. Infer the relationship of scale among cells, tissues, organs, systems, and organisms.
3. Explain that one-celled organisms can carry out functions that enable them to live.
4. Observe and infer the transport of materials through a cell membrane.
5. Relate cell structure according to an organism's life function.
6. Observe and compare different methods of asexual reproduction in plants.
7. Compare/contrast sexual reproduction with sexual reproduction based on number of parents.

- 8 Compare and contrast the cell structures of different organisms.
- 9 Communicate that organisms are classified based on their characteristics.

- 10 Relate the process of mitosis to cell growth and relate meiosis to cell reproduction.
- 11 Relate how the study of cell reproduction has led to new scientific discoveries and advances in science and technology.
- 12 Observe cell structures of different organisms.

LABS:

1. Microscopes
2. Looking at plants
3. Animal parts

PROJECTS:

1. Creature Reports

TEXTBOOK(S) AND OTHER SUPPORT MATERIAL:

1. Textbook -Structures of Life Macmillan/McGraw-Hill 1993

VIDEOS:

1. Skin; The Eye; Cells; Bones and Muscles; Respiration; Digestion; Nutrition; Animal Locomotion; Planet of Life; Evolution of insects; Reptiles; Bats; Rain Forest Allies

B. Physics

The students will understand the following:

1. Motion is the change in position of an object.
2. Motion can be measured.
3. A force is a push or a pull that one object exerts on another object.
4. An object at rest tends to stay at rest unless acted upon by a net force.
5. An object in motion tends to stay in motion in a straight line at a constant speed unless acted upon by a net force.
6. The acceleration of an object is directly proportional to the mass of the object.
7. Forces always come in pairs. For every action there is an equal but opposite reaction force.

Skills:

The student will be able to:

1. Determine that speed is the rate of change of position.
2. Calculate the speed of a moving object by measuring the distance traveled and the time of travel.
3. Recognize that acceleration is a change in the velocity of a moving object.
4. Distinguish between constant speed and acceleration.
5. Explain that a force is a push or a pull that one object exerts on another object.
Observe how friction can make an object in motion slow down.
6. Understand how friction can be reduced.
7. Understand how gravity affects objects.
8. Experiment to find that objects at rest remain at rest and objects in motion remain in motion in straight line and at a constant speed unless acted upon by net force.
9. Understand that mass is a measure of inertia.
10. Interpret the relationship of mass and inertia to the application of a net force and predict the outcome.
11. Observe that the acceleration of an object will increase as the size of the net force on the object increases.
12. Determine the relationship among a force on an object, the mass of the object, and the acceleration of the object.
13. Distinguish between balanced or unbalanced forces and action-reaction forces.
14. Recognize and be able to identify action/reaction forces.

Lab:

1. Toothpick structures
2. Spinmaster
3. AMA Cub (rubber band powered plane)

TEXTBOOK(S) AND OTHER SUPPORT MATERIAL :

Textbook:

Forces at Work Macmillan/McGraw-Hill 1993

Videos:

Newton in Space; Simple Machines; Flight
How to build the AMA Cub
Aircraft -Odd Designs
Forces -How a plane flies (HC110)

C. Astronomy

The student will be able to:

1. Give examples of the benefits of space technology in our everyday lives.
2. Recognize a need for mapping the night sky.

3. Relate Earth's movements -revolution and rotation -to the repeating positions of constellations.
4. Construct a model of constellations
5. Infer repeating patterns in the movements of objects in space.
6. List components of the universe, such as space, matter, and energy.
7. Compare light-years to other units of measure.
8. Infer that star color is dependent on the star's surface temperature.
9. Formulate a model of the events in the life cycle of a star.
10. Classify the order of the nine planets.
11. Compare and contrast the inner and outer planet
12. Formulate a model of the planets of the solar system.
13. Interpret a model of the formation of the solar system.
14. Construct a model of constellations
15. List components of the universe, such as space, matter, and energy.

TEXTBOOK(S) AND OTHER SUPPORT MATERIAL :

Textbook:

Exploring space Macmillan/McGraw-Hill 1993

Videos:

Future Flight Parts 1 & 2; Amazing Space Series; Types of Telescopes Earth; Moon; Asteroids; Comets; How to Locate Constellations; Star Trekking; Space Travel; The Sun; The Moon

Project:

Design a spaceship

D. Oceanography

Major knowledge concepts

The students will understand the following:

1. Earth's water undergoes a predictable cycle.
2. Ocean water has definite physical and chemical properties and the ocean floor has a variety of geological features.
3. Ocean water is in constant motion and supports a variety of life forms.
4. Humans are dependent upon oceans and their natural resources.

Skills

The student will be able to:

1. Observe factors that affect evaporation of water.
2. Construct a diagram of the water cycle, showing each of the changes through which water moves.
3. Describe water as a nonrenewable resource.

4. Describe the factors that affect the salinity of ocean water.
5. Describe the factors that affect the density of ocean water and how this affects floating objects.
6. Illustrate a cross-section of the ocean floor and describe the following features: continental shelf, continental slope, abyssal plain, and trench.
7. Compare the motion of ocean water produced by the interaction of waves, currents, and tides.
8. Observe and explain how both surface and deep water tides are produced.
9. Explain the effects of ocean water movements on life in the sea and the shapes of beaches and shorelines.
10. Identify producers and consumers in a typical ocean food web, and explain their role in the system.
11. Compare plankton, nekton, and benthos environments and identify typical members in each.

Assessments:

In this class, in addition to projects, there will be quizzes and tests, class discussions and formative checking for understanding on a daily basis.

2009 Science NJCCCS:

5.3.6.D.1 Predict the long-term effect of interference with normal patterns of reproduction.

5.3.6.D.3 Distinguish between inherited and acquired traits/characteristics.

5.3.6.E.1 Describe the impact on the survival of species during specific times in geologic history when environmental conditions changed.

5.3.6.D.3 Distinguish between inherited and acquired traits/characteristics.

5.3.8.E.1 Organize and present evidence to show how the extinction of a species is related to an inability to adapt to changing environmental conditions using quantitative and qualitative data.

5.3.8.D.3 Describe the environmental conditions or factors that may lead to a change in a cell's genetic information or to an organism's development, and how these changes are passed on.

5.3.12.D.1 Explain the value and potential applications of genome projects.

5.2.6.E.3 Demonstrate and explain the frictional force acting on an object with the use of a physical model.

5.2.8.E.1 Calculate the speed of an object when given distance and time.

5.2.8.E.2 Compare the motion of an object acted on by balanced forces with the motion of an object acted on by unbalanced forces in a given specific scenario.

5.2.6.A.2 Calculate the density of objects or substances after determining volume and mass.

5.4.6.A.4 Compare and contrast the major physical characteristics (including size and scale) of solar system objects using evidence in the form of data tables and photographs.

5.4.8.A.4 Analyze data regarding the motion of comets, planets, and moons to find general patterns of orbital motion.

5.4.6.A.2 Construct and evaluate models demonstrating the rotation of Earth on its axis and the orbit of Earth around the Sun.

5.4.8.A.1 Analyze moon-phase, eclipse, and tidal data to construct models that explain how the relative positions and motions of the Sun, Earth, and Moon cause these three phenomena.

5.4.12.A.3 Analyze an H-R diagram and explain the life cycle of stars of different masses using simple stellar models.

5.4.8.F.3 Create a model of the hydrologic cycle that focuses on the transfer of water in and out of the atmosphere. Apply the model to different climates around the world.

5.4.6.G.1 Illustrate global winds and surface currents through the creation of a world map of global winds and currents that explains the relationship between the two factors.

5.4.6.G.2 Create a model of ecosystems in two different locations, and compare and contrast the living and nonliving components.

5.4.6.G.3 Describe ways that humans can improve the health of ecosystems around the world.

5.4.8.G.2 Investigate a local or global environmental issue by defining the problem, researching possible causative factors, understanding the underlying science, and evaluating the benefits and risks of alternative solutions.