

SCIENCE

LENGTH OF TIME: one year

GRADE LEVEL: 7

COURSE STANDARDS:

Students will:

1. Demonstrate an understanding of basic genetics, including DNA and its role in inheritance, Mendel's laws, punnett squares, and genetic disorders (PA Academic Std 3.3.7C; 3.8.7C; 3.7.7B)
2. Demonstrate an understanding of watersheds, their components, and the ways that humans interact with watersheds. (PA Academic Std 4.1.7A, 4.1.7B, 4.1.7C, 4.1.7D, 4.1.7E; 4.6.7B)
3. Demonstrate an ability to gather and interpret field data through the use of different measurement devices and technology. (PA Academic Std 4.1.7A, 4.1.7B, 4.1.7C, 4.1.7D, 4.1.7E; 4.6.7B)
4. Apply the concepts and principles of motion, velocity, acceleration, deceleration, and momentum to problem solving. (PA Academic Std 3.4.7C; 3.7.7B)
5. Demonstrate understanding of the basic components and properties of matter and properties of elements, compounds and mixtures. (PA Academic Std 3.4.7A; 3.7.7B)
6. Develop familiarity with the basic processes of the scientific method. (PA Academic Std 3.2.7B, 3.2.7C)

RELATED PA ACADEMIC STANDARDS FOR SCIENCE AND TECHNOLOGY

- 3.2 Inquiry and Design
 - B. Process Knowledge
 - C. Scientific Method
- 3.3 Biological Sciences
 - C. Inheritance
- 3.4 Physical Science, Chemistry and Physics
 - A. Matter
 - C. Forces and Motion
- 3.7 Technological Devices
 - B. Instruments
- 3.8 Science, Technology and Human Endeavors
 - C. Consequences and Impacts

RELATED PA ACADEMIC STANDARDS FOR ENVIRONMENT AND ECOLOGY

- 4.1 Watersheds and Wetlands
 - A. Cycles
 - B. Role of watersheds
 - C. Physical Factors
 - D. Characteristics and functions of wetlands
 - E. Impacts of watersheds and wetlands

4.6 Ecosystems and their Interactions

B. Cycles

PERFORMANCE ASSESSMENTS:

Students will demonstrate achievement of the standards by:

1. Creating a genetic “family tree” that traces the history of certain dominant and recessive traits. (Course Standard 1)
2. Evaluating the general health of specific components of a watershed, identifying problems, and making recommendations, if warranted, for solutions to improve the overall health of the component being studied. (Course Standard 2)
3. Measuring the health of components within a watershed using a variety of instruments and techniques. (Course Standard 3)
4. Performing a variety of laboratory experiments reinforcing the different aspects of motion and calculating the forces involved. (Course Standard 4)
5. Performing a variety of laboratory experiments reinforcing the different properties of matter and predicting the outcomes of similar experiments. (Course Standard 5)
6. Identifying, during the course of experimentation, the distinct steps of the scientific method, control, and variables that might influence the outcome. (Course Standard 6)

DESCRIPTION OF COURSE:

This course allows students to investigate concepts in biology, physical science, earth and space science, and ecology by providing core knowledge related to thematic units and allowing students to explore and interact with these new ideas through the scientific thought processes summarized in the scientific method. The general scope of course content includes basic genetics, characteristics of the watershed, forces and motion, and properties of matter. Throughout the course, students will be expected to interact with content through the use of technology ranging from traditional lab equipment to current uses of computers to research and produce documents. An emphasis on inquiry, the scientific method, limits of science, and methods of observation will be woven through the content strands. When appropriate, the course will use interdisciplinary assignments to solidify connection with content in other disciplines. Students will be asked to demonstrate mastery of course content through a variety of assessments techniques, both individually and in cooperative learning opportunities, including but not limited to traditional tests and quizzes, performance assessments, projects, presentations, and documentation of experimental laboratory work.

TITLES OF UNITS:

1. Genetics– 45 Days
 - Genetic inheritance
 - Genes and patterns of inheritance- dominance, recessiveness, co-dominance
 - Different methods of reproduction among organisms
 - Mutation
 - Selective breeding and genetic modification
2. The Watershed – 45 Days
 - The water cycle

- Characteristics and role of the watershed
 - Role and interdependence of organisms within a watershed
 - Wetlands
 - Human impact and interactions within watersheds and wetlands
 - Field research and data collection
3. Forces and Motion – 45 Days
 - Motion as position, direction, and speed
 - Laws of motion
 - Inertia, momentum, and friction
 4. Properties of Matter – 45 Days
 - Elements, compounds, and mixtures
 - Physical and chemical properties
 - Chemical reactions

SAMPLE INSTRUCTIONAL STRATEGIES:

1. Informational reading
2. Cooperative learning
3. Comprehension questions
4. Graphic organization of content / notes
5. Class discussion
6. Laboratory activities
7. Student presentations
8. Projects
9. Information summaries
10. Audio/Visual presentations
11. Internet-based presentations
12. Demonstrations
13. Computer activities

MATERIALS:

1. Cells, Heredity, and Classification; Holt, Rinehart, and Winston, 2005
2. Environmental Science; Holt, Rinehart, and Winston, 2005
3. Introduction to Matter; Holt, Rinehart, and Winston, 2005
4. Forces, Motion, and Energy; Holt, Rinehart, and Winston, 2005
5. Lab Bank; Holt, Rinehart, and Winston, 2005
6. Program Teaching Resources; Holt, Rinehart, and Winston, 2005
7. One-Stop Planner CD-ROM with Examview Test Generator; Holt, Rinehart, and Winston, 2005
8. Teacher generated materials
9. CD-Rom software
10. Library materials
11. Trade books
12. Laboratory equipment

13. Handheld computer and probe technology
14. Computers
15. Audio/Visual equipment
16. Guest speakers

METHODS OF ASSISTANCE AND ENRICHMENT:

1. Special assistance – IST, SAP
2. Resource extra help sessions
3. Review materials
4. Differentiation of content and product
5. Accommodation materials
6. Peer tutoring
7. Parent conferences
8. Supplemental materials
9. Extra credit projects
10. Speakers
11. Field trips
12. Integrated units

PORTFOLIO DEVELOPMENT:

At least yearly, students will be encouraged to select work that illustrates understanding of course content and adherence to common expectations for quality work for a portfolio that will be jointly maintained by the student and science teachers during their time in the middle school. The purpose of the portfolio is to provide the student with a compilation of high quality work samples that meet or exceed course standards for longitudinal reflection of progress in science courses.

METHODS OF EVALUATION:

1. Traditional tests and quizzes
2. Performance assessments
3. Projects
4. Presentations
5. Documentation of experimental laboratory work.
6. Use of rubrics specific to above methods of evaluation

INTEGRATED ACTIVITIES:

1. Concepts
 - Genetics and inheritance
 - Forces and motion.
 - Scientific method
 - Experimental design
 - Elements, compounds, and mixtures
 - Physical and chemical properties
 - Chemical reactions
 - Motion as position, direction, and speed

- Laws of motion
 - Inertia, momentum, and friction
 - Genetic inheritance
 - Genes and patterns of inheritance- dominance, recessiveness, co-dominance
 - Different methods of reproduction among organisms
 - Mutation
 - Selective breeding and genetic modification
 - The water cycle
 - Characteristics and role of the watershed
 - Role and interdependence of organisms within a watershed
 - Wetlands
 - Human impact and interactions within watersheds and wetlands
 - Field research and data collection
2. Communication
- Respond orally and in written form
 - Produce, perform or exhibit work
 - Listening comprehension
 - Oral and written expression of ideas
 - Informational reading
3. Thinking/Problem Solving
- Sensory observation
 - Data analysis
 - Compute, measure, estimate
 - Scientific method
 - Make predictions
 - Translate data
 - Evaluate
 - Formulate and solve problems
 - Define constraints and limits
 - Draw and generalize conclusions
 - Show relationships
 - Recognize patterns
4. Application of Knowledge
- Evaluate scientific data
 - Exhibit skills
 - Examine and evaluate problems and solutions
 - Demonstrate relationships

5. Interpersonal Skills

- Demonstrate skills
- Work cooperatively
- Communicate effectively
- Work effectively with other students