

# SCIENCE

LENGTH OF TIME: one year

GRADE LEVEL: 8

## COURSE STANDARDS:

Students will:

1. Demonstrate an understanding of taxonomy, speciation, and fluency with the dichotomous key and biological classification; use a taxonomic key to identify organisms and classify them appropriately. (PA Academic Std 3.3.7C, 3.3.7D; 4.7.7A, 4.7.7C)
2. Apply knowledge of taxonomy towards conclusions about evolution and gene recombination. (PA Academic Std 3.3.7C, 3.3.7D; 4.7.7A, 4.7.7C)
3. Demonstrate an understanding of the ways that physical and chemical properties dictate the interaction of different substances; demonstrate familiarity with basic element structures. (PA Academic Std 3.1.7A, 3.1.7C; 3.2.7B, 3.2.7C; 3.4.7A; 3.7.7A, 3.7.7B)
4. Demonstrate basic knowledge of climate, weather, and the factors that affect them. (PA Academic Std 3.1.7E; 3.5.7C, 3.5.7D; 3.8.7B)
5. Apply the concepts and principles of simple machines in problem solving situations. (PA Academic Std 3.1.7A, 3.1.7C; 3.2.7B, 3.2.7C; 3.4.7C; 3.7.7A, 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

- 3.1 Unifying Themes
  - A. Systems
  - C. Patterns
  - E. Change
- 3.2 Inquiry and Design
  - B. Process Knowledge
  - C. Scientific Method
- 3.3 Biological Sciences
  - C. Inheritance
  - D. Evolution
- 3.4 Physical Science, Chemistry and Physics
  - A. Matter
  - C. Forces and Motion
- 3.5 Earth Sciences
  - C. Meteorology
  - D. Hydrology and Oceanography
- 3.7 Technological Devices
  - A. Tools
  - B. Instruments
- 3.8 Science, Technology and Human Endeavors

## B. Meeting Human Needs

### RELATED PA ACADEMIC STANDARDS FOR ENVIRONMENT AND ECOLOGY

#### 4.7 Threatened, Endangered and Extinct Species

##### A. Diversity

##### C. Management Strategies

#### PERFORMANCE ASSESSMENTS:

Students will demonstrate achievement of the standards by:

1. Creating a student-selected project that incorporates themes of taxonomy and evolution as well as elements of all the different taxonomic kingdoms. (Course Standard 1)
2. Creating written and drawn documents that illustrate relationships between species in the animal kingdom. (Course Standard 2)
3. Using the scientific method to conduct various experiments describing different chemical reactions. (Course Standard 3)
4. Forecasting the weather using many of the variables that affect weather in a particular area. (Course Standard 4)
5. Designing a project that uses all six simple machines to move an object from one point to another. (Course Standard 5)
6. Using the scientific method to design and implement an experiment to test environmental phenomena. (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 taxonomic classification, evolution, gene recombination, chemical reaction and properties of matter, meteorology, and simple machines. 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. Biology and The Nature of Science– 45 Days
  - Genetic inheritance
  - Speciation
  - Classification, taxonomy, and the dichotomous key
  - Extinction

2. Chemical Reactions and Properties of Matter – 45 Days
  - Bonding
  - Elements and compounds
  - Physical and chemical properties
  - Chemical reactions
3. Weather – 45 Days
  - Weather data and symbols
  - Oceanic impact on climate
  - Cloud types and prevailing winds
  - Cloud formation and precipitation
  - The atmosphere
  - The water cycle
4. Simple Machines– 25 Days\*
  - Simple machines and systems

\*Approximately 20 instructional days are dedicated to the completion of the 8<sup>th</sup> grade project.

#### 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. Micro-organisms, Fungi, and Plants; Holt, Rinehart, and Winston, 2005
2. Animals; Holt, Rinehart, and Winston, 2005
3. Cells, Heredity, and Classification; Holt, Rinehart, and Winston, 2005
4. Weather and Climate; Holt, Rinehart, and Winston, 2005
5. Interactions of Matter; Holt, Rinehart, and Winston, 2005
6. Forces, Motion, and Energy; Holt, Rinehart, and Winston, 2005
7. Lab Bank; Holt, Rinehart, and Winston, 2005
8. Program Teaching Resources; Holt, Rinehart, and Winston, 2005
9. One-Stop Planner CD-ROM with Examview Test Generator; Holt, Rinehart, and Winston, 2005

10. Teacher generated materials
11. CD-Rom software
12. Library materials
13. Trade books
14. Laboratory equipment
15. Handheld computer and probe technology
16. Computers
17. Audio/Visual equipment
18. 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
  - Simple machines and force
  - The scientific method and experimentation
  - Chemical properties

- Meteorology
  - Technology and data collection
  - Bonding
  - Elements and compounds
  - Physical and chemical properties
  - Chemical reactions
  - Genetic inheritance
  - Natural Selection and evolution
  - Speciation
  - Classification, taxonomy, and the dichotomous key
  - Extinction
  - Weather data and symbols
  - Oceanic impact on climate
  - Cloud types and prevailing winds
  - Cloud formation and precipitation
  - The atmosphere
  - The water cycle
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