SCIENCE

LENGTH OF TIME: one year

GRADE LEVEL: 6

COURSE STANDARDS:
Students will:

1. Demonstrate an understanding of different ways that living things adapt to survive in diverse climatic regions. (PA Academic Std 3.3.7A, 3.3.7D; 3.1.7B; 4.6.7A, 4.6.7C; 4.7.7A, 4.7.7B, 4.7.7C; 4.8.7C)
2. Demonstrate an understanding of biological evolution, natural selection, extinction, and the support that the fossil record lends to evolution. (PA Academic Std 3.3.7A, 3.3.7D, 4.3.7C; 3.1.7B; 4.7.7A, 4.7.7B, 4.7.7C)
3. Demonstrate an understanding of cell biology and the levels of cellular organization in multicelled organisms. (PA Academic Std 3.3.7B, 3.1.7B; 4.6.7A, 3.7.7A, 3.7.7B)
4. Demonstrate understanding of the structure and scale of the universe as it relates to the different kinds of celestial bodies and the differences in size and distance between them. (PA Academic Std 3.4.7D; 3.5.7B)
5. Demonstrate an understanding of different forms of energy, specifically light and other electromagnetic forms, sound, and heat as well as energy transfer. (PA Academic Std 3.4.7B; 3.1.7B)
6. Demonstrate understanding of the different types of natural resources and their renewability. (PA Academic Std 4.2.7A, 4.2.7B, 4.2.7C, 4.2.7D)
7. 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
- B. Models

3.2 Inquiry and Design
- B. Process Knowledge
- C. Scientific Method

3.3 Biological Sciences
- A. Living Forms
- B. Structure and Function
- D. Evolution

3.4 Physical Science, Chemistry and Physics
- B. Energy
- D. Astronomy

3.5 Earth Sciences
- B. Resources

3.7 Technological Devices
- A. Tools

B. Instruments

RELATED PA ACADEMIC STANDARDS FOR ENVIRONMENT AND ECOLOGY

4.2 Renewable and Nonrenewable Resources
- A. Uses
- B. Availability
- C. Management
- D. Influential Factors

4.3 Environmental Health
- C. Biological Diversity

4.6 Ecosystems and their Interactions
- A. Living and Nonliving Components
- C. Change over Time

4.7 Threatened, Endangered and Extinct Species
- A. Diversity
- B. Adaptation
- C. Management Strategies

4.8 Humans and the Environment
- C. Human Impacts

PERFORMANCE ASSESSMENTS:

Students will demonstrate achievement of the standards by:

1. Completing an individualized research project exploring an exotic mammal and making use of library and computer resources; project will incorporate interdisciplinary elements into finished product. Creating a drawing or model to demonstrate comprehension of structural and behavioral adaptations either specific to one species or exemplified by members of different species. (Course Standard 1)
2. Creating a model of a "new species" and synthesizing understanding of elements of adaptations and biomes into a cohesive group presentation of the model. (Course Standard 2)
3. Creating a drawing or model comparing and contrasting the studied parts of a cell with the components of another working system. Identifying the distinct stages of mitosis from a microscope specimen containing hundreds of individual cells. (Course Standard 3)
4. Creating a model of the solar system scaled for relative size of the planets and possibly enriched by demonstrating relative distance of the models related to model scale. Creating a student-selected project demonstrating knowledge of an aspect of the solar system and how it impacts life on earth. (Course Standard 4)
5. Creating and presenting an experimental design guided by the scientific method and demonstrating a transfer of energy via heat, light, or sound. (Course Standard 5)
6. Analyzing a system that uses natural resources as energy input and recommending either alternate energy sources (for non-renewable resources) or suggesting ways that renewable resources could be more efficiently utilized. (Course Standard 6)
7. Identifying, during the course of experimentation, the distinct steps of the scientific method and relating each step to an experimental outcome. (Course Standard 7)

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 adaptations, biomes, and evolution; cell biology; energy and its different forms, i.e. light, heat, and sound; use of the earth's natural resources; and fundamentals of astronomy. 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. Biomes, Adaptations, and Evolution – 45 Days
   - Animal adaptations (structural and behavioral) and plant adaptations
   - Biomes
   - Evolution, the fossil record, and natural selection
   - Biologic extinction
   - Dichotomous Key
   - Ecosystem structure and components

2. Cell Biology – 45 Days
   - Cells, tissues, organs, organ systems, organisms
   - Measurement tools and scales

3. Energy – 45 Days
   - Light and the electromagnetic spectrum
   - Properties of mirrors and lenses
   - Heat
   - Sound
   - Characteristics of waves
   - Natural resources and renewability
   - Steps of the scientific method
   - Controls and variables
   - Scientific vs. non-scientific questions

4. Astronomy – 45 Days
   - Structure of the solar system
   - Galactic structure

- Stars
- Satellites – planets, moons, comets, asteroids, and their motions

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. Animals; Holt, Rinehart, and Winston, 2005
2. Cells, Heredity, and Classification; Holt, Rinehart, and Winston, 2005
3. Environmental Science; Holt, Rinehart, and Winston, 2005
4. Astronomy; Holt, Rinehart, and Winston, 2005
5. Sound and Light; Holt, Rinehart, and Winston, 2005
6. Lab Bank; Holt, Rinehart, and Winston, 2005
7. Program Teaching Resources; Holt, Rinehart, and Winston, 2005
8. One-Stop Planner CD-ROM with Examview Test Generator; Holt, Rinehart, and Winston, 2005
9. TOPPS learning and laboratory materials
10. Teacher generated materials
11. CD-Rom software
12. Library materials
13. Trade books
14. Laboratory equipment
15. Computers
16. Audio/Visual equipment
17. 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
    - Ecosystem structure and components
    - Cells, tissues, organs, organ systems, organisms
    - Measurement tools and scales, experimental design
    - Steps of the scientific method
    - Controls and variables
    - Scientific vs. non-scientific questions
    - Light and the electromagnetic spectrum
    - Properties of mirrors and lenses
    - Heat
    - Sound
    - Characteristics of waves
    - Animal adaptations (structural and behavioral) and plant adaptations
    - Biomes
    - Evolution, the fossil record, and natural selection
    - Biologic extinction
    - Dichotomous Key
    - Cell biology and organization
    - Structure of the solar system
    - Galactic structure

- Stars
- Satellites – planets, moons, comets, asteroids, and their motions
- Natural resources and renewability

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