

# SCIENCE

LENGTH OF TIME: one year

GRADE LEVEL: 4

## COURSE STANDARDS:

Students will:

1. Demonstrate an understanding of the differences and similarities between rocks and minerals and describe how rocks and minerals are used. (PA Academic Std 3.5.4b)
2. Describe earth features and processes including: major layers of the earth, folding, faulting, volcanism, sedimentation, erosion, weathering and plate movement. (PA Academic Std 3.5.7a)
3. Distinguish between examples of rapid surface changes (e.g. landslides, earthquakes) and slow surface changes (e.g. weathering) (PA Academic Std 3.5.7a)
4. Develop an understanding of motion physics and how to apply these concepts to technological design. (PA Academic Std 3.2.4d, 3.4.4c, 3.8.4a)
5. Develop an understanding of the structure and interrelationships of an ecosystem. (PA Academic Std 3.1.4a, 3.1.4c, 3.1.4e, 4.1.4a,b,c,e, 4.3.4c, 4.6.4a-c)
6. Develop an understanding of how pollutants can disturb the stability of an ecosystem. (PA Academic Std 3.8.4c, 4.3.4b, 4.6.4c, 4.8.4c)
7. Describe ways to reduce pollutants in the environment (PA Academic Std 4.3.4b)

## RELATED PA ACADEMIC STANDARDS FOR SCIENCE AND TECHNOLOGY

- 3.1 Unifying Themes
  - A. Systems
  - C. Patterns
  - E. Change
- 3.2 Inquiry and Design
  - D. Problem Solving in Technology
- 3.4 Physical Science, Chemistry and Physics
  - C. Forces and Motion
- 3.5 Earth Sciences
  - A. Land Forms and Processes
  - B. Resources
  - D. Hydrology and Oceanography
- 3.8 Science, Technology and Human Endeavors
  - A. Constraints
  - 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
- E. Impacts of watersheds and wetlands
- 4.3 Environmental Health
  - B. Human Actions
  - C. Biological Diversity
- 4.6 Ecosystems and their Interactions
  - A. Living and Nonliving Components
  - B. Cycles
  - C. Change over Time
- 4.8 Humans and the Environment
  - C. Human Impacts

#### PERFORMANCE ASSESSMENTS:

Students will demonstrate achievement of the standards by:

1. Designing, building, testing, and modifying vehicles to meet design requirements. (Course Standard 3, 4)
2. Building vehicles from technical two and three view drawings. (Course Standard 4)
3. Recording and comparing distances a vehicle travels under various conditions. (Course Standard 3, 4)
4. Communicating results of an investigation of a task performed by a vehicle through charts and drawings. (Course Standard 3, 4)
5. Recording and discussing observations of the properties of rocks and minerals. (Course Standard 1, 2)
6. Performing and interpreting tests on minerals. (Course Standard 1, 2)
7. Applying previously learned concepts to identify unknown minerals. (Course Standard 2, 3)
8. Conducting, recording and organizing daily observations of a model ecosystem. (Course Standard 5, 6)
9. Planning, implementing, and analyzing an experiment involving the affect of a pollutant on an ecosystem. (Course Standard 6)
10. Sampling and recording sources of air pollution. (Course Standards 6, 7)
11. Communicating the results of applying the technological design process to an air pollution problem. (Course Standards 6, 7)

#### DESCRIPTION OF COURSE:

This course allows students to observe and investigate concepts of biology, physical, and earth/space sciences. This course introduces new concepts to the student and builds on previous knowledge using a variety of topics such as: Newton's Laws of Motion, different kinds of energy, how an engineer develops and modifies a design to meet specific requirements, rocks are aggregates of minerals, rocks and minerals have different properties, properties determine how rocks and minerals are used, ecosystems consist of the interrelationships of all the living and nonliving elements in them, including food chains and webs, and pollutants disturb the stability of ecosystems, sources of air pollution and their effects on the human respiratory system, and how to use the technological design process to solve pollution problems..

#### TITLES OF UNITS:

- |                                                   |            |
|---------------------------------------------------|------------|
| 1. Biology, <u>Ecosystems</u>                     | 30-45 days |
| 2. Physical Science, <u>Motion and Design</u>     | 30-45 days |
| 3. Earth/Space Science, <u>Rocks and Minerals</u> | 30-45 days |
| 4. <u>Solving Pollution Problems</u>              | 30-40 days |

#### SAMPLE INSTRUCTIONAL STRATEGIES:

1. Cooperative groups for research, experimentation and construction
2. Independent research
3. Discussion groups
4. Lecture
5. Role playing and simulations
6. Telecommunication
7. Computer data input and display
8. Differentiated instruction (activities and assessments)

#### MATERIALS:

1. Carolina Biological Kits, Grade 4, 1998
2. BSCS T.R.A.C.S. Kit Solving Pollution Problems 1999.

#### METHODS OF ASSISTANCE AND ENRICHMENT:

1. Peer helpers
2. Adaptive strategies: graphic organizers, trade books with a range of reading levels
3. Interactive encyclopedia
4. Individual teacher help
5. Special projects

#### PORTFOLIO DEVELOPMENT:

1. Written report of how design of a vehicle is modified to perform a specific task
2. Organized daily observations of an ecosystem.
3. Lab report on mineral testing

#### METHODS OF EVALUATION:

1. Tests with short answers and longer written reports
2. Experiments
3. Projects
4. Written and oral reports
5. Self-evaluation
6. Group evaluation

#### INTEGRATED ACTIVITIES:

1. Concepts
  - ecosystems
  - physics of motion (Newton's Laws)
  - technology/technological tools

- rocks and minerals
  - geological processes
  - pollutants
2. Communication
- read and use a variety of methods to make sense of various kinds of complex texts
  - respond orally and in writing
  - write for a variety of purposes (e.g. narrate, inform, persuade)
  - exchange information orally (discuss)
  - listen and understand complex oral messages
  - compose and make oral presentations
  - produce, perform or exhibit work
  - converse
  - construct meaning from experiments, observations, discussions
  - use the writing process
3. Thinking/Problem Solving
- analyze
  - observe
  - make critical judgments about
  - use effective research and information management skills
  - evaluate
  - respond critically to
  - compute, measure, estimate
  - apply the concepts of
  - formulate and solve problems
  - infer
  - draw conclusions
  - show relationships
  - make decisions
  - make predictions
  - construct
  - generate potential conclusions
  - develop and defend a position
  - recognize patterns
4. Application of Knowledge
- use and evaluate
  - relate
  - exhibit skills
  - examine and evaluate problems
  - demonstrate connections, relationships
5. Interpersonal Skills
- demonstrate skills
  - work cooperatively
  - communicate effectively
  - work effectively with others
  - negotiate