

Elizabethtown Area School District

Grade Six Science

Course Number: Length of Course: 184 days
Grade Level: Six Total Clock Hours: 150
Length of Period: 49 minutes Date Written: February 23, 2007
Periods per Week/Cycle: 5 Periods/Week
Written By: Edward Barlow, William Dietz, and Roy Whited
Credits (if app):

Course Description:

The sixth grade general science program is designed to generate interest in the field of science. The science curriculum is based on the Pennsylvania Academic Standards. This curriculum consists of learning units with hands-on labs including: measurement, chemistry, nuclear energy, energy sources, electricity, electromagnetic waves, inquiry-based scientific method activities, weather, and astronomy. The formal assessments used to evaluate understanding are administered at the end of each of unit, as well as throughout the year in the form of spiral review.

I. Overall Course/Grade Level Standards

Students will KNOW and be able TO DO the following as a result of taking this course.

- A) Use science tools and the metric system of measurement to accurately measure length, volume, and mass.
- B) Define and describe the properties of matter.
- C) Explain the impact of radioactive materials on humans and the environment.
- D) Describe the advantages and disadvantages of alternative energy sources.
- E) Compare and contrast current and static electricity.
- F) Define and explain the differences in characteristics of electromagnetic waves.
- G) Apply knowledge of weather patterns to describe and predict weather.
- H) Demonstrate understanding of Newton's Three Laws of Motion as they apply to the Universe.

II. Content

Major Areas of Study

List all units of study below:

Unit	Estimated Time	Materials
1. Metric System/Measurement	26 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Microscopes - Thermometers - Meter sticks - Rulers - Graduated cylinders - Beakers - Alcohol burners - Two-pan balances - Safety apparatus
2. Chemistry	35 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Textbook - Videos - Online resources - Alcohol burners - Test tubes - Beakers - Litmus paper - Red cabbage - Periodic tables - Physical change demonstration items - Chemical change demonstration items - pH scale - Various chemicals
3. Nuclear Energy	21 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Textbook - Videos - Online resources - Power plant diagrams - Uranium pellet models - Scaler units - Geiger counter - Radioactive sources - Radiation protective suit - Various shielding devices

4. Energy Sources	15 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Textbook - Videos - Online resources - Solar oven - Fuel cell car - Coal samples - Oil samples - Chocolate chip cookies - Toothpicks - Recyclables - Solar car
5. Inquiry-Based Scientific Method Project	5 periods	<ul style="list-style-type: none"> - Materials will vary based on project
6. Electromagnetic Energy	17 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Textbook - Videos - Online resources - Prisms - Spectroscopes - Large spring - Retinal fatigue materials - Decibel meter - Laser - Concave and convex mirrors - Concave and convex lenses - Eye model
7. Electricity	22 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Textbook - Videos - Online resources - Whimshurst generator - Van de Graff generator - D Cell batteries - Battery holders - Various wires - Test leads - 1.5 volt bulbs - Magnets - Electromagnets

		<ul style="list-style-type: none"> - Wet and dry cell battery models - Conductors - Insulators - Voltmeters - Ammeters - Circuit board - Electric meters - Fuses - Circuit breakers - Pith balls - Rabbit fur - Rubber wand
8. Weather	11 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Textbook - Videos - Online resources - Weather maps - Thermometers - Barometer - Magdeburg hemispheres - Vacuum pump - Bell jar - Tornado tubes - Cartesian divers
9. Astronomy	27 periods	<ul style="list-style-type: none"> - Unit packet - Unit notes - Textbook - Videos - Online resources - Star finders - Model rocket engines - Model rocket launch system - Altiscope - Newtonian demonstration devices - Planetary models - Lunar models

III. Course Assessments

Check types of assessments to be used in the teaching of the course and provide examples of each type.

- | | |
|---|---|
| <input checked="" type="checkbox"/> Objective Tests/Quizzes | <input type="checkbox"/> Response Journals |
| <input type="checkbox"/> Constructed Responses | <input type="checkbox"/> Logs |
| <input checked="" type="checkbox"/> Essays | <input type="checkbox"/> Computer Simulations |
| <input checked="" type="checkbox"/> Reports | <input checked="" type="checkbox"/> Research Papers |
| <input checked="" type="checkbox"/> Projects | <input type="checkbox"/> Class Participation |
| <input type="checkbox"/> Portfolios | <input type="checkbox"/> Note Taking |
| <input type="checkbox"/> Presentations | <input checked="" type="checkbox"/> Daily Assignments |
| <input checked="" type="checkbox"/> Performance Tasks | <input type="checkbox"/> Writing Samples |

Provide copies of common assessments that will be utilized for all students taking this course. Overall course/grade level standards will be measured by a common course assessment. Unit objectives will be measured on an ongoing basis as needed by the classroom teacher to assess learning and plan for instruction. List common assessments below and recommend date/time frame for administration (at least quarterly).

Name of Common Assessment	When given?
1. Pretest	Two periods during first week
2. Review Tests	Following each unit
3. Mid-Year Benchmark Test	One period mid-year
4. Posttest	Two periods during last week
5. Labs	Within individual units
6. Projects	Within individual units
7. Performance Tasks (Reader Response)	Quarterly

IV. Expected levels of achievement

Current grading scale

92-100 = A
83-91 = B
74-82 = C
65-73 = D
0-64 = F

PA Proficiency Levels
Advanced
Proficient
Basic
Below Basic

The following scoring documents have been developed for this course:

* See attached documents following this page

Name of Unit: Metric System/Measurement

Essential Question: How do you use science tools and measure using metric measurement?

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about the metric system?	C	A	3.1.7
2. What are the essential safety rules in a science room?	E	A	3.7.4.A
3. What is the metric system?	I	A	3.7.7.B
4. What are the basic metric prefixes?	I	A	3.1.7.D
5. How do you use a two-pan balance to measure mass?	I	A	3.1.7.D 3.7.7.B
6. How do you measure the length of various objects using metric linear units?	I	A	3.1.7.D
7. What are the temperature scales?	I	A	3.1.7.D
8. How do you read a Celsius thermometer?	I	A	3.1.7.D 3.7.7.B
9. What happens to the temperature of water when it is boiled?	C	A	3.1.7.D
10. What are the parts of a bar/line graph?	E	A	3.1.7.B 3.1.7.D
11. What are the three basic units of measurement in the metric system?	E	A	3.1.7.A
12. How do you use a graduated cylinder?	I	A	3.1.7.D 3.7.7.B
13. How do you find and focus on objects using a microscope?	I	A	3.1.7.B 3.1.7.D 3.7.7.A 3.7.7.B
14. How do you calculate the density of solids?	C	A	3.1.7.C

Name of Unit: Chemistry**Essential Question: What is matter and how would the properties of matter be described through chemistry?**

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about chemistry?	C	B	3.4.7.A
2. What is matter?	E	B	3.4.7.A
3. What are the basic phases of matter?	E	B	3.4.7.A
4. What are phase changes?	I	B	3.4.7.A
5. What is a physical change and what are some examples of physical changes?	I	B	3.4.7.A
6. What are the differences between physical properties and changes?	I	B	3.4.7.A
7. What makes a chemical change and what are some examples of chemical changes?	I	B	3.4.7.A
8. What are the differences between chemical properties and changes?	I	B	3.4.7.A
9. What are the differences between elements, mixtures, and compounds?	C	B	3.4.7.A
10. What are the parts of an atom?	I	B	3.4.7.A
11. How would you use a model to demonstrate how an atom is constructed?	C	A, B	3.1.7.B 3.4.7.A
12. How do you identify parts of the Periodic Table of the Elements?	C	B	3.1.7.C 3.4.7.A
13. What is the Periodic Table of the Elements and how is it used?	I	A, B	3.1.7.C 3.4.7.A
14. What are protons, neutrons and electrons, and how do they relate to atomic number and atomic mass?	C	B	3.4.7.A
15. What is a molecule?	C	B	3.4.7.A
16. What are acids and bases?	I	B	3.4.7.A
17. How do you determine if a sample is an acid or a base using litmus paper?	C	A, B	3.2.7.B 3.2.7.C 3.4.7.A
18. How is cabbage juice used as an indicator?	C	A, B	3.2.7.B 3.2.7.C

			3.4.7.A
19. What is the pH scale?	I	A, B	3.1.7.C 3.4.7.A
20. How do you use the IMC to complete the Element Report?	C	A, B	3.2.7.B 3.4.7.A
21. What are the properties of an element?	I	B	3.4.7.A
22. How does salt affect the boiling point of water?	C	A, B	3.2.7.B 3.4.7.A
23. How do you identify individual elements in a compound?	C	B	3.4.7.A
24. What are the chemical changes when mixing dangerous chemicals?	C	B	3.2.7.B 3.4.7.A

Name of Unit: Nuclear Energy

Essential Question: How does radiation affect the human body and environment through energy production and the medical field?

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about nuclear energy?	C	C	3.4.7.B
2. What is energy?	E	C	3.4.7.B
3. What are the differences between potential and kinetic energy?	I	C	3.4.7.B 3.4.7.C
4. What is work?	I	C	3.4.7.B 3.4.7.C
5. What are the three types of radiation?	E	C	3.4.7.A 3.4.7.B
6. What are the ways you can protect yourself from radiation?	I	C	3.7.7.A
7. How do you calculate yearly radiation exposure?	C	C	3.4.7.B 4.3.7.A
8. What are the main parts of a nuclear power plant?	I	C	3.1.7.A 3.2.7.A 3.4.7.B 3.6.7.C
9. How does a nuclear power plant produce electricity?	C	C	3.1.7.A 3.6.7.C
10. What is the difference between fission and fusion?	I	C	3.1.7.B 3.4.7.A
11. What are the basic TMI myths?	C	C	4.3.7.A 4.3.7.B
12. What happened at TMI in March of 1979?	I	C	3.6.7.C 4.3.7.B
13. What are the pros and cons of using nuclear energy?	I	C	3.8.7.A 4.2.7.B 4.2.7.D 4.3.7.A 4.3.7.B

14. How does nuclear waste affect our environment?	I	C	4.3.7.A 4.3.7.B
15. What is a scaler and how is it used in the shielding lab?	I	A, C	3.2.7.A 3.2.7.B 3.7.7.A
16. What is half-life and why is it important in the area of radiation safety?	I	C	3.1.7.B 3.8.7.C 4.3.7.A
17. Why are the lessons learned from Chernobyl important?	C	C	3.6.7.C 4.3.7.A
18. How do we use radiation in today's world?	C	C	3.4.7.B 3.8.7.A 3.8.7.B 3.8.7.C
19. What are the major effects of radiation on a cell?	C	C	3.4.7.B 3.8.7.C 4.3.7.A

Name of Unit: Energy Sources

Essential Question: What are the advantages and disadvantages of alternative energy sources?

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about energy sources?	C	D	3.4.7.B
2. What are our energy sources and how are they used?	I	D	3.4.7.B 3.5.7.B 3.6.7.A 3.8.7.A 4.2.7.A 4.2.7.B 4.2.7.C
3. What are fossil fuels and how are they formed?	I	D	3.4.7.B 3.5.7.B 4.2.7.A 4.2.7.B 4.2.7.C
4. Why are we so dependent on electricity?	C	D	3.4.7.B
5. What is an energy blackout?	C	D	3.4.7.B 4.3.7.B
6. What are the advantages and disadvantages of using fossil fuels?	E	D	3.4.7.B 3.5.7.B 3.8.7.A 3.8.7.B 3.8.7.C 4.2.7.A 4.2.7.B 4.2.7.C 4.2.7.D 4.3.7.A 4.3.7.B 4.8.7.B 4.8.7.C

7. What are alternative energy sources and how can they be used to our advantage?	E	C, D	3.4.7.B 3.5.7.B 3.8.7.A 3.8.7.B 3.8.7.C 4.2.7.A 4.2.7.B 4.2.7.C
8. What are the disadvantages of using alternative energy sources?	E	C, D	3.4.7.B 3.5.7.B 3.6.7.A 3.8.7.A 3.8.7.B 3.8.7.C 4.2.7.A 4.2.7.B 4.2.7.C 4.2.7.D 4.3.7.A 4.3.7.B 4.8.7.B 4.8.7.C
9. What is the importance of recycling to our environment?	C	D	3.4.7.B 4.3.7.B
10. What are the advantages and disadvantages of strip mining?	C	D	3.4.7.B 3.5.7.B 4.2.7.A 4.2.7.B 4.2.7.C
11. How do we get rid of trash in Lancaster County?	C	D	3.4.7.B 4.3.7.B
12. What are some ways to conserve energy?	C	D	3.4.7.B
13. How do you design and construct a car that is powered by wind?	I	A, D	3.2.7.A 3.2.7.C

			3.4.7.B 3.6.7.C
14. How does an incinerator work?	C	D	3.4.7.B 4.3.7.B

Name of Unit: Electricity**Essential Question: How do you compare/contrast properties of current electricity and static electricity through the use of electrical devices?**

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about electricity?	C	E	3.4.7.B
2. What is electricity?	E	E	3.4.7.B
3. How does electricity flow?	I	E	3.4.7.C
4. How are wet and dry cell batteries constructed?	I	E	3.1.7.A
5. What is current and static electricity?	E	E	3.7.7.A
6. What are advantages and disadvantages of wet and dry cell batteries?	I	E	3.1.7.A 3.7.7.A
7. What are conductors and insulators?	I	E	3.7.7.B
8. What are several facts concerning lightning?	C	E	3.4.7.B
9. How does a series circuit differ from a parallel circuit?	C	E	3.1.7.A 3.1.7.B 3.4.7.B 3.7.7.A
10. How can you create a circuit using a battery?	I	E	3.1.7.A 3.7.7.A
11. What is the difference between volts, amps, and watts?	I	E	3.4.7.B
12. How do you determine volts, amps, and watts of batteries?	I	E	3.4.7.B
13. What are the two types of magnets?	I	E	3.7.7.A
14. What are the theories of magnetism?	C	E	3.1.7.B
15. What are three elements that can be made into magnets?	I	E	3.7.7.A 3.7.7.B
16. How do you make a magnet using common items?	I	E	3.7.7.B
17. What is the difference between the magnetic and geographic north poles?	I	E	3.5.7.A
18. Why do we have fuses and circuit breakers in our homes?	I	E	3.7.7.A
19. How do you read an electric meter and determine your family's electrical usage?	I	E	3.7.7.A

Name of Unit: Electromagnetic Energy

Essential Question: What are the characteristics of the different types of electromagnetic waves?

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about electromagnetic energy?	C	F	3.4.7.B 3.4.7.C
2. What are the characteristics of a wave?	E	F	3.1.7.B 3.1.7.C 3.4.7.C
3. How long does it take to count to one million?	C	F	3.1.7.D
4. What are examples of electromagnetic energy?	I	F	3.4.7.B 3.4.7.C
5. What are the basic parts of the eye?	I	F	3.1.7.A 3.1.7.B
6. Why do you see certain colors?	I	F	3.4.7.B 3.4.7.C
7. How does light travel?	I	F	3.4.7.B 3.4.7.C
8. What is a prism?	I	A, F	3.7.7.B
9. What is a spectroscope and how do you use it?	I	A, F	3.4.7.C 3.7.7.B
10. What is a laser and what are some common uses?	I	F	3.4.7.B 3.4.7.C
11. What are three types of mirrors, and what do they do to an image?	E	F	3.4.7.C
12. What are the two types of lenses, and what do they do to light?	E	F	3.4.7.C
13. What is a decibel, and what level can cause permanent damage?	I	F	3.4.7.B 3.4.7.C

Name of Unit: Weather

Essential Question: What causes weather and how do you forecast weather?

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about weather?	C	G	3.5.7.C
2. What are the basic weather map symbols?	E	G	3.1.7.B 3.5.7.C
3. What are the layers of the atmosphere?	E	G	3.1.7.D 3.5.7.C
4. How do you make a scale drawing of the layers of the atmosphere?	I	G	3.1.7.B 3.1.7.D 3.2.7.B 3.5.7.C
5. What are the causes of weather?	I	G	3.5.7.C
6. What are the major gasses of Earth's atmosphere?	C	G	3.5.7.C
7. What are the differences between fronts and pressure systems?	I	G	3.1.7.B 3.5.7.C
8. How do you forecast daily weather?	I	G	3.1.7.C 3.5.7.C
9. How does air pressure affect us?	I	G	3.5.7.C
10. What are the characteristics of tornadoes, hurricanes, and thunderstorms?	I	G	3.2.7.A 3.5.7.C
11. What are the basic cloud types?	E	G	3.5.7.C
12. How are clouds used to predict weather?	I	G	3.5.7.C

Name of Unit: Astronomy

Essential Question: How do we use Newton’s Three Laws of Motion to examine forces and motion in the universe?

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What do you know about space?	C	H	3.1.7.B 3.4.7.D
2. What do you know about constellations?	C	H	3.1.7.B 3.4.7.D
3. What are constellations?	E	H	3.4.7.D
4. What is a star and what is it made of?	I	H	3.4.7.D
5. What are the names of common constellations?	I	H	3.1.7.B 3.4.7.D
6. How do you locate constellations using a star finder?	I	A, H	3.1.7.B 3.4.7.D 3.7.7.B
7. What is the life cycle of a star?	I	H	3.4.7.D
8. How do you create and use a scale model of the solar system?	I	H	3.1.7.D 3.4.7.D
9. What are the two types of eclipses?	I	H	3.4.7.D
10. What are Newton’s Three Laws of Motion?	E	H	3.4.7.C 3.4.7.D
11. What are examples of Newton’s Laws and how do they relate to everyday experiences?	E	H	3.4.7.C 3.4.7.D
12. What are some problems with living in space?	I	H	3.4.7.D 4.3.7.A
13. How long does it take to travel to the planets in our solar system?	C	H	3.4.7.D
14. What are the phases of the moon?	E	H	3.4.7.D
15. What is a brief history of space flight?	C	H	3.4.7.D 3.6.7.C 3.8.7.B
16. What is a rocket and how does it work?	I	H	3.4.7.D

17. What is the difference between a satellite, space probe, and spacecraft?	C	H	3.4.7.D
18. How do you build and launch a model rocket?	I	H	3.1.7.B 3.1.7.D 3.4.7.D 3.7.7.A
19. What are the safety procedures for launching model rockets?	I	H	3.4.7.D 3.7.4.A
20. How do you calculate the maximum height reached by your rocket?	C	A, H	3.1.7.D 3.4.7.D
21. How do you design and test a recovery system?	C	H	3.1.7.A 3.1.7.B 3.1.7.D 3.4.7.D 3.7.7.B

Name of Unit: Inquiry-Based Scientific Method Project

Essential Question: How do you use the scientific method to conduct an experiment?

Unit Objectives/Key Question	Priority	Aligned to Course Standard	Aligned to PA Standard
1. What is the scientific method?	E	A	3.2.7.C
2. How do you form a question to be solved by experimentation?	I	A	3.2.7.C
3. How do you collect data/information related to an experiment?	I	A	3.2.7.C
4. How do you form a hypothesis?	I	A	3.2.7.C
5. How do you test a hypothesis?	I	A	3.2.7.C
6. How do you record and study experimental data?	I	A	3.2.7.A 3.2.7.B 3.2.7.C
7. How do you write a conclusion to report your findings?	I	A	3.2.7.C
