Twin Valley School District

Science K - 12

Scope & Sequence

Board Approved, September 2003

The Scope and Sequence provides an *overview* of the K-12 science curriculum as developed by a team of district teachers representing all grade levels. The Scope and Sequence establishes a *pathway* for all students to master the Academic Standards for Science and Technology and Environment and Ecology.

The format for each grade level includes the following:

1. Topics of study
2. Unifying themes: concepts that apply across all content areas
3. Inquiry and Design: scientific process skills
4. Content Standards

Since the state assessments are given in grades 4, 7, and 10, this document was designed by back mapping to assure that the standards for all students have been mastered by the time the test is administered. This document will be reviewed at the end of every school year. At that time, any proposed modifications to the Scope and Sequence will be considered by the K-12 Science Committee.

K-12 Science Committee

TVHS

Lisa Chillot
Ron Frederick
Doug Mountz
Nick Platco
Michelle Riehl
Dale Regener
Sue Paull - Math
Patsy Meyers

TVMS

Alison Verbanas
Tana Landis
Nancy Schneider

TVEC

Michelle Bebee

REC

Richard Bleacher
Brian Emerich
Esther Rush

HBEC

Holly Urbine
Sheila Rattigan

STANDARD-BASED SCIENCE CURRICULUM

Scope and Sequence for Grade Level Topics

Kindergarten	1st Grade	2nd Grade
Topics of Study: Senses Living versus non living Hygiene	***Topics of Study:*** Properties of Matter Humans and their Environment Systems of Human Body	***Topics of Study:*** Weather Habitats Watersheds and Wetlands Living things over time
Standard ***Exposure/Introduction*** ***3.1 Unifying Themes*** • 3.1.4. A Systems • 3.1.4. B. Models • 3.1.4. C. Patterns • 3.1.4. D. Scale • 3.1.4. E. Change ***3.2 Inquiry and Design*** • 3.2 4. A. Nature of Scientific Knowledge. • 3.2.4. B. Process Knowledge • 3.2.4. C. Scientific Method • 3.2.4. D. Problem Solving in Technology. ***3.3 Biological Sciences*** • 3.3.4. A. Know the similarities and differences of living things. • 3.3.4. B. Know that living things are made up parts that have specific functions.	***Standard*** ***Exposure/Introduction*** ***3.1 Unifying Themes*** • 3.1.4. A Systems • 3.1.4. B. Models • 3.1.4. C. Patterns • 3.1.4. D. Scale • 3.1.4. E. Change ***3.2 Inquiry and Design*** • 3.2 4. A. Nature of Scientific Knowledge. • 3.2.4. B. Process Knowledge • 3.2.4. C. Scientific Method • 3.2.4. D. Problem Solving in Technology. ***3.3 Biological Sciences*** • 3.3.4. A. Know the similarities and differences of living things. • 3.3.4. B. Know that living things are made up parts that have specific functions.	***Standard*** ***Introduction/Working Knowledge*** ***3.1 Unifying Themes*** • 3.1.4. A Systems • 3.1.4. B. Models • 3.1.4. C. Patterns • 3.1.4. D. Scale • 3.1.4. E. Change ***3.2 Inquiry and Design*** • 3.2 4. A. Nature of Scientific Knowledge. • 3.2.4. B. Process Knowledge • 3.2.4. C. Scientific Method • 3.2.4. D. Problem Solving in Technology. ***3.3 Biological Sciences*** • 3.3.4.D. Identify changes in living things over time. ***3.5 Earth Sciences*** • 3.5.4. A. Know basic landforms and earth history.

4.3 Environmental Health • 4.3.4. A. Know that plants, animals, and humans are dependent upon water.	***3.4 Physical Sciences, Chemistry and Physics*** • 3.4.4. A. Recognize basic concepts about the structure and properties of matter. ***4.2 Renewable and Nonrenewable Resources*** 4.2.4. A. Identify the needs of people. ***4.8 Humans and the Environment*** • 4.8.4. A. Identify the biological requirements of humans.	• 3.5.4. C. Know basic weather elements. ***4.1 Watersheds and Wetlands*** • 4.1.4. A. Identify various types of water environments. • 4.1.4. B. Explain the differences between moving and still water. • 4.1.4. C. Identify living things found in water environments. • 4.1.4. D. Identify a wetland and the plants and animals found there. • 4.1.4. E. Recognize the impact of watersheds and wetlands on animals and plants. ***4.2 Renewable and Nonrenewable Resources*** • 4.2.4. A. Identify the needs of people. ***4.6 Ecosystems and their Interactions*** • 4.6.4. C. Identify how ecosystems change over time. ***4.7 Threatened, Endangered and Extinct Species*** • 4.7.4. A. Identify differences in living things. • 4.7.4. B. Know that adaptations are important for survival • 4.7.4. C. Identify and understand extinction. ***4.8 Humans and the Environment*** • 4.8.4. A. Identify the biological requirements of humans. • 4.8.4. B. Know that environmental conditions influence where and how people live. ***4.9 Environmental Laws and Regulations*** • 4.9.4. A. Know that there are laws and regulations for the environment.

Twin Valley School District

STANDARD-BASED SCIENCE CURRICULUM

Proposed Grade level Topics

3rd Grade	4th Grade	5th Grade
Topics of Study: Plants Animals Solar System Forces and Motion	***Topics of Study:*** Land Forms, Rocks/Minerals Energy Types Weather Systems / Meteorology Oceans	***Topics of Study:*** Introduction to Cells/ Body Systems/Health Issues Simple Machines/Forces and Motion Rocks and minerals/ Earth's Renewable/nonrenewable resources Weather
Standard Mastery ***3.1 Unifying Themes*** • 3.1.4. A Systems • 3.1.4. B. Models • 3.1.4. C. Patterns • 3.1.4. D. Scale • 3.1.4. E. Change ***3.2 Inquiry and Design*** • 3.2 4. A. Nature of Scientific Knowledge. • 3.2.4. B. Process Knowledge • 3.2.4. C. Scientific Method • 3.2.4. D. Problem Solving in Technology. ***3.3 Biological Science*** • 3.3.4. A. Know the similarities and differences of living things. • 3.3.4. B. Know that living things are made up of parts that have specific	***Standard Mastery*** **(Spring State Assessment)** ***3.1 Unifying Themes*** • 3.1.4. A Systems • 3.1.4. B. Models • 3.1.4. C. Patterns • 3.1.4. D. Scale • 3.1.4. E. Change ***3.2 Inquiry and Design*** • 3.2 4. A. Nature of Scientific Knowledge. • 3.2.4. B. Process Knowledge • 3.2.4. C. Scientific Method • 3.2.4. D. Problem Solving in Technology. ***3.4 Physical Sciences, Chemistry and Physics*** • 3.4.4. A. Recognize basic concepts about the structure and properties of matter.	***Standard Mastery*** ***3.1 Unifying Themes*** • 3.1.7. A Systems • 3.1.7. B. Models • 3.1.7. C. Patterns • 3.1.7. D. Scale • 3.1.7. E. Change ***3.2 Inquiry and Design*** • 3.2 7. A. Nature of Scientific Knowledge. • 3.2.7. B. Process Knowledge • 3.2.7. C. Scientific Method • 3.2.7. D. Problem Solving in Technology. ***3.3 Biological Science*** • 3.3.7. A. Describe the similarities and differences that characterize diverse living things. • 3.3.7. B. Describe the cell as the

functions.

- 3.3.4. C. Know that characteristics are inherited and thus offspring closely resemble their parents.
- 3.3.4. D. Identify changes in living things over time.

3.4 Physical Sciences, Chemistry and Physics

- 3.4.4. C. Observe and describe different types of force and motion.
- 3.4.4. D. Describe the composition and structure of the universe and the Earth's place in it.

4.2 Renewable and Nonrenewable Resources

- 4.2.4. A. Identify the needs of people.
- 4.2.4. B. Identify products derived from natural resources
- 4.2.4. D. Identify byproducts and their use of natural resources.

4.3 Environmental Health

- 4.3.4. A. Know that plants, animals, and humans are dependent upon air and water.
- 4.3.4. B. Identify how human actions affect environmental health
- 4.3.4. C. Understand that the elements of natural systems are interdependent.

4.4 Agriculture and Society

- 4.4.4. A. Know the importance of agriculture to humans.
- 4.4.4. B. Know that food and fiber originate from plants and animals.
- 4.4.4. C. Identify technology and energy use associated with agriculture.

4.5 Integrated Pest Management

- 4.5.4. A. Know types of pests
- 4.5.4. B. Explain pest control

- 3.4.4. B. Know basic energy types, sources and conversions.

3.5 Earth Sciences

- 3.5.4. A. Know basic landforms and Earth history.
- 3.5.4. B. Know types and uses of Earth materials.
- 3.5.4. C. Know basic weather elements.
- 3.5.7. C. Describe basic elements of meteorology.
- 3.5.4. D. Recognize the Earth's different water resources.

4.6 Ecosystems and their Interactions

- 4.6.4. A. Understand that living things are dependent upon nonliving things in their environment for survival.
- 4.6.4. B. Understand the concept of cycles.

basic structural and functional unit of living things.

3.4 Physical Sciences, Chemistry and Physics

- 3.4.7. C. Identify and explain the principles of force and motion

3.5 Earth Sciences

- 3.5.7. B. Recognize Earth resources and how they affect everyday life.
- 3.5.7. C. Describe basic elements of meteorology.

4.2 Renewable and Nonrenewable Resources

- 4.2.7. A. Know that raw materials come from natural resources.
- 4.2.7. B. Examine the renewability of the resources.
- 4.2.7. C. Explain natural resource distribution.
- 4.2.7. D. Describe the role of recycling and waste management

4.3 Environmental Health

- 4.3.7. A. Identify environmental health issues.

4.8 Humans & Environment

- 4.8.7. D. Explain the importance of maintaining the natural resources at the local, state and national levels.

• 4.5.4. C. Understand society's need for integrated pest management ***4.6 Ecosystems and their Interactions*** • 4.6.4. A. Understand that living things are dependent on nonliving things in the environment for survival. ***4.7 Threatened, Endangered and Extinct Species*** • 4.7.4. A. Identify differences in living things. • 4.7.4. B. Know that adaptations are important for survival • 4.7.4. C. Identify and understand extinction.		

STANDARD-BASED SCIENCE CURRICULUM

Grade level Topics

6th Grade **Integrated Physical Science**	**7th Grade** **Life Science**	**8th Grade** **Earth Science**
Topics of Study: Matter Energy types Earth's Composition Earth's features, processes, Water systems Water sheds Environmental Laws Pollution	***Topics of Study:*** Cells Living Things – 5 Kingdoms Genetics Natural Selection Ecosystems/Wetlands Endangered Species Pest Management	***Topics of Study:*** Geology Meteorology Oceanography Astronomy
Standard Mastery	***Standard Mastery*** (Spring State Assessment)	***Standard Mastery***
3.1 Unifying Themes • 3.1. 7. A Systems • 3.1.7. B. Models • 3.1.7. C. Patterns • 3.1.7. D. Scale • 3.1.7. E. Change ***3.2 Inquiry and Design*** • 3.2 7. A. Nature of Scientific Knowledge. • 3.2.7. B. Process Knowledge • 3.2.7. C. Scientific Method • 3.2.7. D. Problem Solving in Technology. ***3.4 Physical Science, Chemistry and Physics*** • 3.4.7. A. Describe concepts about the structure and properties of matter.	***3.1 Unifying Themes*** • 3.1. 7. A Systems • 3.1.7. B. Models • 3.1.7. C. Patterns • 3.1.7. D. Scale • 3.1.7. E. Change ***3.2 Inquiry and Design*** • 3.2 7. A. Nature of Scientific Knowledge. • 3.2.7. B. Process Knowledge • 3.2.7. C. Scientific Method • 3.2.7. D. Problem Solving in Technology. ***3.4 Physical Science, Chemistry and Physics*** • 3.4.7. A. Describe concepts about the structure and properties of matter.	***3.1 Unifying Themes*** • 3.1.A Systems • 3.1.B. Models • 3.1.C. Patterns • 3.1.D. Scale • 3.1.E. Change ***3.2 Inquiry and Design*** • 3.2.10. A. Nature of Scientific Knowledge. • 3.2.10. B. Process Knowledge • 3.2.10. C. Scientific Method • 3.2.10. D. Problem Solving in Technology. ***3.4 Physical Science, Chemistry and Physics*** • 3.4.10. C Explain essential ideas about the composition and structure of the universe.

• 3.4.7. B. Relate energy sources and transfers to heat and temperature • 3.4.7. D. Describe the essential ideas about the composition and structure of the universe and the Earth's place in it. ***3.5 Earth Science*** • 3.5.7. A. Describe Earth features and processes. • 3.5.7. D. Explain the behavior and impact of the Earth's water systems. ***4.1 Watersheds, Wetlands*** • 4.1.7. A. Explain the role of the water cycle within a watershed. • 4.1.7. B. Understand the role of the watershed. • 4.1.7. C. Explain the effects of water on the life of organisms in the watershed. • 4.1.7. E. Describe the impact of watersheds and wetlands on people. ***4.3 Environmental Health*** • 4.3.7. B. Describe how human actions affect the health of the environment ***4.9 Environmental Laws*** • 4.9.7. A. Explain the role of environmental laws and regulations. 4.9.7. B. Explain the role of local and state agencies in enforcing environmental laws and regulations.	• 3.4.7. B. Relate energy sources and transfers to heat and temperature • 3.4.7. D. Describe the essential ideas about the composition and structure of the universe and the Earth's place in it. ***3.5 Earth Science*** • 3.5.7. A. Describe Earth features and processes. • 3.5.7. D. Explain the behavior and impact of the Earth's water systems. ***4.1 Watersheds, Wetlands*** • 4.1.7. A. Explain the role of the water cycle within a watershed. • 4.1.7. B. Understand the role of the watershed. • 4.1.7. C. Explain the effects of water on the life of organisms in the watershed. • 4.1.7. E. Describe the impact of watersheds and wetlands on people. ***4.3 Environmental Health*** • 4.3.7. B. Describe how human actions affect the health of the environment ***4.9 Environmental Laws*** • 4.9.7. A. Explain the role of environmental laws and regulations. • 4.9.7. B. Explain the role of local and state agencies in enforcing environmental laws and regulations.	• 3.4.12. C Analyze the essential ideas about the composition and structure of the universe. ***3.5 Earth Science*** • 3.5.10 .A. Relate earth features and processes that change the Earth. • 3.5.12.A Analyze and evaluate earth features and processes that change the earth. • 3.5.10. B. Explain sources and uses of Earth resources. • 3.5.12.B. Analyze the availability, location and extraction of earth resources. • 3.5.10.C. Interpret meteorological data. • 3.5.12.C. Analyze atmospheric energy transfers. • 3.5.10 D. Assess the value of water as a resource. • 3.5.12.D. Analyze the principles and history of hydrology. ***3.7. Technological Devices*** • 3.7.10.B. Apply appropriate instruments and apparatus to examine a variety of objects and processes. ***4.1 Watersheds and Wetlands*** • 4.1.10.A. Describe changes that occur from a stream's origin to its final outflow. • 4.1.10.B.Explain the relationship among landforms, vegetation, and the amount and speed of water. • 4.1.10.E. Identify and describe natural and human events on watersheds and wetlands. ***4.2 Renewable and Nonrenewable Resources*** • 4.2.10.A Explain that renewable and non-renewable resources supply

		energy and materials. • 4.2.12.A. Analyze the use of renewable and non-renewable resources. ***4.3 Environmental Health*** • 4.3.10.A Describe environmental health issues. • 4.3.10.B Explain how multiple variables determine the effects of pollution on environmental health, natural processes and human practices.

STANDARD-BASED SCIENCE CURRICULUM

Grade level Topics

9th Grade Physics	10th Grade Chemistry	11h Grade Biology
Mastery	***Mastery***	***Mastery***
3.1 Unifying Themes • 3.1.10 & 12. A Systems • 3.1.10 & 12. B. Models • 3.1.10 & 12. C. Patterns • 3.1.10 & 12. D. Scale • 3.1.10 & 12. E. Change ***3.2 Inquiry and Design*** • 3.2 10 & 12. A. Nature of Scientific Knowledge. • 3.2. 10 & 12. B. Process Knowledge • 3.2. 10 & 12. C. Scientific Method • 3.2. 10 & 12. D. Problem Solving in Technology ***3.4 Physical Science, Chemistry and Physics*** • 3.4.10. A Explain concepts about the structure and properties of matter. • 3.4.12. A. Apply concepts about the structure and properties of matter. • 3.4.10. B. Analyze energy sources and transfers of heat. • 3.4.12. B. Apply and analyze energy sources and conversions and their relationship to heat and temperature. • 3.4.10. C. Distinguish among the principles of force and motion. • 3.4.12. C. Apply the principles of force and motion.	***3.1 Unifying Themes*** • 3.1.10 & 12. A Systems • 3.1.10 & 12. B. Models • 3.1.10 & 12. C. Patterns • 3.1.10 & 12. D. Scale • 3.1.10 & 12. E. Change ***3.2 Inquiry and Design*** • 3.2 10 & 12. A. Nature of Scientific Knowledge. • 3.2. 10 & 12. B. Process Knowledge • 3.2. 10 & 12. C. Scientific Method • 3.2. 10 & 12. D. Problem Solving in Technology ***3.4 Physical Science, Chemistry and Physics*** • 3.4.10. A Explain concepts about the structure and properties of matter. • 3.4.12. A. Apply concepts about the structure and properties of matter. • 3.4.10. B. Analyze energy sources and transfers of heat. • 3.4.12. B. Apply and analyze energy sources and conversions and their relationship to heat and temperature.	***3.1 Unifying Themes*** • 3.1.10 & 12. A Systems • 3.1.10 & 12. B. Models • 3.1.10 & 12. C. Patterns • 3.1.10 & 12. D. Scale • 3.1.10 & 12. E. Change ***3.2 Inquiry and Design*** • 3.2 10 & 12. A. Nature of Scientific Knowledge. • 3.2. 10 & 12. B. Process Knowledge • 3.2. 10 & 12. C. Scientific Method • 3.2. 10 & 12. D. Problem Solving in Technology ***3.3 Biological Sciences*** • 3.3.12.A. Explain the relationship between structure and function at all levels of organization. • 3.3.12.B. Analyze the chemical and structural basis of living organisms. • 3.312. C. Explain gene inheritance and expression at the molecular level. • 3.3.12. D. Analyze the theory of evolution. ***3.6. Technology Education*** • 3.6.12.A. Analyze biotechnologies that relate to propagating, growing, maintaining, adapting, treating and converting. • 3.6.12.B Analyze knowledge of information technologies of

3.6. Technology Education

- 3.6.10. B. Apply knowledge of information technologies of processing, encoding, transmitting, receiving, storing, retrieving and decoding.

- 3.6.12.B Analyze knowledge of information technologies of processing, encoding, transmitting, receiving, storing, retrieving and decoding.

3.7. Technological Devices

- 3.7.10.A. Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.

- 3.7.12.A. Apply advanced tools, materials and techniques to answer complex questions.

- 3.7.10.B. Apply appropriate instruments and apparatus to examine a variety of objects and processes.

- 3.7.12.B. Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

- 3. 7.10. C. Apply computer operations and concepts as to their effectiveness to solve specific problems.
- 3. 7.12. C. Evaluate computer operations and concepts as to their effectiveness to solve specific problems.

3.8. Science, Technology and Human Endeavors

- 3.8.10.C. Evaluate possibilities, consequences and impacts of scientific and technological solutions.

3.7. Technological Devices

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processing, encoding, transmitting, receiving, storing, retrieving and decoding.

3.7. Technological Devices

- 3.7.12.A. Apply advanced tools, materials and techniques to answer complex questions.
- 3.7.12.B Evaluate appropriate instruments and apparatus to accurately measure materials and processes.
- 3. 7.12. C. Evaluate computer operations and concepts as to their effectiveness to solve specific problems.
- 3.7.12.E. Assess the effectiveness of computer communications systems.

3.8. Science, Technology and Human Endeavors

- 3.8.12.C. Evaluate the consequences and impacts of scientific and technological solutions.

4.6. Ecosystems and Their Interactions

- 4.6.12. A. Analyze the interdependence of an ecosystem.
- 4.6.12. B. Analyze the impact of cycles on the ecosystem.
- 4.6.12. C. Analyze how human action and natural changes affect the balance within an ecosystem.

4.7. Threatened, Endangered and Extinct Species

- 4.712. A Analyze biological diversity as it relates to the stability.
- 4.7.12. B Examine the effects of extinction, both natural and human caused, on the environment.
- 4.7.12. C Analyze the effects of threatened, endangered or extinct species on human and natural systems.

STANDARD-BASED SCIENCE CURRICULUM

Proposed Scope and Sequence for Grade Level Topics

12h Grade Physics		
Mastery		
3.1 Unifying Themes • 3.1. 12. A Systems • 3.1. 12. B. Models • 3.1. 12. C. Patterns • 3.1. 12. D. Scale • 3.1. 12. E. Change ***3.2 Inquiry and Design*** • 3.2 12. A. Nature of Scientific Knowledge. • 3.2. 12. B. Process Knowledge • 3.2. 12. C. Scientific Method • 3.2. 12. D. Problem Solving in Technology ***3.4 Physical Science, Chemistry and Physics***. • 3.4.12. A. Apply concepts about the structure and properties of matter. • 3.4.12. B. Apply and analyze energy sources and conversions and their relationship to heat and temperature. • 3.4.12. C. Apply the principles of force and motion. ***3.6. Technology Education*** • 3.6.10. B. Apply knowledge of information technologies of processing, encoding, transmitting, receiving, storing, retrieving and decoding. • 3.6.12.B Analyze knowledge of information technologies of processing, encoding, transmitting, receiving, storing, retrieving and decoding.		

3.7. Technological Devices • 3.7.10.B. Apply appropriate instruments and apparatus to examine a variety of objects and processes. • 3.7.12.B. Evaluate appropriate instruments and apparatus to accurately measure materials and processes. • 3.7.12.A. Apply advanced tools, materials and techniques to answer complex questions. • 3.7.12.B. Evaluate appropriate instruments and apparatus to accurately measure materials and processes. • 3. 7.12. C. Evaluate computer operations and concepts as to their effectiveness to solve specific problems. ***3.8. Science, Technology and Human Endeavors*** • 3.8.12.C. Evaluate the consequences and impacts of scientific and technological solutions.		