North Dakota Science

Content and Achievement Standards

Standard 1

March 2006

North Dakota Department of Public Instruction

Dr. Wayne G. Sanstead, State Superintendent

600 E Boulevard Avenue, Dept. 201

Bismarck, North Dakota 58505-0440

www.dpi.state.nd.us

Standard 1: Unifying Concepts

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Models				
K.1.1. Identify models (e.g., dolls, stuffed animals, toy vehicles) that are not real	Students identify an extensive variety of models that are not real.	Students identify a variety of models that are not real.	Students identify some different models that are not real.	Students identify very few models that are not real.
Constancy and Change				
K.1.2. Identify things that can change (e.g., weather, people, water)	Students identify an extensive variety of things that can change.	Students identify a variety of things that can change.	Students identify some different things that can change.	Students identify very few things that can change.
Grade 1				
Models				
1.1.1. Identify models that represent real objects (e.g., globe represents the Earth, doll represents a real baby)	Students identify an extensive variety of models that represent real objects.	Students identify a variety of models that represent real objects.	Students identify some different models that represent real objects.	Students identify very few models that represent real objects.
Systems				
1.1.2. Identify objects (e.g., toy vehicles, dolls, human body, plants) that are made of parts	Students identify an extensive variety of objects that are made of parts.	Students identify a variety of objects that are made of parts.	Students identify some different objects that are made of parts.	Students identify a limited variety of objects that are made of parts.
Constancy and Change				
1.1.3. Describe different ways that things can change (e.g., size, mass, color, movement)	Students describe an extensive variety of different ways things can change.	Students describe a variety of different ways things can change.	Students describe some different ways things can change.	Students describe very few ways things can change.
Grade 2				
Models				

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	PROFICIENCY DESCRIPTOR			
	ADVANCED PROFICIENT	**PROFICIENT**	**PARTIALLY PROFICIENT**	**NOVICE**
2.1.1. Explain ways models are like (e.g., globe and Earth are both round) and unlike (e.g., different sizes, missing details and functions) real things	Students explain an extensive variety of ways models are like and unlike real things.	Students explain a variety of ways models are like and unlike real things.	Students explain some different ways models are like and unlike real things.	Students explain a few ways models are like and unlike real things.
SYSTEMS				
2.1.2. Identify some things that may not work if some of their parts are missing, broken, or assembled incorrectly (e.g., batteries are necessary for some toys to operate, wheels are necessary for a car to function)	Students identify with no errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.	Students identify with no significant errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.	Students identify with a few significant errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.	Students identify with many significant errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.
CONSTANCY AND CHANGE				
2.1.3 Identify changes that are slow (e.g., human development) or fast (e.g., plant growth)	Students identify, with no errors, some changes that are slow or fast.	Students identify, with no significant errors, some changes that are slow or fast.	Students identify, with a few significant errors, some changes that are slow or fast.	Students identify, with many significant errors, some changes that are slow or fast.
Grade 3				
MODELS *No benchmark expectations at this level*				
SYSTEMS *No benchmark expectations at this level*				
CONSTANCY AND CHANGE				
3.1.1. Identify changes that are repetitive (e.g., seasons, day and night, water cycle)	Students identify an extensive variety of changes that are repetitive.	Students identify a variety of changes that are repetitive.	Students identify some changes that are repetitive.	Students identify very few changes that are repetitive.
Grade 4				
MODELS				

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
4.1.1. Explain changes in the real world using a model (e.g., erosion, volcano, stream table, wing designs for airplanes)	Students provide an insightful explanation for changes in the real world using a model.	Students provide a reasonable explanation for changes in the real world using a model.	Students provide an obvious explanation for changes in the real world using a model.	Students provide an unreasonable explanation for changes in the real world using a mode.
SYSTEMS *No benchmark expectations at this level*				
CONSTANCY AND CHANGE				
4.1.2. Identify changes <u>that</u> can be steady or irregular (e.g., floods, earthquakes, erosion, tooth decay)	Students identify an extensive variety of changes that can be steady or irregular.	Students identify a variety of changes that can be steady or irregular.	Students identify some changes that can be steady or irregular.	Students identify very few changes that can be steady or irregular.
Grade 5				
MODELS				
5.1.1. Use an appropriate model (e.g., drawing, equation, computer program, diagram, or 3-D device) to convey scientific information	Students convey scientific information, with no errors, using an appropriate model	Students convey scientific information, with no significant errors, using an appropriate model.	Students convey scientific information, with few significant errors, using an appropriate model.	Students convey scientific information, with many significant errors, using an appropriate model.
SYSTEMS *No benchmark expectations at this level*				
CONSTANCY AND CHANGE				
5.1.2. Explain how changes alter the balance within a system (e.g., the effects of limited resources on populations, global climate change, flood, drought)	Students provide an insightful explanation of how changes alter the balance within a system.	Students provide a reasonable explanation of how changes alter the balance within a system.	Students provide an obvious explanation of how changes alter the balance within a system.	Students provide an unreasonable explanation of how changes alter the balance within a system.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Form And Function 5.1.3. Identify details of an object's form which determine its function (e.g., webbed feet for use in water, human feet for walking, shovel for scooping dirt, a rake for collecting leaves, tape measure and ruler to measure distance)	Students identify all of the significant details of an object's form which determine its function.	Students identify most of the significant details of an object's form which determine its function.	Students identify some of the significant details of an object's form which determine its function.	Students identify few of the significant details of an object's form which determine its function.
Grade 6				
Models 6.1.1. Construct a model to represent concepts, features, or phenomena in the real world (e.g., solar system, earth's interior)	Students construct a model with no errors.	Students construct a model with no significant errors.	Students construct a model with a few significant errors.	Students construct a model with many significant errors.
Systems 6.1.2. Identify systems that are composed of subsystems (e.g., solar system, cell, ecosystems.)	Students identify an extensive variety of systems and subsystems.	Students identify many different systems and subsystems.	Students identify some different systems and subsystems.	Students identify very few systems and subsystems.
Constancy and Change 6.1.3. Explain the connection between cause and effect in a system	Students give an insightful explanation of the connection between cause and effect in a system.	Students give a reasonable explanation of the connection between cause and effect in a system.	Students give an obvious explanation of the connection between cause and effect in a system.	Students give an unreasonable explanation of the connection between cause and effect in a system.
Form and Function *No benchmark expectations at this level*				

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 7				
Models				
7.1.1. Explain how models can be used to illustrate scientific principles (e.g., osmosis, cell division)	Students give an insightful explanation of how models can be used to illustrate scientific principles.	Students give a reasonable explanation of how models can be used to illustrate scientific principles.	Students give an obvious explanation of how models can be used to illustrate scientific principles.	Students give an unreasonable explanation of how models can be used to illustrate scientific principles.
Systems				
7.1.2. Identify the components (e.g., tissues, organs, living and nonliving things) within a system (e.g., body systems, ecosystems)	Students identify all of the significant components within a system.	Students identify most of the significant components within a system.	Students identify some of the significant components within a system.	Students identify few of the significant components within a system.
Constancy And Change				
7.1.3. Identify examples of feedback mechanisms (e.g., hunger, perspiring)	Students identify an extensive variety of feedback mechanisms.	Students identify a variety of feedback mechanisms.	Students identify some different examples of feedback mechanisms.	Students identify few feedback mechanisms.
Form And Function				
7.1.4. Identify the relationship between form and function (e.g., wings, fins and feet)	Students identify an extensive variety of relationships between form and function.	Students identify a variety of relationships between form and function.	Students identify some diverse relationships between form and function.	Students identify few relationships between form and function.
Grade 8				
MODELS *No benchmark expectations at this level*				
Systems				
8.1.1. Organize changes (e.g., patterns, cycles) that occur sequentially in systems	Students organize sequentially the significant changes that occur in systems with no errors.	Students organize sequentially the significant changes that occur in systems with no significant errors.	Students organize sequentially the significant changes that occur in systems with a few significant errors.	Students organize sequentially the significant changes that occur in systems with many significant errors.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Constancy And Change *No benchmark expectations at this level* Form and Function *No benchmark expectations at this level*				
Grade 9-10				
Models 9-10.1.1. Explain how models can be used to illustrate scientific principles	Students give an insightful explanation of how models can be used to illustrate scientific principles.	Students give a reasonable explanation of how models can be used to illustrate scientific principles.	Students give an obvious explanation of how models can be used to illustrate scientific principles.	Students give an unreasonable explanation of how models can be used to illustrate scientific principles.
Systems 9-10.1.2. Describe the interaction of components within a system (e.g., interactions between living and nonliving components of an ecosystem, interaction between organelles of a cell)	Students describe all of the significant details of the interaction of components within a system.	Students describe most of the significant details of the interaction of components within a system.	Students describe some of the significant details of the interaction of components within a system.	Students describe few of the significant details of the interaction of components within a system.
Constancy and Change 9-10.1.3. Explain how a system can be dynamic yet may remain in equilibrium (e.g., water cycle, rock cycle, population)	Students explain how a system can be dynamic yet may remain in equilibrium with no errors.	Students explain how a system can be dynamic yet may remain in equilibrium with no significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with a few significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with many significant errors.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Form And Function				
9-10.1.4. Describe the relationship between form and function (e.g., solids, liquids, gases, cell specialization, simple machines, and plate tectonics)	Students describe all of the significant details relating form and function.	Students describe most of the significant details relating form and function.	Students describe some of the significant details relating form and function.	Students describe very few of the significant details relating form and function.
9-10.1.5. Explain how classification can be based on the relationship between form and function (e.g., elements and compounds, biological classifications, types of clouds)	Students explain how classification can be based on the relationship between form and function with no errors.	Students explain how classification can be based on the relationship between form and function with no significant errors.	Students explain how classification can be based on the relationship between form and function with a few significant errors.	Students explain how classification can be based on the relationship between form and function with many significant errors.
Evolution And Equilibrium				
9-10.1.6. Identify principles governing evolution and equilibrium within systems (e.g., cause and effect, positive and negative feedback)	Students identify all of the significant principles governing evolution and equilibrium within systems.	Students identify most of the significant principles governing evolution and equilibrium within systems.	Students identify some of the significant principles governing evolution and equilibrium within systems.	Students identify few of the significant principles governing evolution and equilibrium within systems.
Grade 11-12				
Models				
11-12.1.1. Explain how scientists create and use models to address scientific knowledge	Students explain all of the significant details of how scientists create and use models to address scientific knowledge.	Students explain most of the significant details of how scientists create and use models to address scientific knowledge.	Students explain some of the significant details of how scientists create and use models to address scientific knowledge.	Students explain few of the significant details of how scientists create and use models to address scientific knowledge.
Systems				
11-12.1.2. Identify the structure, organization, and dynamics of components within a system (e.g., cells, tissues, organs, organ systems, reactants and products in chemical equilibrium)	Students identify all of the significant details of the structure, organization, and dynamics of components within a system.	Students identify most of the significant details of the structure, organization, and dynamics of components within a system.	Students identify some of the significant details of the structure, organization, and dynamics of components within a system.	Students identify few of the significant details of the structure, organization, and dynamics of components within a system.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Constancy and Change				
11-12.1.3. Explain how a system can be dynamic yet may remain in equilibrium (e.g., balance of forces, Le Chatelier's Principle, acid base systems)	Students explain how a system can be dynamic yet may remain in equilibrium with no errors.	Students explain how a system can be dynamic yet may remain in equilibrium with no significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with a few significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with many significant errors.
Form And Function				
11-12.1.4. Explain the relationship between form and function (e.g., atoms and ions, enzymes, aerodynamics)	Students explain all of the significant details relating form and function.	Students explain most of the significant details relating form and function.	Students explain some of the significant details relating form and function.	Students explain few of the significant details relating form and function.
11-12.1.5. Explain how classification can be based on the relationship between form and function (e.g., polar vs. nonpolar molecules, structure of periodic table , DNA vs. RNA)	Students explain how classification can be based on the relationship between form and function with no errors.	Students explain how classification can be based on the relationship between form and function with no significant errors.	Students explain how classification can be based on the relationship between form and function with a few significant errors.	Students explain how classification can be based on the relationship between form and function with many significant errors.
Evolution And Equilibrium *No benchmark expectations at this level*				