North Dakota Science

Content and Achievement Standards

Standard 2

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North Dakota Department of Public Instruction

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Standard 2: Science Inquiry

Standard 2: Students use the process of science inquiry.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Abilities Necessary To Do Scientific Inquiry				
K.2.1. Use senses (i.e., sight, hearing, touch, smell, taste) to make observations about the world around them	Students use senses to make insightful observations about the world around them.	Students use senses to make reasonable observations about the world around them.	Students use senses to make obvious observations about the world around them.	Students use senses to make unreasonable observations about the world around them.
K.2.2. Use simple tools (e.g., hand lens, balance, funnel, strainer) to extend the senses	Students use simple tools with ease to extend the senses.	Students use simple tools with minimal difficulty to extend the senses.	Students use simple tools with difficulty to extend the senses.	Students use simple tools with great difficulty to extend the senses.
Grade 1				
Abilities Necessary To Do Scientific Inquiry				
1.2.1. Record and describe observations with pictures, numbers, or words	Students record and describe an extensive variety of observations with pictures, numbers, or words.	Students record and describe a variety of observations with pictures, numbers, or words.	Students record and describe some observations with pictures, numbers, or words.	Students record and describe few observations with pictures, numbers, or words.
Grade 2				
Abilities Necessary To Do Scientific Inquiry				
2.2.1. Ask questions and seek answers about the world (e.g., Why do we have seasons?)	Students ask insightful questions and seek answers about the world.	Students ask reasonable questions and seek answers about the world.	Students ask obvious questions and seek answers about the world.	Students ask unreasonable questions and seek answers about the world.
2.2.2. Communicate (e.g., verbal, written, graphic) observations to others	Students communicate observations with accuracy.	Students communicate observations with no significant errors.	Students communicate observations with few significant errors.	Students communicate observations with many significant errors.

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Grade 3				
Abilities Necessary to do Scientific Inquiry				
3.2.1. Select appropriate scientific tools (i.e., magnifiers, thermometers, rulers, balances) for investigations	Students always select appropriate scientific tools for investigations.	Students generally select appropriate scientific tools for investigations.	Students sometimes select appropriate scientific tools for investigations.	Students rarely select appropriate scientific tools for investigations.
3.2.2. Ask questions directly related to a scientific investigation	Students ask insightful questions directly related to a scientific investigation.	Students ask reasonable questions directly related to a scientific investigation.	Students ask obvious questions directly related to a scientific investigation.	Students ask unreasonable questions directly related to a scientific investigation.
3.2.3. Record observations (e.g., journals, drawings, charts) based on simple investigations	Students record all significant details of observations based on simple investigations.	Students record most of the significant details of observations based on simple investigations.	Students record some of the significant details of observations based on simple investigations.	Students record few of the details of observations based on simple investigations.
Grade 4				
Abilities Necessary to do Scientific Inquiry				
4.2.1. Review and ask questions about the scientific investigations of others	Students review and ask insightful questions about the scientific investigations of others.	Students review and ask reasonable questions about the scientific investigations of others.	Students review and ask obvious questions about the scientific investigations of others.	Students review and ask unreasonable questions about the scientific investigations of others.
4.2.2. Conduct simple investigations to answer questions based on observations	Students conduct simple investigations with ease.	Students conduct simple investigations with minimal difficulty.	Students conduct simple investigations with difficulty.	Students conduct simple investigations with great difficulty.
4.2.3. Use scientific tools (i.e., thermometers, rulers, balances) during simple investigations	Students use scientific tools with no errors during simple investigations.	Students use scientific tools with no significant errors during simple investigations.	Students use scientific tools with few significant errors during simple investigations.	Students use scientific tools with many significant errors during simple investigations.

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Grade 5				
Abilities Necessary to do Scientific Inquiry				
5.2.1. Communicate scientific procedures (e.g. visual display, graph, journal, oral presentation) that enable others to repeat the investigation	Students communicate all of the significant details as well as subtleties of scientific procedures that enable others to repeat the investigation.	Students communicate most of the significant details of scientific procedures that enable others to repeat the investigation.	Students communicate some of the significant details of scientific procedures that enable others to repeat the investigation.	Students communicate very few details of scientific procedures that enable others to repeat the investigation.
5.2.2. Formulate an explanation supported by data	Students formulate an insightful explanation supported by data.	Students formulate a reasonable explanation supported by data.	Students formulate an obvious explanation supported by data.	Students formulate an unreasonable explanation supported by data.
Grade 6				
Understandings About Scientific Inquiry				
6.2.1. Explain the components of a scientific investigation (e.g., hypothesis, observation, data collection, data interpretation, communication of results, replicable)	Students explain all of the significant components of a scientific investigation as well as the subtleties.	Students explain most of the significant components of a scientific investigation.	Students explain some of the significant components of a scientific investigation.	Students explain very few components of a scientific investigation.
6.2.2. Select alternative methods of scientific investigations (e.g., library, internet, field work) to address different kinds of questions.	Students select the method of scientific investigation to answer a question with no errors.	Students select the method of scientific investigation to answer a question with no significant errors.	Students select the method of scientific investigation to answer a question with a few significant errors.	Students select the method of scientific investigation to answer a question with many significant errors.
6.2.3. Identify biases that may affect data collection and analysis (e.g., gender, race, religion, economic, generational.)	Students identify, with no errors, biases that may affect data collection.	Students identify, with no significant errors, biases that may affect data collection.	Students identify, with few significant errors, biases that may affect data collection.	Students identify, with many significant errors, biases that may affect data collection.

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Abilities Necessary to Do Scientific Inquiry				
6.2.4. Use appropriate tools and techniques to gather and analyze data	Students use appropriate tools and techniques with ease to gather and analyze data.	Students use appropriate tools and techniques with minimal difficulty to gather and analyze data.	Students use appropriate tools and techniques with difficulty to gather and analyze data.	Students use appropriate tools and techniques with great difficulty to gather and analyze data.
6.2.5. Use data from scientific investigations to determine relationships and patterns	Students interpret data from scientific investigations to determine insightful relationships and patterns.	Students interpret data from scientific investigations to determine reasonable relationships and patterns.	Students interpret data from scientific investigations to determine obvious relationships and patterns.	Students interpret data from scientific investigations to determine unreasonable relationships and patterns.
Grade 7				
Understandings About Scientific Inquiry *No benchmark expectations at this level*				
Abilities Necessary to Do Scientific Inquiry				
7.2.1. Communicate the results of scientific investigations using an appropriate format (e.g., journals, lab reports, diagrams, presentations, discussions)	Students always communicate the results of scientific investigations using appropriate format.	Students generally communicate the results of scientific investigations using appropriate format.	Students sometimes communicate the results of scientific investigations using appropriate format.	Students rarely communicate the results of scientific investigations using appropriate format.
Grade 8				
Understandings About Scientific Inquiry				
8.2.1. Explain how science advances through legitimate skepticism	Students provide an insightful explanation of how science advances through legitimate skepticism.	Students provide a relevant explanation of how science advances through legitimate skepticism.	Students provide an obvious explanation of how science advances through legitimate skepticism.	Students provide an irrelevant explanation of how science advances through legitimate skepticism.

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8.2.2. Use evidence to generate descriptions, explanations, predictions, and models	Students use evidence to generate insightful descriptions, explanations, predictions, and models.	Students use evidence to generate reasonable descriptions, explanations, predictions, and models.	Students use evidence to generate typical descriptions, explanations, predictions, and models.	Students use evidence to generate unreasonable descriptions, explanations, predictions, and models.
8.2.3. Use basic mathematics and statistics (e.g., operations, mean, median, mode, range, and estimation) to interpret quantitative data	Students use basic mathematics and statistics with no errors to interpret quantitative data.	Students use basic mathematics and statistics with no significant errors to interpret quantitative data.	Students use basic mathematics and statistics with a few significant errors to interpret quantitative data.	Students use basic mathematics and statistics with many significant errors to interpret quantitative data.
8.2.4. Design and conduct a scientific investigation (e.g., making systematic observations, making accurate measurements, identifying and controlling variables)	Students design and conduct an innovative scientific investigation.	Students design and conduct a reasonable scientific investigation.	Students design and conduct an obvious scientific investigation.	Students design and conduct a superficial scientific investigation.
Grade 9-10				
Understandings about Scientific Inquiry				
9-10.2.1. Explain how scientific investigations can result in new ideas	Students provide an insightful explanation of how scientific investigations can result in new ideas.	Students provide a reasonable explanation of how scientific investigations can result in new ideas.	Students provide an obvious explanation of how scientific investigations can result in new ideas.	Students provide an unreasonable explanation of how scientific can sometimes result in new ideas.
Abilities Necessary to Do Scientific Inquiry				
9-10.2.2. Use appropriate safety equipment and precautions during investigations (e.g., goggles, apron, eye wash station)	Students always use appropriate safety equipment and precautions during investigations.	Students consistently use appropriate safety equipment and precautions during investigations.	Students occasionally use appropriate safety equipment and precautions during investigations.	Students rarely use appropriate safety equipment and precautions during investigations.
9-10.2.3. Identify questions and concepts that guide scientific investigations	Students identify, with no errors, questions and concepts that guide scientific investigations.	Students identify , with no significant errors, questions and concepts that guide scientific investigations.	Students identify, with few significant errors, questions and concepts that guide scientific investigations.	Students identify, with many significant errors, questions and concepts that guide scientific investigations.

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9-10.2.4.	Formulate a testable hypothesis for a simple investigation	Students always formulate a testable hypothesis for a simple investigation.	Students generally formulate a testable hypothesis for a simple investigation.	Students sometimes formulate a testable hypothesis for a simple investigation.	Students rarely formulate a testable hypothesis for a simple investigation.
9-10.2.5.	Identify the independent and dependent variables, the control, and the constants when conducting an experiment	Students identify the independent and dependent variables, the control and the constants when conducting an experiment with no errors.	Students identify the independent and dependent variables, the control and the constants when conducting an experiment with no significant errors.	Students identify the independent and dependent variables, the control and the constants when conducting an experiment with a few significant errors.	Students identify the independent and dependent variables, the control and the constants when conducting an experiment many significant errors.
9-10.2.6.	Design and conduct a guided investigation	Students design and conduct a substantive guided investigation.	Students design and conduct a relevant guided investigation.	Students design and conduct a typical guided investigation.	Students design and conduct a superficial guided investigation.
9-10.2.7.	Maintain clear and accurate records of scientific investigations	Students always maintain clear and accurate records of scientific investigations.	Students generally maintain clear and accurate records of scientific investigations.	Students sometimes maintain clear and accurate records of scientific investigations.	Students rarely maintain clear and accurate records of scientific investigations.
9-10.2.8.	Analyze data found in tables, charts, and graphs to formulate conclusions	Students analyze data found in tables, charts, and graphs to formulate insightful conclusions.	Students analyze data found in tables, charts, and graphs to formulate reasonable conclusions.	Students analyze data found in tables, charts, and graphs to formulate obvious conclusions.	Students analyze data found in tables, charts, and graphs to formulate unreasonable conclusions.
Grade 11-12					
Understandings About Scientific Inquiry					
11-12.2.1.	Explain how new knowledge and methods emerge from different types of investigations and public communication among scientists	Students provide an insightful explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.	Students provide a reasonable explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.	Students provide an obvious explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.	Students provide an unreasonable explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.

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Abilities Necessary to Do Scientific Inquiry				
11-12.2.2. Select and use appropriate instruments, measuring tools, and units of measure to improve scientific investigations	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with no errors.	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with no significant errors.	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with a few significant errors.	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with many significant errors.
11-12.2.3. Use data from scientific investigations to accept or reject a hypothesis	Students use data from scientific investigations in an insightful way to accept or reject a hypothesis.	Students use data from scientific investigations in a reasonable way to accept or reject a hypothesis.	Students use data from scientific investigations in a superficial way to accept or reject a hypothesis.	Students use data from scientific investigations in an unreasonable way to accept or reject a hypothesis.
11-12.2.4. Formulate and revise explanations based upon scientific knowledge and experimental data	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in an insightful way.	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in a reasonable way.	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in a superficial way.	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in an unreasonable way.
11-12.2.5. Use technology and mathematics to improve investigations and communications	Students use technology and mathematics in insightful ways to improve investigations and communications.	Students use technology and mathematics in relevant ways to improve investigations and communications.	Students use technology and mathematics in typical ways to improve investigations and communications.	Students use technology and mathematics in superficial ways to improve investigations and communications.
11-12.2.6. Analyze data using appropriate strategies (e.g., interpolation, and extrapolation of data, significant figures, dimensional analysis)	Students analyze data using appropriate strategies in an insightful way.	Students analyze data using appropriate strategies in a reasonable way.	Students analyze data using appropriate strategies in a superficial way.	Students analyze data using appropriate strategies in an unreasonable way.
11-12.2.7. Design and conduct an independent investigation	Students design and conduct an insightful independent investigation.	Students design and conduct a reasonable independent investigation.	Students design and conduct a superficial independent investigation.	Students design and conduct an unreasonable independent investigation.
11-12.2.8. Communicate and defend a scientific argument	Students communicate and defend a scientific argument using almost all of the significant details.	Students communicate and defend a scientific argument using most of the significant details.	Students communicate and defend a scientific argument using some of the significant details.	Students communicate and defend a scientific argument using few details.