GRADES 4, 8, 10 SCIENCE

WY-TOPP 2018 Performance Level Descriptors

Level	Below Basic	Basic	Proficient	Advanced
Policy PLDs **(Performance Level Descriptors)** General descriptors that provide overall claims about a student's performance in each performance level; used to broadly articulate the goals and rigor for the state's performance standards.	Students at the below basic level in science require extensive support or provide little or no evidence in meeting the standard.	Students performing at the basic level in science are able to identify concepts and processes that explain the natural world. With support, they are able to use inquiry to generate scientific information to make decisions. These students are able to implement limited use of technological tools and communication skills.	Students performing at the proficient level in science understand the dynamic nature of science and use unifying concepts and processes that explain the natural world. They use inquiry to generate and validate scientific information and apply scientific information to make informed decisions about societal issues. These students are able to employ a variety of appropriate technological tools and communication skills.	Students performing at the advanced level in science understand the dynamic nature of science and make connections among unifying concepts and processes to explain the natural world. They are able to extend inquiry to analyze and synthesize scientific information to generate new questions. These students are able to construct personal knowledge independently and apply and critique scientific information to make informed decisions about societal issues. They employ a variety of appropriate technological tools and communication skills.
Cognitive Complexity	The cognitive complexity for students at this level includes those who have difficulty with skills to recognize, use, identify, describe, and recall scientific information.	The cognitive complexity for students at this level includes those who recognize, identify, describe, and recall scientific information with support.	The cognitive complexity for students at this level includes those who recognize, use, identify, describe, and recall scientific information.	The cognitive complexity at this level includes students who reach a higher level of thinking, requiring frequent responses citing evidence, drawing conclusions, explaining phenomena, and using concepts to solve problems.

Range PLDs

Describes the expectations for students across each standard and proficiency level; reflects the knowledge, skills, and processes that are expected of students.

Grade 4 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
Concepts and Processes	Science is a dynamic process; concepts and content are best learned through inquiry and investigation. Concepts in LIFE SYSTEMS, EARTH and SPACE SYSTEMS, and PHYSICAL SYSTEMS are taught within the context of the following Unifying Concepts and Processes of Science: • Systems, classification, order and organization • Evidence, models, and explanations • Change, constancy, and measurement • Evolution and equilibrium • Form and function	• Demonstrate a limited ability to identify concepts and processes that explain the natural world.	• Demonstrate an accurate understanding of some basic science facts and principles that explain the natural world. **With support:** • Make connections to related unifying concepts and processes. • Identify some of the concepts and processes that explain the natural world. They describe and record some characteristics of objects and living things. • Demonstrate or explain: stages in life cycles of plants and animals, changes in the earth and sky, or changes in states of matter.	• Identify and apply unifying concepts and processes to explain the natural world. • Demonstrate an accurate understanding of science content in the context of major concepts and processes. They give examples of observable cycles and change - such as changes in objects in the sky, states of matter, and life cycles - and explain ways to measure or record those changes. • Show connections between living things, their needs, and their environments. Students use observable characteristics to describe, compare, and classify objects and living things. • Describe, predict, investigate, and record findings about physical phenomena and how forces affect objects. • Students explain, classify, organize, model, illustrate, observe, and predict, which extend beyond a habitual response.	• Make connections among unifying concepts and processes to explain the natural world. • Make connections among unifying concepts and processes. • Identify adaptations of plants and animals that enhance survival in their environments and explain how environmental changes could affect survival. • Compare cycles of change to see patterns and interrelationships among them. • Make generalizations about cause-effect relationships in the physical world.

Range PLDs

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Grade 4 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
Science as Inquiry	Students demonstrate knowledge, skills, and habits of mind necessary to safely perform scientific inquiry. Inquiry is the foundation for the development of content, teaching students the use of processes of science that enable them to construct and develop their own knowledge. Inquiry requires appropriate field, classroom, and laboratory experiences with suitable facilities and equipment.	• Use the inquiry process to generate or validate scientific information. • Communicate appropriate conclusions and explanations. • Understand the appropriate use of scientific procedures or tools.	• Given a question and procedure, conduct guided investigations or research topics with additional support. • Demonstrate a limited understanding of the appropriate use of scientific procedures and tools. **With support:** • Apply results to the natural world. • Recognize safety symbols, hazards, and procedures. • Use the inquiry process to generate or validate scientific information or to communicate appropriate conclusions and explanations.	• Use the inquiry process to generate, validate, and apply scientific information to a variety of situations to communicate appropriate conclusions and explanations. • Demonstrate an understanding of the appropriate use of a variety of scientific procedures and tools. • Locate, collect, and utilize information from various sources, and present findings clearly and with understanding, when given research questions. • Pose questions, make related predictions, conduct a guided investigation, and safely use appropriate equipment to gather data in an organized manner, when given a scenario. • Accurately represent data using graphs, charts, diagrams, and/or models. • Communicate results, consistently using scientific vocabulary, making logical connections to the natural world. • Consistently and independently recognize safety symbols, hazards, and procedures.	• Use the inquiry process to analyze and synthesize scientific information to generate new questions. • Construct scientific knowledge independently. • Apply knowledge of science in complex situations to communicate appropriate conclusions and explanations. • Demonstrate an understanding of the appropriate use of a variety of scientific procedures and tools. • Pose their own science questions and obtain information from multiple sources to answer them. • Conduct a simple investigation using their own questions and selecting appropriate tools. • Give logical examples of applications to the natural world and/or raise new questions.

Range PLDs

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Grade 4 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
History and Nature of Science in Personal and Social Decisions	Students recognize the nature of science, its history, and its connections to personal, social, economic, and political decisions. Historically, scientific events have had significant impacts on our cultural heritage.	• Demonstrate little or no understanding of the nature of science.	• Describe what a scientist does. • Demonstrate a limited understanding of the nature of science. **With support:** • Give examples of how scientific ideas change over time • Identify a local science problem and suggest a solution	• Demonstrate an understanding of the nature of science. • Give examples of how scientific ideas change over time. • Describe the contributions of scientists. • Identify and describe local science issues and suggest feasible solutions and personal action plans.	• Demonstrate a thorough understanding of the nature of science. • Accurately sequence changes over time of a scientific concept and suggest a possible future development. • Choose a scientist and explain the importance of his/her contribution(s). • Take action to address resource conservation issues and evaluate how well it works.

Range PLDs

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Grade 8 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
Concepts and Processes	Science is a dynamic process; concepts and content are best learned through inquiry and investigation. Concepts in LIFE SYSTEMS, EARTH and SPACE SYSTEMS, and PHYSICAL SYSTEMS are taught within the context of the following Unifying Concepts and Processes of Science: • Systems, classification, order and organization • Evidence, models, and explanations • Change, constancy, and measurement • Evolution and equilibrium • Form and function	• Demonstrate a limited ability to identify concepts and processes that explain the natural world.	• Demonstrate an understanding of some basic science facts and principles. **With support:** • Make connections to related unifying concepts and processes. • Identify some of the concepts and processes that explain the natural world.	• Identify and apply unifying concepts and processes to explain the natural world. • Demonstrate an accurate understanding of science content in the context of major concepts and processes. • Make connections to related unifying concepts and processes, building on prior knowledge and experiences. - **Life Systems:** students model the cell, identify patterns of inheritance, apply the theory of evolution to diversity of species, connect behaviors of organisms to adaptations, and identify relationships in ecosystems. - **Earth and Space Systems:** students demonstrate an understanding of the solar system dynamics, the structure of Earth systems and geologic history. - **Physical Systems:** students identify structure and properties of matter, physical and chemcial changes, forms and uses of energy, and effects of forces on motion. • Explain, classify, organize, model, illustrate, systematize, evaluate, relate, interpret, observe, and predict, which extend beyond a habitual response.	• Make connections among unifying concepts and processes to explain the natural world and the dynamic nature of science. • Extend many of the higher level thinking skills over an extended period of time. • Make connections between related concepts and phenomena. • Synthesize ideas into new concepts.

Range PLDs

Describes the expectations for students across each standard and proficiency level; reflects the knowledge, skills, and processes that are expected of students.

Grade 8 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
Science as Inquiry	Students demonstrate knowledge, skills, and habits of mind necessary to safely perform scientific inquiry. Inquiry is the foundation for the development of content, teaching students the use of processes of science that enable them to construct and develop their own knowledge. Inquiry requires appropriate field, classroom, and laboratory experiences with suitable facilities and equipment.	• Use the inquiry process to generate or validate scientific information or to communicate appropriate conclusions and explanations. • Understand the appropriate use of scientific procedures or tools.	**With support:** • Safely conduct experiments, organize and apply data, and communicate results obtained from scientific investigations or research. • Use of scientific and mathematical language to communicate findings. • Use the inquiry process to generate or validate scientific information or to communicate appropriate conclusions and explanations. • Understanding of the appropriate use of scientific procedures and tools.	• Use the inquiry process to generate, validate, and apply scientific information to a variety of situations to communicate appropriate conclusions and explanations. • Demonstrate an understanding of the appropriate use of a variety of scientific procedures and tools. • Form a logical hypothesis, when given a problem or experiment. • Demonstrate a systematic process of collecting, organizing and reporting data; and examine results to form a valid conclusion. • Clearly and accurately communicate the results of scientific investigation or research through formal and/or informal reports. Using written, oral, and visual means, they accurately use scientific vocabulary, mathematics and technology. • Consistently use equipment and technology appropriately to safely conduct experiments.	• Use the inquiry process to analyze and synthesize scientific information to generate new questions. • Construct scientific knowledge independently and apply their knowledge of science in complex situations to communicate appropriate conclusions and explanations. • Demonstrate an understanding of the appropriate use of a variety of scientific procedures and tools. • Propose new problems, questions, and/or experimental designs based on results or research. • Analyze information to provide new insights and draw related logical conclusions that are not immediately obvious.

Range PLDs Describes the expectations for students across each standard and proficiency level; reflects the knowledge, skills, and processes that are expected of students.					
Grade 8 Science					
Standard:		**Below Basic students may or may not be able to :**	**Basic students:**	**Proficient students:**	**Advanced students (in addition to proficient):**
History and Nature of Science in Personal and Social Decisions	Students recognize the nature of science, its history, and its connections to personal, social, economic, and political decisions. Historically, scientific events have had significant impacts on our cultural heritage.	• Demonstrate a limited understanding of the nature of science.	• Use scientific information and principles to make responsible decisions about personal and social issues. • Demonstrate a limited understanding of the nature of science.	• Demonstrate an understanding of the nature of science. • Examine and explain how scientific knowledge changes and grows due to the contributions of individuals. • Use scientific concepts to make responsible decisions about personal and social issues, when given a situation. • Explore a variety of careers in scientific or technical fields and the role of science in solving problems.	• Demonstrate a thorough understanding of the nature of science. • Identify issues, evaluate science information and principles, and make and support decisions, with justification. • Independently research how scientific knowledge changes and grows due to the contributions of individuals.

Range PLDs

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Grade 10 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
Concepts and Processes	Science is a dynamic process; concepts and content are best learned through inquiry and investigation. Concepts in LIFE SYSTEMS, EARTH and SPACE SYSTEMS, and PHYSICAL SYSTEMS are taught within the context of the following Unifying Concepts and Processes of Science: • Systems, classification, order and organization • Evidence, models, and explanations • Change, constancy, and measurement • Evolution and equilibrium • Form and function	• Demonstrate a limited ability to identify concepts and processes that explain the natural world.	• Demonstrate an understanding of some basic science facts and principles. **With support:** • Make connections to related unifying concepts and processes. • Identify some of the concepts and processes that explain the natural world.	• Identify and apply unifying concepts and processes to explain the natural world. • Demonstrate an accurate understanding of science content. • Make connections to the major related unifying concepts and processes, building on their prior knowledge and experiences. - **Life Systems:** students demonstrate an understanding of cellular processes, molecular basis of heredity, biological evolution, interdependence of organisms, living systems, behaviors and adaptations. - **Earth and Space Systems:** students describe geochemical cycles, origin and evolution of the Earth Systems and of the Universe. - **Physical Systems:** students demonstrate understanding of struture and properties of matter, chemical reactions, energy, forces, and motion. • Explain, classify, organize, model, illustrate, systematize, evaluate, relate, interpret, observe, and predict, which extends beyond a habitual response.	• Make connections among unifying concepts and processes to explain the natural world and the dynamic nature of science. • Extend many of the higher level thinking skills over a period of time. • Make connections between related concepts and phenomena. • Synthesize ideas into new concepts.

Range PLDs

Describes the expectations for students across each standard and proficiency level; reflects the knowledge, skills, and processes that are expected of students.

Grade 10 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
Science as Inquiry	Students demonstrate knowledge, skills, and habits of mind necessary to safely perform scientific inquiry. Inquiry is the foundation for the development of content, teaching students the use of processes of science that enable them to construct and develop their own knowledge. Inquiry requires appropriate field, classroom, and laboratory experiences with suitable facilities and equipment.	• Use the inquiry process to generate or validate scientific information. • Communicate appropriate conclusions and explanations. • Understand the appropriate and safe use of scientific procedures or tools.	• Gather information and data obtained from scientific investigation or research. **With support:** • Use written, oral, and/or visual means to organize, analyze, and communicate the results of scientific investigations. **Demonstrate limited:** • Use of scientific and mathematical language to communicate findings. • Ability to use the inquiry process to generate or validate scientific information or to communicate appropriate conclusions and explanations. • Understand the appropriate and safe use of scientific procedures and tools.	• Use the inquiry process to generate, validate, and apply scientific information to a variety of situations to communicate appropriate conclusions and explanations. • Demonstrate an understanding of the appropriate use of scientific procedures and tools. • Design and safely conduct experiments. • Appropriately represent the data obtained through experiments or research. • Draw appropriate conclusions, based on the data collected. They clearly and accurately communicate the results of scientific investigations or research - through written, oral, and visual means - using scientific vocabulary, mathematics, and technology. • Accurately describe the role technology plays in science inquiry and the role that inquiry plays in science and technology. • Choose and safely use appropriate technology and recognize the limitations of science inquiry.	• Use the inquiry process to analyze and synthesize scientific information to generate new questions. • Construct scientific knowledge independently and apply their knowledge of science in complex situations to communicate appropriate conclusions and explanations. • Demonstrate an understanding of the appropriate and safe use of a variety of scientific procedures and tools. • Propose new problems and questions based on experimental results or research. • Analyze information to provide new insight and draw logical conclusions that are not immediately obvious.

Range PLDs

Describes the expectations for students across each standard and proficiency level; reflects the knowledge, skills, and processes that are expected of students.

Grade 10 Science

Standard:		Below Basic students may or may not be able to :	Basic students:	Proficient students:	Advanced students (in addition to proficient):
History and Nature of Science in Personal and Social Decisions	Students recognize the nature of science, its history, and its connections to personal, social, economic, and political decisions. Historically, scientific events have had significant impacts on our cultural heritage.	• Demonstrate little or no understanding of the nature of science.	• Describe careers in science or technical fields, but require additional support to investigate the use of science in decision-making. • Demonstrate a limited understanding of the nature of science.	• Demonstrate an understanding of the nature of science. • Examine the evolution of scientific knowledge and its impact on specific areas of human endeavor. • Explain the implications of the misuse of scientific research to make important decisions. • Investigate the interdisciplinary nature of life, physical, and earth or space sciences. • Explain the historical role of science and the significance of contributions of individuals to scientific thought. • Compare options for a career in scientific or technical fields. • Apply science concepts to investigate natural resource issues: past, present, and future. • Explore a variety of careers in scientific or technical fields, natural resource issues, and the role of science in solving problems.	• Demonstrate a thorough understanding of the nature of science. • Analyze the impact of scientific knowledge on social, economic, or political decisions. • Explore a variety of careers in scientific or technical fields, natural resource issues, and the role of science in solving problems.