GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: HYDROLOGY/HYDROGEOLOGY (SEPTEMBER)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. How are landforms created, worn away and recreated? 2. How does destruction of one landform by natural process create another landform? 3. Explain the statement "The Earth has all the water it will ever have." 4. Explain how rivers continue to flow. 5. How does what we do change our natural systems? Give examples. 6. What is scientific reasoning? 7. How are scientific predictions made? 8. How are models helpful to earth scientists?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts. *For Example: Use data or satellite images to identify locations of earthquakes and volcanoes, ages of sea floor, ocean surface temperatures and ozone concentration in the stratosphere. (8.1.3.4.1)*	• Items may address data sets and maps from 8.3.2.2.2 and 8.3.2.2.3. • Items assessing this benchmark may also assess benchmarks 7.1.1.2.3, 8.3.1.1.2 and 8.3.1.1.3.		
Substrand: Earth Structure and Processes Standard: Understand that landforms are the result of the combination of constructive and destructive processes.	Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering erosion and deposition of sediment. *(8.3.1.2.1)*	• Items will NOT require knowledge of specific geographic locations (e.g., riverbank erosion as a process if assessable, but specific knowledge of the Mississippi River is not to be assessed). • Items may address chemical and physical weathering. • Items will NOT address the formation of different types of soil. • Additional vocabulary may include terms such as uplift, constructive process and destructive process.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: HYDROLOGY/HYDROGEOLOGY (SEPTEMBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interdependence Within the Earth System Standard: Understand that water, which covers the majority of the Earth's surface, circulates through the crust, oceans and atmosphere in what is known as the water cycle.	Describe the location, composition and use of major water reservoirs on the Earth, and the transfer of water among them. *(8.3.2.3.1)*	• Composition is limited to fresh water and salt water. • Transfer of water may include precipitation, evaporation, condensation, runoff, infiltration and transpiration. • Items may relate changes of phase to particle actions. • Items assessing this benchmark may also assess benchmark 6.2.1.2.3.		
Substrand: Interdependence Within the Earth System Standard: Understand that water, which covers the majority of the Earth's surface, circulates through the crust, oceans and atmosphere in what is known as the water cycle.	Describe how the water cycle distributes materials and purifies water. *For Example: Dissolved gases in rain can change the chemical composition of substances on Earth. Another Example: Waterborne disease. (8.3.2.3.2)*	• Items may include transportation and deposition of sediment and pollutants. • Purification may include evaporation, aeration and filtration. • Items assessing this benchmark may also assess benchmark 6.2.1.2.3.		
Substrand: Human Interactions with Earth Systems Standard: Understand that in order to maintain and improve their existence, humans interact with and influence Earth systems.	Recognize that land and water use practices can affect natural processes and that natural processes interfere and interact with human systems. *For Example: Levees change the natural flooding process of a river. Another Example: Agricultural runoff influences natural systems far from the source. (8.3.4.1.2)*	• Items will provide relevant background information.		
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 1: HYDROLOGY/HYDROGEOLOGY (SEPTEMBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH CHEMISTRY (SEPTEMBER-OCTOBER)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What is a physical property? 2. How do physical properties play a role in earth science? 3. What is a chemical change? 4. Explain how chemical changes help us to understand earth processes? 5. What is scientific reasoning? 6. How are scientific predictions made? 7. How are models helpful to earth scientists? 8. Why does scientific knowledge continue to change?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: Matter Standard: Understand that pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.	Distinguish between a mixture and a pure substance and use physical properties including color, solubility, density, melting point and boiling point to separate mixtures and identify pure substances. *(8.2.1.1.1.)*	• Physical properties that can be used to separate mixtures are limited to color, density, melting point, boiling point and solubility. • Items will NOT include quantitative data on solubility. • Items will NOT require students to distinguish between types of mixtures.		
Substrand Matter Standard: Understand that pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.	Use physical properties to distinguish between metals and non-metals. *(8.2.1.1.2)*	• Physical properties will be limited to electrical and thermal conductivity.		
Substrand Matter Standard: Understand that substances can undergo physical and/or chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	Identify evidence of chemical changes, including color change, generation of a gas, solid formation and temperature change. *(8.2.1.2.1)*	• Evidence is limited to color change, generation of a gas, solid formation and temperature change. • More than one piece of evidence is necessary to identify a chemical change.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH CHEMISTRY (SEPTEMBER-OCTOBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand Matter Standard: Understand that substances can undergo physical and/or chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	Distinguish between chemical and physical changes in matter. *(8.2.1.2.2)*	• Evidence for chemical reactions will be limited to a gas produced, heat released, a color change and formation of a solid precipitate. • More than one piece of evidence will be given when possible to identify a chemical change. • Examples of chemical changes may include baking soda and vinegar in a sealed plastic bag and burning a candle in a closed jar. • Evidence for physical changes will be limited to changes in state (phase), shape and dissolving (e.g., salt and water). • Items will NOT include chemical formulas or equations. • Items will NOT use the term precipitate.		
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH CHEMISTRY (SEPTEMBER-OCTOBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		
Substrand: Matter Standard: Understand that substances can undergo physical and/or chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	Use the particle model of matter to explain how mass is conserved during physical and chemical changes in a closed system. *(8.2.1.2.3)*	• Examples of physical changes where mass remains constant may include the following: a ball of clay has the same mass if you change its shape, the mass of an ice cube is the same as the mass of the liquid formed by melting the ice cube, the mass of an object is the same as the mass of sum of the pieces of that object. • Examples of chemical changes where mass remains constant may include baking soda and vinegar in a sealed plastic bag and burning a candle in a closed jar. • Items assessing this benchmark may also assess benchmark 6.2.1.2.2.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 2: EARTH CHEMISTRY (SEPTEMBER-OCTOBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Matter Standard: Understand that substances can undergo physical and/or chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	Recognize that acids are compounds whose properties include a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water. *(8.2.1.2.4)*	• Properties are limited to a sour taste, characteristic color changes with litmus and other acid/base indicators and the tendency to react with bases to produce a salt and water. • Acids and bases are limited to common household materials, such as vinegar, fruit juice, antacids and baking soda solution.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that science and engineering operate in the context of society and both influence and are influenced by this context.	Explain how scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations. *(8.1.3.3.1)*	• Items will provide background knowledge needed for an engineering solution or scientific investigation in order to identify possible constraints. • Items may include a list of possible constraints and their potential effects.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Understand that science and engineering operate in the context of society and both influence and are influenced by this context.	Understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data. *For Example: Analyze how new telescopes have provided new information about the universe. (8.1.3.3.2)*	• Items assessing this benchmark may also assess benchmark 8.1.3.2.1. • Items will provide background knowledge about the technology. • Items are limited to new technologies related to grades 6-8 benchmarks in physical science, life science or Earth science content standards.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that science and engineering operate in the context of society and both influence and are influenced by this context.	Provide examples of how advances in technology have impacted the ways in which people live, work and interact. *(8.1.3.3.3)*	• Items will provide background knowledge about the technology. • Items assessing this benchmark may also assess benchmark 6.1.2.1.1.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: METEOROLOGY (OCTOBER-DECEMBER)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What are the variables that affect incoming solar radiation? 2. How do those variables relate to seasons and climate? 3. Compare and contrast coastal climates with our climate in Minnesota. Why is there a difference? 4. What causes uneven heating of the Earth's surface? 5. How does uneven heating create density differences? 6. How do density differences create circulation? 7. How do pressure differences in the atmosphere create wind? 8. How does the composition of the Earth's atmosphere affect climate? 9. What can a weather map tell you? How? 10. Explain the statement "The Earth has all the water it will ever have." 11. Explain how rivers continue to flow. 12. How does what we do change our natural systems? Give examples. 13. How are models helpful to earth scientists?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts. *For Example: Use data or satellite images to identify locations of earthquakes and volcanoes, ages of sea floor, ocean surface temperatures and ozone concentration in the stratosphere. (8.1.3.4.1)*	• Items may address data sets and maps from 8.3.2.2.2 and 8.3.2.2.3. • Items assessing this benchmark may also assess benchmarks 7.1.1.2.3, 8.3.1.1.2 and 8.3.1.1.3.		
Substrand: Interdependence Within the Earth System Standard: Understand that the sun is the principal external energy source for the Earth.	Explain how the combination of the Earth's tilted axis and revolution around the sun causes the progression of seasons. *(8.3.2.1.1)*	• Items may require students to interpret a polar orbit animation or other diagram illustrating the combination of Earth's tilted axis and revolution around the Sun. • Items will describe or illustrate phenomena as they would be observed in the Northern Hemisphere. • Additional vocabulary may include terms such as equinox and solstice.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: METEOROLOGY (OCTOBER-DECEMBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interdependence Within the Earth System Standard: Understand that the sun is the principal external energy source for the Earth.	Recognize that oceans have a major effect on global climate because water in the oceans holds a large amount of heat. *(8.3.2.1.2)*	• Items will NOT require the students to know the terms heat capacity or specific heat. • Items may require students to compare qualitatively the heat absorption by oceans and the heat absorption by land. • Items assessing this benchmark may also assess benchmarks 8.3.2.1.3 and 8.3.2.2.3.		
Substrand: Interdependence Within the Earth System Standard: Understand that the sun is the principal external energy source for the Earth.	Explain how heating of the Earth's surface and atmosphere by the sun drives convection within the atmosphere and hydrosphere producing winds, ocean currents and the water cycle, as well as influencing global climate. *(8.3.2.1.3)*	• Items may require students to explain how wind and temperature differences cause the creation of ocean currents. • Items may require students to explain winds in terms of air moving due to pressure differences in the atmosphere. • Items may require students to explain how density differences in the atmosphere, due to uneven heating of the Earth's surface, cause wind. • Items will include relevant climatic background information for any specified locations. • Items may assess that the sun is the principal external source of energy for the Earth. • Additional vocabulary may include terms such as prevailing winds. • Items assessing this benchmark may also assess benchmarks 6.2.3.2.3, 8.3.2.1.2, 8.3.2.2.2 and 8.3.2.2.3.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: METEOROLOGY (OCTOBER-DECEMBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interdependence Within the Earth System Standard: Understand that patterns of atmospheric movement influence global climate and local weather.	Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate, and the distribution of particulates and gases. *For Example: Certain gases contribute to the greenhouse effect. (8.3.2.2.1)*	• Items will NOT require students to recall the name of layers. • Items may require students to recognize the presence of variations in temperature, pressure and compositions among the layers of the atmosphere. • Composition of the atmosphere may include dust, water vapor and other greenhouse gases. • Structure of the atmosphere may include regions for the ozone layer, the location of most weather phenomena and the jet stream. • Items that reference substances in the atmosphere will use the name rather than the chemical formula. • Items will NOT require students to know the mechanism of the greenhouse effect.		
Substrand: Interdependence Within the Earth System Standard: Understand that patterns of atmospheric movement influence global climate and local weather.	Analyze changes in wind direction, temperature, humidity and air pressure and relate them to fronts and pressure systems. *(8.3.2.2.2)*	• Items may require students to analyze how a shift in wind direction and change in cloud type are related to the passing of a pressure system. • Items may require students to interpret data but will NOT require students to memorize weather symbols. • Items assessing this benchmark may also assess benchmark 8.3.2.1.3.		
Substrand: Interdependence Within the Earth System Standard: Understand that patterns of atmospheric movement influence global climate and local weather.	Relate global weather patterns to patterns in regional and local weather. *(8.3.2.2.3)*	• Items may include land and sea breezes and global wind patterns. • Items assessing this benchmark may also assess benchmarks 8.3.2.1.2 and 8.3.2.1.3.		
Substrand: Interdependence Within the Earth System Standard: Understand that water, which covers the majority of the Earth's surface, circulates through the crust, oceans and atmosphere in what is known as the water cycle.	Describe the location, composition and use of major water reservoirs on the Earth, and the transfer of water among them. *(8.3.2.3.1)*	• Composition is limited to fresh water and salt water. • Transfer of water may include precipitation, evaporation, condensation, runoff, infiltration and transpiration. • Items may relate changes of phase to particle actions. • Items assessing this benchmark may also assess benchmark 6.2.1.2.3.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: METEOROLOGY (OCTOBER-DECEMBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Human Interactions with Earth Systems Standard: Understand that in order to maintain and improve their existence, humans interact with and influence Earth systems.	Recognize that land and water use practices can affect natural processes and that natural processes interfere and interact with human systems. *For Example: Levees change the natural flooding process of a river. Another Example: Agricultural runoff influences natural systems far from the source. (8.3.4.1.2)*	• Items will provide relevant background information.		
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 3: METEOROLOGY (OCTOBER-DECEMBER) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 4: OCEANOGRAPHY (DECEMBER-JANUARY)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. Compare and contrast coastal climates with our climate in Minnesota. Why is there a difference? 2. Explain how the sun and moon cause tides. 3. How does what we do change our natural systems? Give examples. 4. What is scientific reasoning? 5. How are scientific predictions made? 6. How are models helpful to earth scientists?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts. *For Example: Use data or satellite images to identify locations of earthquakes and volcanoes, ages of sea floor, ocean surface temperatures and ozone concentration in the stratosphere. (8.1.3.4.1)*	• Items may address data sets and maps from 8.3.2.2.2 and 8.3.2.2.3. • Items assessing this benchmark may also assess benchmarks 7.1.1.2.3, 8.3.1.1.2 and 8.3.1.1.3.		
Substrand: Interdependence Within the Earth System Standard: Understand that the sun is the principal external energy source for the Earth.	Recognize that oceans have a major effect on global climate because water in the oceans holds a large amount of heat. *(8.3.2.1.2)*	• Items will NOT require the students to know the terms heat capacity or specific heat. • Items may require students to compare qualitatively the heat absorption by oceans and the heat absorption by land. • Items assessing this benchmark may also assess benchmarks 8.3.2.1.3 and 8.3.2.2.3.		
Substrand: The Universe Standard: Understand that the Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.	Recognize that gravitational force exists between any two objects and describe how the masses of the objects and distance between them affect the force. *(8.3.3.1.3)*	• Items will NOT require calculations. • Items assessing this benchmark may also assess benchmark 6.2.2.2.4.		

UNIT 4: OCEANOGRAPHY (DECEMBER-JANUARY) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Human Interactions with Earth Systems Standard: Understand that in order to maintain and improve their existence, humans interact with and influence Earth systems.	Recognize that land and water use practices can affect natural processes and that natural processes interfere and interact with human systems. *For Example: Levees change the natural flooding process of a river. Another Example: Agricultural runoff influences natural systems far from the source. (8.3.4.1.2)*	• Items will provide relevant background information.		
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 4: OCEANOGRAPHY (DECEMBER-JANUARY) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 5: PLATE TECTONICS (FEBRUARY)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. Why are there mountain ranges, mid-ocean ridges, sea floor trenches, and islands? 2. Where are most earthquakes and volcanoes located? 3. What is scientific reasoning? 4. How are scientific predictions made? 5. How are models helpful to earth scientists?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: Earth Structure and Processes Standard: Understand that the movement of tectonic plates results from interactions among the lithosphere, mantle and core.	Recognize that the Earth is composed of layers, and describe the properties of the layers, including the lithosphere, mantle and core. *(8.3.1.1.1)*	• Properties may include composition of lithosphere, mantle and core, brittle behavior of lithosphere and plastic behavior of mantle. • Layers are limited to lithosphere, mantle and core. • Items will NOT require students to distinguish between crust and lithosphere.		
Substrand: Earth Structure and Processes Standard: Understand that the movement of tectonic plates results from interactions among the lithosphere, mantle and core.	Correlate the distribution of ocean trenches, mid-ocean ridges and mountain ranges to volcanic and seismic activity. *(8.3.1.1.2)*	• Items assessing this benchmark may also assess benchmarks 8.1.3.4.1 or 8.3.1.1.3.		
Substrand: Earth Structure and Processes Standard: Understand that the movement of tectonic plates results from interactions among the lithosphere, mantle and core.	Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates. *(8.3.1.1.3)*	• Items assessing this benchmark may also assess benchmarks 8.1.3.4.1 or 8.3.1.1.2. • Items will NOT require students to name tectonic plates. • Items may require students to understand the relative motions that occur at plate boundaries but not name or recognize the names of the boundary types. • Additional vocabulary may include terms such as subduction and fault.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 5: PLATE TECTONICS (FEBRUARY) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 5: PLATE TECTONICS (FEBRUARY) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 6: GEOLOGY (MARCH)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. How are minerals and rocks identified, grouped, and classified? 2. Explain what is meant by the statement "if it is not grown, it has to be mined." 3. Explain why oil mineral resources are finite. 4. How is energy transfused? 5. What is scientific reasoning? 6. How are scientific predictions made? How are models helpful to earth scientists?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: Earth Structure and Processes Standard: Understand that rocks and rock formations indicate evidence of the materials and conditions that produced them.	Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks. *(8.3.1.3.2)*	• Items will NOT require students to recall the names or properties of specific minerals and rocks. • Mineral characteristics are limited to density, hardness, streak and luster. • Rock characteristics may include grain size, mineral composition and texture. • Items may require students to use mineral properties to identify a mineral. • Rock and mineral examples are limited to those common to Minnesota and will be described in the item.		
Substrand: Earth Structure and Processes Standard: Understand that rocks and rock formations indicate evidence of the materials and conditions that produced them.	Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock. *(8.3.1.3.3)*	• Physical conditions are the major processes that produce each major classification of rock, including melting, cooling, crystallization, recrystallization, erosion, deposition, heat, pressure and cementation. • Items may require students to describe the environment or physical conditions in which a particular rock type was formed. • Items will NOT require students to identify specific rock names (e.g., quartzite, sandstone).		
Substrand: Human Interactions with Earth Systems Standard: Understand that in order to maintain and improve their existence, humans interact with and influence Earth systems.	Describe how mineral and fossil fuel resources have formed over millions of years, and explain why these resources are finite and non-renewable over human time frames. *(8.3.4.1.1)*	• Items will provide relevant background information.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 6: GEOLOGY (MARCH) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Energy Standard: Understand that waves involve the transfer of energy without the transfer of matter.	Explain how seismic waves transfer energy through the layers of the Earth and across its surface. *(8.2.3.1.1)*	• Layers of the earth are limited to lithosphere, mantle and core. • Items may compare the way different Earth materials affect the propagation and seismic waves. • Items will NOT require calculations. • Items assessing this benchmark may also assess benchmark 8.3.1.1.1.		
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 6: GEOLOGY (MARCH) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 7: MINNESOTA GEOLOGY (MARCH-APRIL)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. How are landforms created, worn away, and recreated? 2. How does the destruction of one landform by natural process create another landform? 3. What does the rock record tell us about the Earth's past? 4. How can we "read" the rock record? 5. Does this help us to look toward the future? 6. How are minerals and rocks identified, grouped, and classified? 7. What is scientific reasoning? 8. How are scientific predictions made? 9. How are models helpful to earth scientists?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: Earth Structure and Processes Standard: Understand that landforms are the result of the combination of constructive and destructive processes.	Explain the role of weathering, erosion and glacial activity in shaping Minnesota's current landscape. *(8.3.1.2.2)*	• Items will NOT require prior knowledge of specific geographic locations. • Items will provide relevant information about specific geographic locations. • Items may address chemical and physical weathering. • Landscape features may include lakes, river valleys, cliffs, moraines, flood plains and will NOT address specific features such as drumlins, eskers, potholes and outwash plains.		
Substrand: Earth Structure and Processes Standard: Understand that rocks and rock formations indicate evidence of the materials and conditions that produced them.	Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms. *(8.3.1.3.1)*	• Items may require students to interpret a rock cross-section. • Items may include comparisons of relative age within a rock cross-section. • Additional vocabulary may include terms such as superposition, index fossils, original horizontality, relative dating, and cross cutting.		
Substrand: Earth Structure and Processes Standard: Understand that rocks and rock formations indicate evidence of the materials and conditions that produced them.	Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock. *(8.3.1.3.3)*	• Physical conditions are the major processes that produce each major classification of rock, including melting, cooling, crystallization, recrystallization, erosion, deposition, heat, pressure and cementation. • Items may require students to describe the environment or physical conditions in which a particular rock type was formed. • Items will NOT require students to identify specific rock names (e.g., quartzite, sandstone).		

UNIT 7: MINNESOTA GEOLOGY (MARCH-APRIL) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 7: MINNESOTA GEOLOGY (MARCH-APRIL) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 8: PLANETS/ASTRONOMY (APRIL-JUNE)

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. How would you classify our star compared to other stars? 2. Why do planets stay in orbit around a star? 3. Explain how the sun and moon cause tides. 4. Compare and contrast the difference in Terrestrial vs. Joren planets? 5. Why does the moon go through phases? 6. What is scientific reasoning? 7. How are scientific predictions made? How are models helpful to earth scientists?	Options include, but are not limited to:

Substrand/Standard	Curriculum Benchmark	MCA III Test Item Specifications	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Substrand: The Universe Standard: Understand that the Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.	Recognize that the sun is a medium-sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth. *(8.3.3.1.1)*	• Items will NOT include Hertzsprung-Russell (H-R) diagrams.		
Substrand: The Universe Standard: Understand that the Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.	Describe how gravity and inertia keep most objects in the solar system in regular and predictable motion. *(8.3.3.1.2)*	• Items will NOT require calculations.		
Substrand: The Universe Standard: Understand that the Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.	Recognize that gravitational force exists between any two objects and describe how the masses of the objects and distance between them affect the force. *(8.3.3.1.3)*	• Items will NOT require calculations. • Items assessing this benchmark may also assess benchmark 6.2.2.2.4.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 8: PLANETS/ASTRONOMY (APRIL-JUNE) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: The Universe Standard: Understand that the Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.	Compare and contrast the sizes, locations, and compositions of the planets and moons in our solar system. *(8.3.3.1.4)*	• Items will provide numerical information about mass, distance and size as needed. • Distance is given in astronomical units (AU). • Items may require students to compare inner planets and outer planets as groups.		
Substrand: The Universe Standard: Understand that the Earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects.	Use the predictable motions of the Earth around its own axis and around the sun, and of the moon around the Earth, to explain day length, the phases of the moon, and eclipses. *(8.3.3.1.5)*	• Items may require students to interpret a polar orbit animation or other diagram illustrating the combination of Earth's tilted axis and revolution around the Sun. • Items will describe or illustrate phenomena as they would be observed in the Northern Hemisphere. • Items may require students to identify relative positions of the Earth, sun and moon in their explanations. • Additional vocabulary may include terms such as rotate, revolve and orbit.		
Substrand: The Practice of Science Standard: Understand that science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	**Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.** *For example: Evaluate the use of pH in advertising products related to body care or gardening. (8.1.1.1.1)*	• Items will address scientific evidence in the context of science content. • Evidence consists of observations and data on which to base scientific explanations. • Items assessing this benchmark may also assess benchmark 7.1.1.2.3.		
Substrand: The Practice of Science Standard: Understand that scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	**Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.** *(8.1.1.2.1)*	• Items may require students to differentiate among several proposed descriptions, explanations or models to determine which are best supported by the evidence. • Items may require students to develop predictions based on the given evidence. • Evidence consists of observations and data.		

GRADE 8: SCIENCE CURRICULUM FRAMEWORKS

UNIT 8: PLANETS/ASTRONOMY (APRIL-JUNE) (continued)				
Substrand/Standard	**Curriculum Benchmark**	**MCA III Test Item Specifications**	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Substrand: Interactions Among Science, Technology, Engineering, Mathematics and Society Standard: Understand that men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history. *(8.1.3.2.1)*	• Items will NOT require students to identify specific individuals or groups and their contributions. • Items may provide names of individuals or groups, cultural backgrounds and important associated contributions and expect students to describe the effect of said contributions on the advancement of science, engineering and technology. • Items assessing this benchmark may also assess benchmark 8.1.3.3.2.		
Substrand: Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard: Understand that current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts. *(8.1.3.4.2)*	• Examples of tools include a Celsius thermometer, metric ruler, timer, electronic balance and graduated cylinder. • Items may require students to determine the tool used to accurately measure a particular quantity. • Items may include constructing and analyzing graphs from a set of data and comparing graphs and data; graphs may include line graphs, scatterplots, circle graphs and histograms. • Mathematical analyses are limited to mean, median, range and use of mathematical equations; no algebraic manipulation of equations will be required.		