North Dakota Science

Content and Achievement Standards

Standard 5

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North Dakota Department of Public Instruction

Dr. Wayne G. Sanstead, State Superintendent

600 E Boulevard Avenue, Dept. 201

Bismarck, North Dakota 58505-0440

www.dpi.state.nd.us

Standard 5: Earth and Space Science

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Weather, Seasons, And Climate				
K.5.1. Describe day-to-day weather changes (e.g., sunny, rainy, cloudy, snowy)	Students describe day-to-day weather changes with accuracy.	Students describe day-to-day weather changes with no significant errors.	Students describe day-to-day weather changes with a few significant errors.	Students describe day-to-day weather changes with many significant errors.
Earth's Surface *No benchmark expectations at this level*				
Objects In The Sky				
K.5.2. Identify objects (e.g., sun, birds, airplanes, moon) in the sky	Students identify objects in the sky with accuracy.	Students identify objects in the sky with no significant errors.	Students identify objects in the sky with few significant errors.	Students identify objects in the sky with many significant errors.
Grade 1				
Weather, Seasons, And Climate				
1.5.1. Explain that short-term weather conditions can change daily, and how weather affects people's daily activities	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in an extensive variety of ways.	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in many different ways.	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in some different ways.	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in few ways.
Earth's Surface *No benchmark expectations at this level*				
Objects In The Sky				
1.5.2. Explain why the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night	Students explain why, with no errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.	Students explain why, with no significant errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.	Students explain why, with few significant errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.	Students explain why, with many significant errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.

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Grade 2				
Weather, Seasons, And Climate				
2.5.1. Describe the patterns and characteristics of the four seasons, and how these changes in weather influence plant, animal, and human activities.	Students describe, with no errors, the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.	Students describe, with no significant errors, the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.	Students describe, with few significant errors. the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.	Students describe, with many significant errors, the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.
Earth's Surface				
2.5.2. Identify different physical properties (e.g., size, shape, texture) of earth materials (e.g., rocks, sand, water)	Students identify extensive physical properties of earth materials.	Students identify most physical properties of earth materials.	Students identify some physical properties of earth materials.	Students identify few physical properties of earth materials.
2.5.3. Explain how fossils provide evidence about plants and animals and their environments that lived long ago (e.g., wooly mammoth, fern, ice age).	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with no errors.	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with no significant errors.	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with few significant errors.	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with many significant errors.
Objects In The Sky				
2.5.4. Describe how the sun provides light and heat to warm the earth (e.g., land, air, and water)	Students describe how, with no errors, the sun provides light and heat to warm the earth.	Students describe how, with no significant errors, the sun provides light and heat to warm the earth.	Students describe how, with few significant errors, the sun provides light and heat to warm the earth.	Students describe how, with many significant errors, the sun provides light and heat to warm the earth.
2.5.5. Explain how the moon appears slightly different every day, but looks nearly the same every four weeks	Students explain how, with no errors, the moon appears slightly different every day, but looks nearly the same every four weeks.	Students explain how, with no significant errors, the moon appears slightly different every day, but looks nearly the same every four weeks.	Students explain how, with few significant errors, the moon appears slightly different every day, but looks nearly the same every four weeks.	Students explain how, with many significant errors, the moon appears slightly different every day, but looks nearly the same every four weeks.

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Grade 3				
Weather, Seasons, And Climate				
3.5.1. Identify weather conditions that can be measured (e.g., temperature, wind direction and speed, and precipitation)	Students identify an extensive variety of weather conditions that can be measured.	Students identify a variety of weather conditions that can be measured.	Students identify some different weather conditions that can be measured.	Students identify few weather conditions that can be measured.
Earth's Surface				
3.5.2. Identify different uses (e.g., building materials, sources of fuel) of Earth's materials based on their properties	Students identify an extensive variety of uses of Earth's materials based on their properties.	Students identify a variety of uses of Earth's materials based on their properties.	Students identify some uses of Earth's materials based on their properties.	Students identify few uses of Earth's materials based on their properties.
3.5.3. Identify ways (e.g., wind, rain, people) that larger rocks break down into smaller rocks	Students identify, with no errors, ways that larger rocks break down into smaller rocks.	Students identify, with no significant errors, ways that larger rocks break down into smaller rocks.	Students identify, with few significant errors, ways that larger rocks break down into smaller rocks.	Students identify, with many significant errors, ways that larger rocks break down into smaller rocks.
3.5.4. Identify the properties of soil (e.g., color, texture, ability to support plant growth, capacity to retain water)	Students identify an extensive variety of properties of soil.	Students identify a variety of properties of soil.	Students identify some properties of soil.	Students identify few properties of soil.
Objects in the Sky				
3.5.5. Explain how stars are like the Sun, but because they are at a great distance, they look like small points of light	Students explain how, with no errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.	Students explain how, with no significant errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.	Students explain how, with few significant errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.	Students explain how, with many significant errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.

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Grade 4				
Weather, Seasons, And Climate				
4.5.1. Describe how as water condenses small droplets of water form clouds and fog	Students describe how, with no errors, as water condenses small droplets form clouds and fog	Students describe how, with no significant errors, as water condenses small droplets form clouds and fog	Students describe how, with few significant errors, as water condenses small droplets form clouds and fog	Students describe how, with many significant errors, as water condensers small droplets form clouds and fog.
Earth's Surface				
4.5.2. Identify slow and rapid processes (e.g., wind, water, waves, ice, volcano, earthquake) that are constantly changing Earth's surface	Students identify an extensive variety of slow and rapid processes that are constantly changing Earth's surface.	Students identify a variety of slow and rapid processes that are constantly changing Earth's surface.	Students identify some slow and rapid processes that are constantly changing Earth's surface.	Students identify few slow and rapid processes that are constantly changing Earth's surface.
4.5.3. Use characteristics to classify Earth's materials (i.e. rocks, soil)	Students use an extensive variety of characteristics to classify Earth's materials.	Students use a variety of characteristics to classify Earth's materials.	Students use some different characteristics to classify Earth's materials.	Students use few characteristics to classify Earth's materials.
4.5.4. Compare fossil evidence to existing organisms	Students compare all of the significant details of fossil evidence to existing organisms.	Students compare most of the significant details of fossil evidence to existing organisms.	Students compare some of the significant details of fossil evidence to existing organisms.	Students compare few of the significant details of fossil evidence to existing organisms.
Solar System				
4.5.5. Identify components of our solar system (e.g., planets, moons, Sun)	Students identify all of the components of our solar system.	Students identify most of the components of our solar system.	Students identify some of the components of our solar system.	Students identify few of the components of our solar system.
The Universe				
4.5.6. Identify tools that are used to study the universe (e.g., telescopes, space probes, satellites, space craft)	Students identify, with no errors, tools that are used to study the universe.	Students identify, with no significant errors, tools that are used to study the universe.	Students identify, with few significant errors, tools that are used to study the universe.	Students identify, with many significant errors, tools that are used to study the universe.

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Grade 5				
Weather, Seasons, And Climate				
5.5.1. Measure weather conditions (i.e., temperature, wind direction and speed, and precipitation)	Students measure weather conditions with no errors.	Students measure weather conditions with no significant errors.	Students measure weather conditions with few significant errors.	Students measure weather conditions with many significant errors.
5.5.2. Identify characteristics of different clouds (i.e., cumulus, stratus, cirrus)	Students identify all of the significant characteristics of different clouds.	Students identify most of the significant characteristics of different clouds.	Students identify some of the significant characteristics of different clouds.	Students identify few of the significant characteristics of different clouds.
Earth's Surface				
5.5.3. Identify how the components of soil (e.g., plant roots, bacteria, weathered rock) influence the properties of soil (e.g., texture, fertility, capacity to hold water)	Students identify, with extensive detail, how the components of soil influence the properties of soil.	Students identify, with significant detail, how the components of soil influence the properties of soil.	Students identify, with some significant detail, how the components of soil influence the properties of soil.	Students identify, with little significant detail, how the components of soil influence the properties of soil.
The Universe				
5.5.4. Identify the characteristics of the Earth (i.e., spherical in shape, orbits the Sun, rotates on tilted axis)	Students identify, with no errors, the characteristics of the Earth.	Students identify, with no significant errors, the characteristics of the Earth.	Students identify, with few significant errors, the characteristics of the Earth.	Students identify, with many significant errors, the characteristics of the Earth.
5.5.5. Identify the objects in the sky that have predictable patterns of movement (e.g., sun, planets, moons, stars)	Students identify, with no errors, the objects in the sky that have predictable patterns of movement.	Students identify, with no significant errors, the objects in the sky that have predictable patterns of movement.	Students identify, with few significant errors, the objects in the sky that have predictable patterns of movement.	Students identify, with many significant errors, the objects in the sky that have predictable patterns of movement.
Grade 6				
Weather, Seasons, And Climate				
6.5.1. Identify adverse weather conditions and how humans prepare for them	Students identify adverse weather conditions and how to prepare for them with no errors.	Students identify adverse weather conditions and how to prepare for them with no significant errors.	Students identify adverse weather conditions and how to prepare for them with few significant errors.	Students identify adverse weather conditions and how to prepare for them with many significant errors.

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Characteristics Of The Earth				
6.5.2. Explain how rocks are formed (e.g., melting, cooling, metamorphism, combinations of minerals)	Students explain an extensive variety of ways rocks form.	Students explain many different ways rocks form.	Students explain some different ways rocks form.	Students explain a limited variety of ways rocks form.
6.5.3. Describe the characteristics of the layers of the Earth (i.e., crust, mantle, core)	Students describe the characteristics of the layers of the Earth with accuracy.	Students describe the characteristics of the layers of the Earth with no significant errors.	Students describe the characteristics of the layers of the Earth with few significant errors.	Students describe the characteristics of the layers of the Earth with many significant errors.
The Solar System				
6.5.4. Identify the basic characteristics (e.g., composition, rings) of objects (e.g., planets, sun, small bodies) in the solar system	Students identify all of the significant details as well as subtleties of objects in the solar system.	Students identify most of the significant details of objects in the solar system.	Students identify some of the significant details of objects in the solar system.	Students identify few of the significant details of objects in the solar system.
Grade 7				
Weather, Seasons, And Climate				
7.5.1. Identify the factors (e.g., latitude, altitude, mountains, bodies of water) that affect the Earth's climate	Students identify all of the significant factors that affect the Earth's climate.	Students identity most of the significant factors that affect the Earth's climate.	Students identify some of the significant factors that affect the Earth's climate.	Students identify few of the significant factors that affect the Earth's climate.
7.5.2. Explain how seasons affect organisms (e.g., hibernation, photoperiodism, migration)	Students explain an extensive variety of ways that seasons affect organisms.	Students explain many different ways that seasons affect organisms.	Students explain some different ways that seasons affect organisms.	Students explain a limited variety of ways that seasons affect organisms.
Characteristics Of The Earth				
7.5.3. Identify the Earth's renewable and nonrenewable resources (e.g., solar, wind, fossil fuels, water, soil, metals)	Students identify an extensive variety of examples of Earth's renewable and nonrenewable resources.	Students identify many different examples of Earth's renewable and nonrenewable resources.	Students identify some different examples of Earth's renewable and nonrenewable resources.	Students identify a limited variety of examples of Earth's renewable and nonrenewable resources.

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Grade 8				
Weather, Seasons, And Climate				
8.5.1. Explain how factors (i.e., fronts, winds, air masses, air pressure, humidity, temperature, location) affect weather	Students explain how an extensive variety of factors that affect weather.	Students explain how many different factors that affect weather.	Students explain how some different factors that affect weather.	Students explain how a limited variety of factors that affect weather.
Geologic Processes				
8.5.2. Understand the rock cycle	Students explain all of the significant details of the rock cycle.	Students explain most of the significant details of the rock cycle.	Students explain some of the significant details of the rock cycle.	Students explain few of the significant details of the rock cycle.
8.5.3. Explain the water cycle	Students explain the water cycle with no errors.	Students explain the water cycle with no significant errors.	Students explain the water cycle with few significant errors.	Students explain the water cycle with many significant errors.
8.5.4. Explain how landforms are changed (e.g., crustal deformation, volcanic eruption, deposition, weathering, erosion)	Students explain, with no errors, how landforms are changed.	Students explain, with no significant errors, how landforms are changed.	Students explain, with few significant errors, how landforms are changed.	Students explain, with many significant errors, how landforms are changed.
8.5.5. Identify evidence for plate tectonics theory (e.g., fit of continents, location of earthquakes, volcanoes, mid-ocean ridge, plate boundaries)	Students identify an extensive variety of evidence for plate tectonics theory.	Students identify a variety of evidence for plate tectonics theory.	Students identify some different evidence for plate tectonics theory.	Students identify a limited variety of evidence for plate tectonics theory.
8.5.6. Identify a variety of methods (e.g., rock sequences, fossil correlation, radiometric dating) used to determine geologic time	Students identify an extensive variety of methods used to determine geologic time.	Students identify a variety of methods used to determine geologic time.	Students identify some different methods used to determine geologic time.	Students identify a limited variety of methods used to determine geologic time.
8.5.7. Explain the changes Earth has undergone over geologic time (e.g., fossil record, plate tectonics, climate change, glaciation)	Students explain all of the significant details of the changes Earth has undergone over geologic time.	Students explain most of the significant details of the changes Earth has undergone over geologic time.	Students explain some of the significant details of the changes Earth has undergone over geologic time.	Students explain few of the significant details of the changes Earth has undergone over geologic time.

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Characteristics Of The Earth				
8.5.8. Explain how phenomena on Earth (i.e., day, year, seasons, lunar phases, eclipses, tides) are related to the position and motion of the Sun, Moon, and Earth	Students explain, with no errors, how phenomena on Earth are related to the position and motion of the Sun, Moon, and Earth.	Students explain, with no significant errors, how phenomena on Earth are related to the position and motion of the Sun, Moon, and Earth.	Students explain, with few significant errors, how phenomena on Earth are related to the position and motion of the Sun, Moon and Earth.	Students explain, with many significant errors, how phenomena on Earth are related to the position and motion of the Sun, Moon, and Earth.
The Universe				
8.5.9. Identify characteristics of stars (e.g., color, size, temperature, life cycle)	Students identify an extensive variety of characteristics of stars.	Students identify many different characteristics of stars.	Students identify some different characteristics of stars.	Students identify a limited variety of characteristics of stars.
8.5.10. Identify the composition (e.g., stars, galaxies) and scale of the universe	Students identify all of the significant details of the composition and scale of the universe.	Students identify most of the significant details of the composition and scale of the universe.	Students identify some of the significant details of the composition and scale of the universe.	Students identify few of the significant details of the composition and scale of the universe.
Grade 9-10				
The Universe				
9-10.5.1. Explain the relationship between the Big Bang Theory and the origin and evolution of the universe	Students provide an insightful explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.	Students provide a reasonable explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.	Students provide a superficial explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.	Students provide an unreasonable explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.

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Earth's History				
9-10.5.2. Relate the changes in the Earth's atmosphere to the evolution of photosynthetic life forms	Students identify all of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.	Students identify most of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.	Students identify some of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.	Students identify few of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.
Energy In The Earth System				
9-10.5.3. Explain how energy in the Earth system is governed by convection, conduction, and radiation (e.g., heat moves in the Earth's mantle by convection, conduction occurs along the mid-oceanic ridges, energy from the Sun reaches the Earth through radiation)	Students explain, with no errors, how energy in the Earth system is governed by convection, conduction, and radiation.	Students explain, with no significant errors, how energy in the Earth system is governed by convection, conduction, and radiation.	Students explain, with few significant errors, how energy in the Earth system is governed by convection, conduction, and radiation.	Students explain, with many significant errors, how energy in the Earth system is governed by convection, conduction, and radiation.
Geologic Processes, Human Activities, And The Environment				
9-10.5.4. Identify the short-term and long-term effects of physical processes (e.g., plate tectonics, extreme weather phenomenon) on the environment and society	Students identify all of the significant details relating short and long term effects of physical processes on the environment and society.	Students identify most of the significant details relating short and long term effects of physical processes on the environment and society.	Students identify some of the significant details relating short and long term effects of physical processes on the environment and society.	Students identify few of the significant details relating short and long term effects of physical processes on the environment and society.
9-10.5.5. Analyze how evidence of past natural hazards and geologic events has predicted subsequent hazards and events (e.g. Gap time method to predict earthquakes and tsunamis)	Students provide insightful analysis how evidence of past natural hazards and geologic events has predicted subsequent hazards and events.	Students provide reasonable analysis how evidence of past natural hazards and geologic events has predicted subsequent hazards and events.	Students provide superficial analysis how evidence of past natural hazards and geologic events has predicted subsequent hazards and events.	Students provide unreasonable analysis how past evidence of past natural hazards and geologic events has predicted subsequent hazards and events.

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9-10.5.6. Explain the effects of human activities (e.g., dams, levees, farming practices, deforestation, land-use practices, land-management strategies) on the environment	Students explain an extensive variety of effects of human activities on the environment.	Students explain a variety of effects of human activities on the environment.	Students explain some different effects of human activities on the environment.	Students explain few effects of human activities on the environment.
Grade 11-12				
The Universe				
11-12.5.1. Explain how the Sun and other stars are powered by nuclear reactions (e.g., the fusion of hydrogen to form helium, formation of elements)	Students explain how the Sun and other stars are powered by nuclear reactions with few, if any, errors.	Students explain how the Sun and other stars are powered by nuclear reactions with no significant errors.	Students explain how the Sun and other stars are powered by nuclear reactions with few significant errors	Students explain how the Sun and other stars are powered by nuclear reactions with many significant errors
Earth's History *No benchmark expectations at this level*				
Energy In The Earth System				
11-12.5.2. Explain how Earth systems are in dynamic equilibrium (e.g., cycling of energy and matter through the atmosphere, hydrosphere, and lithosphere)	Students explain all of the significant details that show how Earth systems are in dynamic equilibrium.	Students explain most of the significant details that show how Earth systems are in dynamic equilibrium.	Students explain some of the significant details that show how Earth systems are in dynamic equilibrium.	Students explain few of the significant details that show how Earth systems are in dynamic equilibrium.
Cycles In The Earth System *No benchmark expectations at this level*				
Geologic Processes, Human Activities, And The Environment				
11-12.5.3. Explain the short-term and long-term effects of chemical processes (e.g., acid rain, CO_2 emissions, ozone depletion, run-off) on the environment and society	Students explain an extensive variety of short-term and long-term effects of chemical processes on the environment and society.	Students explain a variety of short-term and long-term effects of chemical processes on the environment and society.	Students explain some different short-term and long-term effects of chemical processes on the environment and society.	Students explain few short-term and long-term effects of chemical processes on the environment and society.