

Roscommon Area Public Schools – Curriculum Framework

Course: Science 6

Unit Number: 7

Timeframe: 5 weeks

Unit Title: Climate Change



Stage 1: Identify Desired Results

Essential Question:

What thought-provoking questions will foster inquiry, meaning making and transfer?

- *An essential question is open ended; has no simple "right answer."*
- *Is meant to be investigated, argued, looked at from different points of view*
- *Encourages active "meaning making" by the learner about important ideas.*
- *Raises other important questions.*
- *Naturally arises*

- What is causing Earth's climate to change?
- How can people manage the effects of Earth's changing climate?

Scaffold Questions:

What questions can we ask students that break the essential question into smaller pieces of content?

- How do questions help to identify and clarify evidence related to the causes of a changing global climate and the impacts it has on people and the natural environment?
- How does Earth's atmosphere impact the mean surface temperature?
- How have natural processes in the past caused changes in Earth's mean surface temperature? How do we know?
- How could human activities cause changes in Earth's mean surface temperature?
- What is causing the current rise in Earth's mean surface temperature? How do we know?
- What are some of the impacts on people and the natural environment caused by current climate change?
- What can we do to reduce our contributions to global climate change?
- How can science help us make decisions relating to global climate change?

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Brief Summary of Unit:	<p>In this unit, students take on the challenge to educate the community about Earth’s climate system. Students learn about Earth’s greenhouse atmosphere and causes and impacts of natural climate changes in the past. They identify human activities that are responsible for causing current climate change, and what actions communities can take to mitigate the effects of global climate change.</p> <p>Students begin by learning the basic greenhouse mechanisms by which Earth’s complex climate system functions, and that the greenhouse effect is responsible for stabilizing the mean surface temperature on Earth (MS-ESS3-5). In the past, natural processes such as solar and volcanic activity have caused changes to the climate system, with disruptions to both ecosystems and human civilizations (MS-ESS3-5). However, they uncover by examining patterns in evidence that human activity (population growth and use of technology that relies on fossil fuel consumption) has caused the extraordinarily rapid rise in greenhouse gas levels and surface temperatures over the past 150 years (MS-ESS3-4). Students learn about the diverse, world-wide impacts of current climate change. They also learn that mitigating and reducing the level of climate change can be achieved at the community level by developing an understanding of climate science, engineering capabilities, and human behaviors, and applying that knowledge wisely in decisions and activities (MS-ESS3-5).</p>
Desired Understanding: <i>The long-term accomplishments that students should be able to do with knowledge and skill, on their own. Frames Standards as long-term performance accomplishments.</i>	<p>Global climate can be changed by many different variables, from both natural processes and human activities. By releasing large amounts of greenhouse gases into the atmosphere, humans have changed global climate significantly over the past 100 years, affecting humans and the natural environment. Applying scientific knowledge and engineering principles can help mitigate the effects of global climate change and identify practical ways to reduce greenhouse gas emissions.</p>

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<i>Answers the questions Why? And What can you do with this?</i>	
Science Discipline Core Ideas - Subject <i>List all of the standards in this unit.</i>	MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]
Science Practices <i>Which practices will be focused on during this unit?</i>	<ol style="list-style-type: none">1. Asking questions (for science) and defining problems (for engineering)2. Developing and using models3. Planning and carrying out investigations4. Analyzing and interpreting data5. Using mathematics and computational thinking6. Constructing explanations (for science) and designing solutions (for engineering)7. Engaging in argument from evidence8. Obtaining, evaluating, and communicating information
Science Crosscutting Concepts <i>Which Crosscutting Concepts will be focused on during this unit?</i>	Stability and Change: For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.
Essential Standards* <i>List the Essential Standards that will be taught and assessed in this unit.</i>	MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural

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	processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]
Crossover standards* <i>Connection to other content areas (Option)</i>	
Alignment to the Vision of High Quality Instruction in Science <i>(How do the instructional targets in this unit align to the district's vision of high quality instruction?)</i>	<ul style="list-style-type: none">• Teachers anchor their instruction in questions related to natural and physical phenomena to engage students' curiosity around natural events• Students engaging in multiple rounds of creating and revising scientific questions, mental models, explanations and evidence-based arguments through observations and experiences• Teachers using a variety of discourse strategies with students to get them to think deeply and to respond to each other's thinking• Students prompting each other to engage in sense-making talk during investigations and other activities• Students' ideas being represented publicly and worked on by the class• Teachers using specialized tools and routines to support students who are not willing or able to participate without help• Students speaking up about what information or experiences they need to move their thinking forward.
Stage 2: Determine Acceptable Evidence	

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(With the exception of formative assessments, all assessments listed in this section are required elements of the district's curriculum and the data associated will be collected in the district's performance management driver system.)

Measure of Understanding (Performance Task)

(How will students demonstrate their attainment of the long term understanding?)

In this unit, students take on the challenge to educate the community about Earth's climate system. Students learn about Earth's greenhouse atmosphere and causes and impacts of natural climate changes in the past. They identify human activities that are responsible for causing current climate change, and what actions communities can take to mitigate the effects of global climate change.

Assessing the Performance Task

(How will we evaluate quality student work in the performance task? How will we determine that students can use their learning independently?)

Students are contacted by the local mayor and tasked with educating their community about global climate change. Students first identify how the greenhouse effect functions as a system and understand how factors such as changes in solar radiation and greenhouse gas input may cause stability and change in the system. Students study natural processes that have led to past global climate change and the effects past changes have had on Earth systems and people. Students ask questions to clarify evidence of human factors most responsible for current global climate change. Additionally, students will investigate the negative effects of global climate change on humans and the natural environment with a focus on the Michigan/Great Lakes region. Lastly, students use criteria and constraints to determine the types of changes that community members could realistically adopt in order to improve the health of people and the natural environment by mitigating the effects of climate change. Throughout the unit, Unit Challenge Groups model the greenhouse gas system under various conditions and develop several evidence-based

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	arguments for the culminating activity to educate the community about global climate change. Final recommendations for the community made by groups are considered by the whole class to determine the most effective solutions.
Summative Assessments <i>(How will we know if students can demonstrate mastery of the unit's content, skills, and common core state standards?) Can overlap the performance-based evidence, thereby increasing the reliability of the overall assessment (especially if the performance task was done by a group)</i>	<i>Unit assessment is available after passing the required content</i> https://mi-star.mtu.edu/pages/unit-87-overview/
Interim Assessments	-none-
Formative Assessments	As part of the modelling system daily formative assessments are conducted through observation and remediated as necessary.
	Daily: classwork is monitored for understanding As Needed: Exit ticket

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Student Self-Reflection and Self-Regulation

(Student-Centered)

*(How will we measure students'
ability to think meta-cognitively?)*

State Assessment Practice

*(How will we measure students'
ability to interact with content and
skills in an MSTEP-like or SAT-like
format?)*

Formative Assessments are geared toward NWEA/MSTEP testing and passage based writing through NewsELA can be incorporated for MSTEP test Prep.

Stage 3: Learning Plan (Summary of Key Learning Events and Instruction)

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What activities, experiences and lessons will lead to achievement of the desired results and success at the assessments?

The learning events –

- should be derived from the goals of Stage 1 and the assessments of Stage 2 to ensure alignment and effectiveness of the activities.
- should match the level of rigor within the standard
- support student Acquisition, Meaning Making, and Transfer.

Lesson Sequencing Table

Lesson #	Lesson Questions	What students do...	# days
1	<ul style="list-style-type: none">• What is causing Earth's climate to change?• How can people manage the effects of Earth's changing climate?	Students observe examples of environmental changes around the world and think about what is causing these issues. They receive the Unit Challenge; they are asked to help the mayor explain to the community about the greenhouse effect, what causes climate to change, how it affects us, and what we can do about it.	2
2	<ul style="list-style-type: none">• How do questions help to identify and clarify evidence related to the causes of a changing global climate and the impacts it has on people and the natural environment?	Students ask questions to identify and clarify evidence of an argument related to global mean surface temperature over time and the signs of global climate change.	2

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	3	<ul style="list-style-type: none">How does Earth's atmosphere impact the mean surface temperature?	Students model how the greenhouse system works on Earth, specifically how greenhouse gases absorb and re-release thermal energy, and how the concentration of greenhouse gases in the atmosphere affects Earth's surface temperature.	3
	4	<ul style="list-style-type: none">How have natural processes in the past caused changes in Earth's mean surface temperature? How do we know?	Students examine how climate change in the past has affected the environment and human society, and model the effects of natural processes on the greenhouse system.	4
	5A	<ul style="list-style-type: none">How could human activities cause changes in Earth's mean surface temperature?	Students examine how human activities affect components of the greenhouse system, and model the relationships between human activities and Earth's mean surface temperature.	3

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	5B	<ul style="list-style-type: none">What is causing the current rise in Earth's mean surface temperature? How do we know?	Students gather and organize evidence, and formally address two competing claims: are natural processes or human activities responsible for current climate change?	3
	6	<ul style="list-style-type: none">What are some of the impacts on people and the natural environment caused by current climate change?	Students explore the negative effects global climate change have on humans and the natural environment, and make claim supported by evidence how climate change is impacting Michigan and the Great Lakes region with both short and long-term negative consequences.	3
	7	<ul style="list-style-type: none">What can we do to reduce our contributions to global climate change?How can science help us make decisions	Students calculate the carbon footprint of an average community member, and use this as evidence to help evaluate recommendations for community action to address climate change.	3

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			relating to global climate change?	Students have the option to generate their own recommendation, as long as it is supported by evidence and reasoning.	
	8	<ul style="list-style-type: none"> What is causing Earth's climate to change? How can people manage the effects of Earth's changing climate? 		Unit Challenge groups each present their responses to the Mayor's challenge. The class reviews the evaluated recommendations on the class decision matrix, and comes to a consensus about the five best recommendations for their community to address climate change.	3
Learning Targets <i>What will students be taught? What should they know? What should they be able to do?</i>	I can: Explain what is causing Earth's climate to change. So I can: Investigate and model natural phenomena I'm successful when I can: Explain this to a peer or teacher.				
How will the unit be sequenced and differentiated to	Sequenced by a team of curriculum experts and should be completed in the designed order. The modeling approach lends itself to differentiation in that the learners are all able to participate at their own level.				

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optimize achievement for all learners?

Teaching -

- *should reflect the instructional approaches most appropriate to the goals (not what is easiest or most comfortable for the teacher).*
- *should employ resources most appropriate to the goals (not simply march through a textbook or commercial program).*
- *be responsive to differences in learners' readiness, interests, and preferred ways of learning.*

Key Vocabulary

Unavailable at this time

Resources

Description or link to resources

https://docs.google.com/document/d/1vRRCUKoZQMgMxH1T_5MM_xjhJfS1zN33-SlkQMsmoXY/edit