

Rocks and Minerals Grade 4 Science

Title of Unit:	Rocks and Minerals	Grade Level	4
Curriculum Area:	Science	Time Frame	Approximately 2 Months
Developed By	Stephanie Voss		
School:	St. Gabriel		
Identify Desired Results (Stage 1)			
Curricular Outcomes			
<p><u>RM4.1</u> Investigate physical properties of rocks and minerals, including those found in the local environment.</p> <p><u>RM4.2</u> Assess how human uses of rocks and minerals impact self, society, and the environment.</p> <p><u>RM4.3</u> Analyze how weathering, erosion, and fossils provide evidence to support human understanding of the formation of landforms on Earth.</p>			
Understandings		Essential Questions	
<p>What do you want students to understand & be able to use several years from now?</p>		<p>Open-ended questions that stimulate thought and inquiry linked to the content of the enduring understanding.</p>	

Students will understand that...

RM4.1

- Minerals can be made into rocks but rocks cannot be made into minerals.
- The purpose of classifying is to help understand commonalities
- Experiences/needs change classification schemes of others- Elders, traditional knowledge keepers, geologists
- There are a variety of rocks and minerals around our community.
- The physical properties of rocks and minerals help us to classify them.

RM4.2

- There are numerous uses for rocks and minerals
- The use of rocks and mineral affect everyone and the future of the Earth
- Different cultures value, respect and use rocks differently.
- That rocks and minerals can affect people's lives through product use and creation, employment, environmental impact
- That there are issues surrounding rock and mineral extraction.
- That there are ways to use natural resources with

RM4.1

1. What types of rocks can be found in our community?
2. What types of minerals can be found in our community?
3. How do you know what type of rock you have found?
4. How are rocks and minerals related?
5. Why do we classify rocks and minerals?

RM4.2

1. What are the uses of rocks and minerals?
2. Are the uses of rocks and minerals essential to you and or those around you?
3. How do the use of rocks and minerals affect you, those around you, the environment?
4. How do cultures differ in their values, respect and uses of rocks and minerals?
5. Why is rock and mineral extraction controversial?
6. How can we protect our environment through our use of natural resources?

RM4.3

1. Is there anything we can do to reduce the effects of weather on the Earth?
2. What does the wind do to rocks/minerals
3. Are there benefits of erosion?
4. How do fossils end up inside rocks?
5. How does the Earth change?
6. How and why do we classify?

stewardship in mind and ways not to.

RM4.3

- The Earth is affected by weather
- Weather causes erosion of the land
- Fossils are found in the Earth, surrounded by rock
- Different kinds of rocks are affected differently
- Change can be sudden or gradual, short-term or long-term
- Classification depends on characteristics
- Erosion can be reduced
- Weathering, erosion and fossils provide evidence to support our understanding of the formation of landforms on the Earth.
- Science is about processes for making predictions, collection evidence or data based on observations and analyzing the data.

7. How can we control erosion and why would we?
8. How do we form explanations about the Earth's land formations?

Knowledge

Students will know...

Skills

Students will be able to...

RM4.1

- Where we find rocks and minerals.
- Terminology - What are the physical properties of rocks and minerals (colour, texture, lustre, hardness, cleavage, transparency, and crystal structure)
- Tools - hand lens, safety glasses, brush, rock pick, knife, measuring tape, and gloves
- How to make observations, collect and display information. Jot notes, labelled diagrams, charts
- Where to and not to collect samples
- How to test hardness
- Compare and contrast data collected
- What is a rock
- What is a mineral
- Generalize from data

RM4.2

- The different uses of rocks and minerals depending on cultural group
- Things that are made from rocks and minerals - nickel, table salt, pottery, cement, carvings, brick, jewellery, bicycle, nutrients, battery, copper wiring, soda can, plumbing pipe, and sidewalk
- Historical (e.g., flint arrowheads, gold jewellery, paint pigments,

RM4.1

- a. Pose questions about the properties of rocks and minerals (e.g., What is the difference between rocks and minerals? Where do we find rocks and minerals? Do rocks become minerals?).
- b. Document the locations and characteristics of rocks that exist in their local environment.
- c. Observe and record physical properties of rocks and minerals using appropriate terminology such as colour, texture, lustre, hardness, cleavage, transparency, and crystal structure.
- d. Use appropriate tools (e.g., hand lens, safety glasses, brush, rock pick, knife, measuring tape, and gloves) safely while making observations and collecting information on the physical properties of rocks and minerals.
- e. Demonstrate respect for all components of their environment when observing and collecting rocks and minerals (e.g., do not remove rocks and minerals from private property without permission).
- f. Demonstrate processes for testing the hardness of rocks, including reference to guides such as Moh's scale of mineral hardness.
- g. Record observations of rocks and minerals using jot notes, labelled diagrams, and charts.
- h. Compare the physical properties of rocks and minerals from their local environment with those from other geological areas.
- i. Develop their own classification scheme to organize their understanding of rocks and minerals.

and coal heating) and contemporary (e.g., fertilizer, building products, ceramics, glass, salt, silver fillings and electronics) uses for rocks and minerals

- Alternative materials or new uses for rocks and minerals.
- Use of rock affected by characteristics such as functionality, mineral shape, cost, availability, and aesthetics
- Where minerals are found - potash, sodium sulphate, salt, kaolin, uranium, copper, coal, diamond, and gold
- Pros and cons of extraction and use of minerals - company owner, employee, scientist, Elder, environmental group, and end user
- Ways to recycle-reuse
- Methods of reclaiming sites and reducing impacts - quarry, strip mine, open pit mine, and hard rock mine
- How they affect natural resources

RM4.3

- Definitions – weathering, erosion, fossils,
- Effects of - tidal wave, flash flood, hurricane, tornado, earthquake, mudslide, forest fire, avalanche, and meteor impact, mulching, crop rotation, strip

j. Account for any variation between their classification schemes of rocks and minerals and those of classmates, Elders, traditional knowledge keepers, geologists, or from other resources.

k. Differentiate between rocks and minerals.

l. Develop simple generalizations about the physical characteristics of rocks and minerals based on observation and research.

RM4.2

a. Discuss ways in which people of different cultures value, respect, and use rocks and minerals, including First Nations and Métis connections to Mother Earth.

b. Identify objects in their local environment that are made from rocks and minerals (e.g., nickel, table salt, pottery, cement, carvings, brick, jewellery, bicycle, nutrients, battery, copper wiring, soda can, plumbing pipe, and sidewalk).

c. Research historical (e.g., flint arrowheads, gold jewellery, paint pigments, and coal heating) and contemporary (e.g., fertilizer, building products, ceramics, glass, salt, silver fillings and electronics) uses for rocks and minerals in Saskatchewan. d. Suggest alternative materials that could be used to create everyday objects or propose new uses for rocks and minerals. e. Relate uses for rocks and minerals to characteristics such as functionality, mineral shape, cost, availability, and aesthetics.

farming, windbreaks, terracing, and sediment basins

- The Landforms On Earth
- Rock classifications - igneous, sedimentary, or metamorphic
- Carrying out an experiment
- possible effects of wind, water, and ice = sandy beaches, coastline erosion, rounded rock formations, sand dunes, river deltas, glacial deposits, and cracks in rocks
- Predict effects - butte, cliff, cave, valley, river, waterfall, and beach
- How soil is created
- How To Create Models Of plants and animals
- Fossil records

f. Identify locations where minerals, including potash, sodium sulphate, salt, kaolin, uranium, copper, coal, diamond, and gold, are extracted in Saskatchewan.

g. Discuss economic benefits associated with mineral extraction and refining, including related careers, in Saskatchewan.

h. Analyze issues related to the extraction and use of minerals from the perspectives of various stakeholders (e.g., company owner, employee, scientist, Elder, environmental group, and end user).

i. Research ways in which products made from rocks or minerals can be recycled and reused.

j. Suggest methods of reclaiming resource extraction sites (e.g., quarry, strip mine, open pit mine, and hard rock mine) to reduce short-term and long-term impacts on communities and the environment.

k. Assess their own and their family's impact on natural resources based on their current lifestyle.

RM4.3

a. Construct a visual representation of the diversity of landscapes and landforms throughout Saskatchewan, including those which have significance for First Nations and Métis people.

b. Examine the effects of natural phenomena (e.g., tidal wave, flash flood, hurricane, tornado, earthquake, mud slide, forest fire, avalanche, and meteor impact)

that cause rapid and significant changes to the landscape.

c. Explain how rocks can be classified as igneous, sedimentary, or metamorphic based on the processes by which they form.

d. Discuss practices and techniques (e.g., mulching, crop rotation, strip farming, windbreaks, terracing, and sediment basins) for minimizing and controlling erosion locally and in communities around the world.

e. Design and construct a prototype of a system for minimizing and controlling gravitational, water, shoreline, ice, or wind erosion in a given situation.

f. Evaluate a prototype of a personally-constructed system for minimizing and controlling erosion and the use of prototypes in science for modelling natural phenomena.

g. Describe possible short-term and long-term effects of wind, water, and ice on local, national, and global landscapes (e.g., sandy beaches, coastline erosion, rounded rock formations, sand dunes, river deltas, glacial deposits, and cracks in rocks).

h. Predict the effects of weathering on various landforms (e.g., butte, cliff, cave, valley, river, waterfall, and beach) in Saskatchewan.

i. Suggest explanations for how soils form from rocks, including the roles that wind,

water, and biological processes (e.g., decomposition of plant and animal matter, and growth of plant roots play) over of time.

j. Create models of different types (e.g., amber, imprint, cast, or mould) of plant and animal fossils.

k. Discuss how fossils and the fossil record provide evidence of the Earth's history, including the formation of various landforms.

l. Predict the types of plant or animal fossils that would be found in Saskatchewan landforms in the past, present, and future.

m. Explain how scientists rely on observations and data to develop explanations of natural phenomena.

n. Pose new questions about Saskatchewan landforms based on what was learned.

Assessment Evidence (Stage 2)

Performance Task Description

<p>The PERFORMANCE TASK describes the learning activity in “story” form. Typically, the P.T. describes a scenario or situation that requires students to apply knowledge and skills to demonstrate their understanding in a real life situation. Describe your performance task scenario below:</p>	<p>Helpful tips for writing a performance task.</p>
<p>Through what authentic performance tasks will students demonstrate the desired understandings? By what criteria will performances of understanding be judged?</p> <p style="text-align: center;">Summative</p> <ol style="list-style-type: none"> 1. Creating brochures on the rock cycle RM4.1 2. Quiz/assignment on how humans use rocks and minerals in their daily lives and how they can be protected RM4.2 3. Quiz/Assignment on weathering, erosion, and fossils RM4.3 <p style="text-align: center;">Formative</p> <ol style="list-style-type: none"> 1. Diagnostic Assessment - Filling out a KWL chart as a class 2. Jigsaw Activity - Observation - Are students contributing to the group discussions? Are they contributing to the creation of the anchor chart? Are they participating in the group presentation? 3. Geology Kitchen - Personal Reflection on Experiment 4. Rock Cycle Worksheet - Check for completion of work sheet 5. Neighborhood Walk - Observation - Are students being respectful of the land/property? 6. Investigating Properties of Rocks - Observation - Take photos of students participating in a hands on investigation 7. Investigating Properties of rocks - Check for filled out charts - have students identified and categorized the different properties? 8. Investigating Properties of Minerals - Observation/Questioning - Are students referring to Moh's scale of hardness? Are they properly using the correct tools? 9. Growing our own crystals - Observation/Photographs to document experiment 10. Uses of rocks and minerals - Observation/Questioning - Are students participating in class discussion? Are the contributing ideas of how we use rocks in our daily lives? 11. Indigenous People's Use of Rocks and Minerals - Exit Slip: Explain one way Indiegnous peoples of Canada used rocks/minerals in their daily lives 	<p>Goal: What should students accomplish by completing this task?</p> <p>Role: What role (perspective) will your students be taking?</p> <p>Audience: Who is the relevant audience?</p> <p>Situation: The context or challenge provided to the student.</p> <p>Product/Performance: What product/performance will the student create?</p>

<p>12. Rocks and Minerals in Sask - Class discussion - are students participating? Are students independently researching different types/careers in sask?</p> <p>13. Weathering & Erosion - Check for completion of worksheet</p> <p>14. Fossils - Observation and photographs of students creation</p> <p>15. Self Reflection - Check for thoughtful completion of self reflection worksheet</p>	<p>Standards (Create the rubric for the Performance Task)</p>
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Other Assessment Evidence: (Formative and summative assessments used throughout the unit to arrive at the outcomes.)

Assessment Evidence:

Conversation	Observation	Product
<ul style="list-style-type: none"> • Are students actively participating in class/group discussions • While students are working, circulate through classroom and ask students to explain what they are working on 	<ul style="list-style-type: none"> • While students are working on hands on investigations (properties of rocks and minerals, growing crystals, creating fossils) 	<ul style="list-style-type: none"> • Brochure on the rock cycle (summative) • Quiz on outcome RM4.2 • Quiz on outcome RM4.3

Learning Plan (Stage 3)

Ideas for Differentiation

- Flexible grouping
- Think-Pair-Share
- Include hands on activities and projects
- Implement the use of technology

What events will help students **experience and explore** the enduring understandings and essential questions in the unit? How will you equip them with needed skills and knowledge? How will you **organize** and **sequence** the learning activities to optimize the engagement and achievement of all students?

OUTCOME RM4.1

TOPIC 1 - Introduction to Rocks and Minerals

- Read Aloud - [I'm Trying to Love Rocks](#) (Maybe)
- Kahoot - Testing Prior Knowledge
- KWL Chart
- Mind Map as a class
- Vocabulary Sheets

TOPIC 2 - 3 Different Types of Rocks

- Read Pages 156-157 in Textbook
- Jigsaw Activity
- [Geology Kitchen Experiment & Reflection](#) (Igneous)

TOPIC 3 - The Rock Cycle

- [Rock Cycle Video](#)
- Read and Fill Out Rock Cycle Worksheet as a Class
- Create Rock Cycle Brochures

TOPIC 4 - Investigating Properties of Rocks

- Read Page 152 in the Textbook
- Pg 106-107 in literacy text (examples of property chart)
- Neighborhood walk to find rocks
- Discuss the importance of respecting the land/property

Time
Frame

Approx. 2
Lessons

Approx
2-3
Lessons

Approx. 3
Lessons

Approx.
2-3
Lessons

<ul style="list-style-type: none"> • Discuss properties of rocks (size, colour, layers, crystals, how easily it breaks apart) • Video: Sorting Rocks by their Properties • Observe and record physical properties of rocks that we have found on worksheets • Use tools such as magnifying glasses, chisels, hammers during investigation <p>TOPIC 5 - Investigating Properties of Minerals</p> <ul style="list-style-type: none"> • Investigate difference between rocks and minerals • Read and Fill Out Comprehension Worksheet as a class • Read textbook pages 160-162 • Video - Properties of Minerals • Moh's Scale of Mineral Hardness • Mineral Sort worksheet - Observe and record different properties of minerals using the proper tools • Growing our own crystals hands on activity <p>OUTCOME RM4.2</p>	<p>Approx. 3 Lessons</p>
<p>TOPIC 6 - Uses of Rocks and Minerals</p> <ul style="list-style-type: none"> • Brainstorm as a class different ways we use rocks and minerals (word web) • Read pages 166-168 in Textbook together • Fill out “used of Rocks and Minerals” worksheet in small groups • Video: Minerals in your daily life (which ones surprised you?) • Investigate Indigenous People’s of Canada’s use of rocks and minerals • Rocks as Tools reading from Royal Sask Museum • Inukshuk Video • https://www.cbc.ca/kidscbc2/the-feed/do-you-know-what-an-inukshuk-is Inukshuk • Possibly create our own Inukshuks? • In pairs, individually research an assigned mineral (where is it found, what is it used for?) 	
<p>TOPIC 7 - Rocks and Minerals in Saskatchewan & Mining</p> <ul style="list-style-type: none"> • Read Textbook Pages 184-185 together • Complete the “Saskatchewan Minerals” worksheet as a class • Jigsaw activity - groups will research different careers in Saskatchewan that incorporate rocks and minerals. Each group will present their findings to the class • Read Textbook Pages 188-191 together OR 	<p>Approx 3 Lessons</p>

<ul style="list-style-type: none"> • Literacy textbook pages 124-125 • How can we recycle/reuse rocks? • Use the “For or Against” worksheet to facilitate a Class Discussion • Assessing our own use of rocks and minerals - Textbook activity on pg 191 - Voting about the mine 	<p>Quiz - 1 Lesson</p>
<p>QUIZ ON OUTCOME RM4.2</p>	<p>Approx 2-3 Lessons</p>
<p>OUTCOME RM 4.3</p>	<p>Approx 2-3 Lessons</p>
<p>TOPIC 8 - Landforms and Landscapes</p> <ul style="list-style-type: none"> • Read pages 176-177 together • Activity on Textbook Page 177 - (Creating a landform out of clay, popsicle sticks sand, pencil crayons) Use “landscape or landform model” worksheet to help plan. Students can research and pick a landform/landscape of their choosing. Partners or small groups • Literacy textbook pages 113-114 (example of how valleys are formed?) 	<p>Approx 2-3 Lessons</p>
<p>TOPIC 9 - Weathering and Erosion</p> <ul style="list-style-type: none"> • Weathering and Erosion Video • Read textbook pages 178-179 as a class • After reading textbook pages, fill out worksheet “Comparing weathering and Erosion” as a class. • Hands on Activity - Candy Erosion Experiment 	<p>Approx 2-3 Lessons</p>
<p>TOPIC 10 - Fossils</p> <ul style="list-style-type: none"> • Read Pages 170-173 in The textbook OR • Literacy text pg 119-121 • Fossil Worksheet independently or in small groups • Royal Sask Museum Fossil Information - Possible Field Trip? • Read pages 174-175 in textbook • Hands on activity - Create our own fossils 	<p>Approx. 1-2 Lessons</p>
<p>REVIEW/REFLECT</p> <ul style="list-style-type: none"> • Virtual Scavenger Hunt • Fill out self reflection on the unit • Maybe - Task Cards • Crossword/Word Search 	<p>Quiz - 1 Lesson</p>

<p>QUIZ/Assignment ON OUTCOME RM4.3</p>	
<p>How will you cause students to reflect and rethink? How will you guide them in rehearsing, revising, and refining their work based on your essential questions and enduring understandings?</p>	
<ul style="list-style-type: none"> • Encourage self reflections throughout unit 	
<p>How will you help students to exhibit and self-evaluate their growing skills, knowledge, and understanding throughout the unit?</p>	
<ul style="list-style-type: none"> • Give students the opportunity to engage in hands on experiments and investigations to demonstrate their learning • Encourage students to work together to gain different insight/opinions on findings 	
<p>How will you tailor and otherwise personalize the learning plan to optimize the engagement and effectiveness of ALL students, without compromising the goals of the unit?</p>	
<ul style="list-style-type: none"> • Completing worksheets/activities in a variety of ways. Some will be as a class, some will be in pairs/small groups, and some will be independent. • Consistent formative assessment will allow me to see who may be struggling with the content 	

Adapted from: Wiggins, Grant and J. McTighe. (1998). *Understanding by Design*, Association for Supervision

Brochure Rubric - Outcome RM4.1

Name: Mark /16	Not Yet Meeting	Beginning to Meet	Meeting Outcomes	Enriched Understanding
Sedimentary Description	An explanation of the formation of sedimentary rock has not been attempted.	An explanation of formation of sedimentary rock has been attempted. Some evidence of understanding.	Student has successfully described the formation of sedimentary rock. A drawing is included	In depth and detailed description of the formation of sedimentary rock. A coloured drawing is included
Metamorphic Description	An explanation of the formation of sedimentary rock has not been attempted	An explanation of formation of metamorphic rock has been attempted. Some evidence of understanding.	Student has successfully described the formation of metamorphic rock. A drawing is included	In depth and detailed description of the formation of metamorphic rock. A coloured drawing is included.
Igneous Description	An explanation of the formation of Igneous rock has not been attempted	An explanation of formation of igneous rock has been attempted. Some evidence of understanding.	Student has successfully described the formation of igneous rock. A drawing is included	In depth and detailed description of the formation of igneous rock. A coloured drawing is included.
Layout	Little to no effort/creativity in design/layout of brochure	Some effort/creativity in design/layout of brochure	Evidence of effort/creativity can be seen in the design/layout of the brochure.	Excellent use of effort/creativity in design layout
Interesting facts	Student has not included interesting facts on their brochure	Student has included 1-2 facts on their brochure.	Student has included 3-4 interesting facts on their brochure	Student has included 3-5 interesting and detailed facts on their brochure

Time to explore some articles on seesaw

<https://www.cbc.ca/kidscbc2/the-feed/mountains-lets-celebrate-these-ancient-formations>

<https://www.cbc.ca/kidscbc2/the-feed/gems-crystals-and-semi-precious-stones>

<https://www.cbc.ca/kidscbc2/the-feed/best-dinosaur-fossil-ever-discovered-in-alberta>

<https://www.cbc.ca/kidscbc2/the-feed/volcanic-eruptions>