

Bachelor of Education (Elementary) & Bachelor of Education (Secondary) STEM Unit Plan Template

Unit Title: <u>Integration Unit</u>	Number of Lessons <u>10</u> <u>Science / Art /</u>	Time (in weeks): <u>4 weeks</u>
Name: <u>Lacey Smith</u>	Subject(s): <u>Math / LA</u>	Grade(s): <u>3/4</u>

Rationale

This unit is important because students get to learn about how the Earth's movement directly affects life here on Earth. Students get to explore this concept through an integration of science, art, math, social studies, and language arts. Students will learn the basics of Earth's daily rotation, its yearly orbit around the sun, and the orbit of the moon around the Sun along with moon phases. There are plenty of hands-on activities, group work, and opportunities for reflection and critical thinking in this unit.

Overview:

Lesson 1: Earth Rotations: 45 mins – 1 hour

In pairs, students use a map and become a model of the Earth to demonstrate what a daily Earth rotation. While they do this, they fill out a worksheet and answer questions.

Lesson 2: How fast does the Earth spin: 45 mins – 1 hour

Students participate in a CGI math lesson to find out how fast the Earth spins around its axis. They will also discuss why we don't notice the movement.

Lesson 3: Secwepemc story of Day and Night and Agamographs: 1 hour – 1 hour 15 mins

Students listen to Ken Thomas tell the Secwepemc story of Day and Night. They will create agamographs based on the story.

Lesson 4: Seasonal Changes and Earth's Axis of Rotation - 1 hour

Students play a game of Guess the Season based on evidence from pictures. Then they demonstrate the elliptical yearly movement of the Earth around the Sun.

Lesson 5: Universe in a Box! 1 hour

In this lesson, students learn about how and why constellations change in the night sky depending on the season by making a Universe in a Box model.

Lesson 6: Polar Day and Polar Night creative writing: 1 hour – 1 hour 20

The effects of seasonal changes --> equator vs North and South Poles --> what are the effects here on earth? What would 24 hours of night time feel like? What would 24 hours of day time feel like? Journal about it! Language arts connection.

Lesson 7: Secwepemc Calendar/Seasonal Rounds: 1 hour

What activities do Secwepemc peoples participate in during different seasons? Based on the Secwepemc 13 months lunar calendar, students participate in a game of charades to communicate those activities to their peers in a fun drama game.

Lesson 8: Phases of the Moon Model: 1 hour

Students model the phases of the moon using an orange and a flashlight. They also create a class wide KWL chart regarding the phases.

Lesson 9: Lunar Cycle Model Art! : 1 hour

Students make a watercolour resist model of the lunar cycle using crayons, watercolours, and construction paper.

BONUS LESSON 10: Spinning Earth : 50 mins

Students make a spinning Earth model.

CORE COMPETENCIES

Communication	Thinking	Personal & Social
<p>Communicating <i>Connecting and engaging with others</i> Students engage in informal and structured conversations in which they listen, contribute, develop understanding and relationships, and learn to consider diverse perspectives. - Students will participate in class discussions and table discussion</p> <p><i>Focusing on intent and purpose</i> Students communicate with intention and purpose. - Students will engage with the topic and communicate intentionally regarding the question prompts in class discussions</p> <p><i>Acquiring and presenting information</i> Students communicate by receiving and presenting information. - Students receive content and use the knowledge offered to make inferences and discuss solutions</p> <p>Collaborating <i>Working collectively</i> Students combine their efforts with those of others to effectively accomplish learning and tasks. - In group or pair tasks students work together to solve problems</p> <p><i>Determining common purposes</i> Students develop shared</p>	<p>Creative Thinking <i>Generating and incubating</i> Students may generate creative ideas through free play, engagement with other's ideas, or consideration of a problem or constraint, and/or because of their interests and passions. - Students use creative thinking during problem solving activities</p> <p>Critical and Reflective Thinking <i>Analyzing and critiquing</i> Students learn to analyze and make judgments about a work, a position, a process, a performance, or another product or act. - Students will complete a self-reflection in one lesson</p> <p><i>Designing and developing</i> Students think critically to develop ideas. Their ideas may lead to the designing of products or methods or the development of performances and representations in response to problems, events, issues, and needs. - Students use critical thinking to address problem solving activities</p> <p><i>Reflecting and assessing</i> Students apply critical, metacognitive, and reflective thinking in given situations, and relate this thinking to other experiences, using this process to identify ways to improve or adapt their approach to</p>	<p>Positive Personal and Cultural Identity <i>Understanding relationships and cultural contexts</i> Students understand that their relationships and cultural contexts help to shape who they are. This includes culture in its broadest sense, including how one identifies in terms of ethnicity, nationality, language(s), abilities, sexual orientation, gender identity, age, geographic region, and religious or spiritual beliefs. Students explore who they are in terms of their relationship to others and their relationship to the world (people and place) around them. - Students get a chance to learn Secwepemc cultural knowledge alongside scientific content and the two are treated as equally valuable lenses to understand the world around them</p> <p><i>Identifying personal strengths and abilities</i> Students acknowledge their strengths and abilities, and they intentionally consider these as assets, helping them in all aspects of their lives. - Students complete a self-reflection where they have the opportunity to reflect on and identify strengths in their work</p> <p>Social Awareness and Responsibility <i>Building relationships</i> Students build and maintain</p>

understandings of information, issues, situations, and problems in pursuit of common purposes and goals. - when students are working in groups they know they are working towards the same goal	learning. - Students participate in a self-reflection and also do a reflective and creative writing assignment	diverse, positive peer and intergenerational relationships. - there is opportunity in this unit for peers to work in pairs and small groups where they get to build relationships while solving problems
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BIG IDEAS

(multiple subject areas for integrated unit)

Subject Name	Subject Name	Subject Name
Science: The motions of Earth	Art: Dance, drama, music, and	Language Arts: Exploring stories and

LEARNING STANDARDS

Curricular Competencies	Content
Science 4:	Science 4:

Prerequisite Concepts and Skills:

- Paragraph writing
- Descriptive writing and imagery
- Basic understanding that Secwepemc peoples have lived here since time immemorial and that they have a distinct culture and historically have lived off the land
- Multiplication and division facts to 10

Teacher Preparation Required:

Lesson #	Teacher Preparation Required (See Unit Plan Sample)
Lesson 1	<p>Materials per partners:</p> <ul style="list-style-type: none"> - Two colours of crayons – one yellow and one colour of choice - Scissors - Tape <p>Teacher demonstration:</p> <ul style="list-style-type: none"> - Timelapse sunrise and sunset video: https://www.pbslearningmedia.org/resource/ess05.sci.ess.eiu.riseset/observe-sunrise-and-sunset/ - Globe - Flashlight - Legoman - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing <p>Print</p> <ul style="list-style-type: none"> - Two maps worksheet: https://docs.google.com/presentation/d/1X1DcP-VPv6l41_NGq8Cm0W3oavPFUwhxra8_j4KoFtY/edit?usp=sharing - One sun model: https://docs.google.com/presentation/d/1OLku401XCUAUjWgDUAhFfAEnRJUmV6gaToTkb8Kt1Y/edit?usp=sharing - Worksheet to fill in partners: https://docs.google.com/document/d/1ZjkR6EeF-VqaKcXP_vd4prjtR98otEjSgiaG7A8kCng/edit?usp=sharing
Lesson 2	<ul style="list-style-type: none"> - Popsicle sticks names for groups - Whiteboard marker for each student (each student in a group should have a different colour)

	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing
Lesson 3	<ul style="list-style-type: none"> - Ken Thomas Secwepemc Day and Night story: Day and Night by Ken Thomas - YouTube - Whatever colouring medium that students prefer, crayons, pencil crayons, or markers - Black marker to outline drawings - Pencil for initial sketch - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing <p>Print</p> <ul style="list-style-type: none"> - Agamograph template: Agamograph template - Blank agamograph: Blank agamograph - Day and Night agamograph: Day and night agamograph
Lesson 4	<ul style="list-style-type: none"> - Video link 1: How can the Sun tell you the season? (mysteryscience.com) - Video link 2: https://mysteryscience.com/astronomy/mystery-3/seasonal-changes-shadow-length/76#slide-id-1160 - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing - Globe - Bright flashlight
Lesson 5	<ul style="list-style-type: none"> - Scissors - Glue stick or tape - ruler - Brad pin for template - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing <p>Print</p> <ul style="list-style-type: none"> - Template for activity: https://docs.google.com/presentation/d/16B1eyYh1JFBHW_y_q1dcwS-cQSSOVHGbCM71WRiS05o/edit?usp=sharing
Lesson 6	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing - Globe - Bright flashlight - Polar day video: https://www.youtube.com/watch?v=oGlx9stITXY - Polar night video: https://www.youtube.com/watch?v=r_g5i2YRC0o - Writing journals
Lesson 7	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing - Secwepemc calendar: 1 - The Secwepemc Calendar Activity Book - Google Docs - Doc for print and cut out Secwepemc activities: https://docs.google.com/document/d/18_jeD1PS2hbA-NjCzTCnjgP9eSrmpP16clvX_TtsSIQ/edit?usp=sharing
Lesson 8	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing - Moon phases slides and video from mystery science: Why does the Moon change shape? (mysteryscience.com) - One flashlight per pair - One piece of fruit (orange) per student - One wooden skewer per pair - Video demonstration of moon phases model: Why does the Moon change shape?

	mysteryscience.com - Post demonstration video: Why does the Moon change shape? (mysteryscience.com)
Lesson 9	- Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing - Watercolour paper - Watercolours - Paintbrushes - Small cups and large cups for tracing - Cups of water - Yellow construction paper - Pencils - Sharpies for outlining moon phase names - White crayons - Coloured crayons - Glue Print - Self-assessment: https://docs.google.com/document/d/1f61D_LYBCgVfkt8w9hwlmrM8U_Y_r-R7Mx5FJt2ZrL4/edit?usp=sharing
BONUS LESSON 10	- Earth templates: spinning paper earth craft US Letter.pdf - Glue - Pre-cut strings of various colour - Beads - Scissors - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing

Cross-Curricular Connections:

In this unit, students explore the Earth and moon's movements through art, social studies, math, science, language arts, and Indigenous ways of knowing. Because students learn about a topic through all these lenses, there is more opportunity for engagement and students gain a more holistic understanding.

Indigenous Connections / First Peoples Principles of Learning:

FPPL

- *Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).*

Students do a lot of hands-on tasks in this unit focused on giving them opportunities to experience the concepts through models. There is also an opportunity to be reflective in a journal entry and also in a self-assessment. A sense of place will also be developed as students will learn how our location on Earth affects the concepts being covered in this unit.

- *Learning recognizes the role of Indigenous knowledge.*

In this unit, Indigenous knowledge is presented as a way of understanding the Earth's movements in terms of seasons and daily rotations.

Traditional Secwepemc stories are shared in this unit alongside content on seasonal rounds.

Universal Design for Learning (UDL):

Engagement

- Foster collaboration and community: students get the opportunity to work together in several

lessons in this unit.

- Develop self-assessment and reflection: students will self-assess their artwork on the last lesson

Representation

- Offer ways of customizing the display of information: all lectures will include visuals and slides. All models will be demonstrated. All information will be frontloaded.
- Illustrate through multiple media: students will be shown videos, do demonstrations, and models will be explained

Action and Expression

- Vary the methods for response and navigation: students will show learning through movement, worksheets, and artworks
- Use multiple tools for construction and composition: students will create artworks to demonstrate learning, demonstrate by physical movement models, whiteboard work, and a worksheet

Differentiate Instruction (DI):

- There is flexible seating in the classroom. Student A may use this flexible seating during lectures and explanations because it helps them focus.
- Students A and B struggle with impulse control. Supplies will be withheld from all students until after instructions are given
- Student C has hearing sensory sensitivity. During work time they may use noise cancelling headphones.

Overview of Lessons:

Lesson 1

Name & Time (Minutes Allotted):	Earth Rotations: 45 mins – 1 hour
Learning Standards: Curricular Competencies	Science 4: <ul style="list-style-type: none"> - Make observations about living and non-living things in the local environment - Experience and interpret the local environment - Observe objects and events in familiar contexts
Learning Standards: Content	Science 4: <ul style="list-style-type: none"> - local changes caused by Earth's axis, rotation, and orbit - the effects of the relative positions of the sun, moon, and Earth including local First Peoples
Instructional Objectives	Students will be able to: <ul style="list-style-type: none"> - Demonstrate which direction the Earth rotates - Explain how the Earth rotations cause the Sun to appear to rise and to set each day
Assessment:	Each student group will demonstrate the answer to each question to the teacher as the teacher walks. The teacher will take notes on level of understanding for each group.
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who demonstrate appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the straws are pulled, the whole class receives free time)
Materials:	Materials per partners: <ul style="list-style-type: none"> - Two colours of crayons – one yellow and one colour of choice - Two maps worksheet: https://docs.google.com/presentation/d/1X1DcP-VpV6l41_NGq8Cm0W3oavPFUwhxra8_j4KoFtY/edit?usp=sharing - One sun model:

	https://docs.google.com/presentation/d/1OLku401XCUAUjWgDUAhFfAEnRJIUmV6gaToTk ring <ul style="list-style-type: none"> - Worksheet to fill in partners: https://docs.google.com/document/d/1ZjkR6EeF-VqaKcXP_vd4prjtR98otEjSgiaG7A8kCng/edit?usp=sharing - Scissors - Tape <p>Teacher demonstration:</p> <ul style="list-style-type: none"> - Timelapse sunrise and sunset: https://www.pbslearningmedia.org/resource/ess05.sci.ess.eiuriseset/observe-sunrise-and-sunset/ - Globe - Flashlight - Legoman - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing
Lesson Activities:	
Introduction/Hook:	<p>Watch time lapse video of the sun rising and setting then have class discussion with the following questions:</p> <p>https://www.pbslearningmedia.org/resource/ess05.sci.ess.eiuriseset/observe-sunrise-and-sunset/</p> <ol style="list-style-type: none"> 1) Why does it look like the Sun is moving? 2) Which way would you face to look in the direction of the Sun in the morning? In the middle of the day? In the afternoon? 3) Do any other objects in the sky seem to move in the same way as the Sun? Explain.
Body:	<ol style="list-style-type: none"> 1) Students get into partners and fill out the worksheet as they go 2) Each pair collects their materials 3) Colour the sun worksheet yellow 4) Colour a dot roughly where you live, then hold the papers together, match them up to the light on the other map 5) Write the 4 directions on each map: North, South, East, West. 6) Cut along the dotted lines of the map worksheet, match up the maps A and B boxes then tape them together to connect each A box and B box together 7) Place the maps over your head with your location on your chest and the opposite map on your back 8) Stand behind a desk with your partner, and put the sun model on the desk. <p>Questions:</p> <ul style="list-style-type: none"> - When you are facing the sun, what time of day is it? - When your back is towards the sun, what time of day is it? - Which direction should you spin to model an Earth rotation? - How many spins will you do to demonstrate 3 days on Earth? - How many hours just went by in those 3 days? - Model how the Earth spins during a sun rise where you live. - What happens on the opposite side of the world when the sun is rising where you live? - Spin to model a sun rise on the opposite side of the world.
Closure:	<p>Teacher demonstration and discussion: Why don't we feel the movement if we're going so fast? It's like we're moving together, the trees, your house, the ground, etc. So we don't notice the movement. We know we're moving though because we can see the sun, the moon, and the stars moving across our sky.</p> <p>Then the teacher will show a demonstration of a globe with a lego man on it where we live and may have a bright light in one spot to represent the sun. Then the lights will go off and the Earth will spin to show the lego man sees in one full rotation of the Earth.</p>

Lesson 2

Name &Time (Minutes Allotted):	How fast does the Earth spin: 45 mins – 1 hour
Learning Standards: Curricular Competencies	Math 4: Reasoning and analyzing

	<ul style="list-style-type: none"> - Use reasoning to explore and make connections <p>Understanding and solving</p> <ul style="list-style-type: none"> - Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving <p>Connecting and reflecting</p> <ul style="list-style-type: none"> - Reflect on mathematical thinking
Learning Standards: Content	<p>Math 4:</p> <ul style="list-style-type: none"> - multiplication and division facts to 100 (introductory computational strategies)
Instructional Objectives	<p>Students will be able to:</p> <ul style="list-style-type: none"> - Calculate the speed of Earth's rotation
Assessment:	<p>Students will be casually assessed for level of understanding based on their communications with each other and to the teacher along with their demonstrations of problem solving on the whiteboard on the first two questions. The last question is above grade level and will be assessed as an extra challenge.</p>
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)
Materials:	<ul style="list-style-type: none"> - Whiteboard space for each group - Random pulling of groups from popsicle sticks names - Whiteboard marker for each student (each student in a group should have a different colour) - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing
Lesson Activities:	
Introduction/Hook:	<p>Watch the video: https://www.youtube.com/watch?v=OuehNbiYisw</p> <p>Explain the formula for calculating speed and leave it on the whiteboard while students complete the body of the lesson.</p>
Body:	<p>Math Questions</p> <p><i>Students complete the following questions at a vertical whiteboard space in randomized groups of 3:</i></p> <ol style="list-style-type: none"> 1) Pretend you've found another planet in a different galaxy. This planet is named Planet Gronkywonky and it spins twice as fast as Earth does. How long is one day on Planet Gronkywonky 2) Pretend you've found another planet called Planet Slowmo. This planet takes 10 times longer to complete one spin than Planet Earth. How many hours is one day on Planet Slowmo? 3) If it takes 24 hours for the Earth to do one complete rotation, how can we figure out how fast the Earth is moving? <p>How many kilometers does the Earth move in one hour?</p> <ul style="list-style-type: none"> - How many kilometers around is the Earth? --> The circumference around the Earth (the distance around the entire equator) is about 39,000 km (24,000 miles). 24,000 miles divided by 24 hours = 1000 miles per hour or 1600 km/hr <p><i>After all groups are finished answering the first question, they get to share with the class how they found the answer. After each group shares,</i></p>

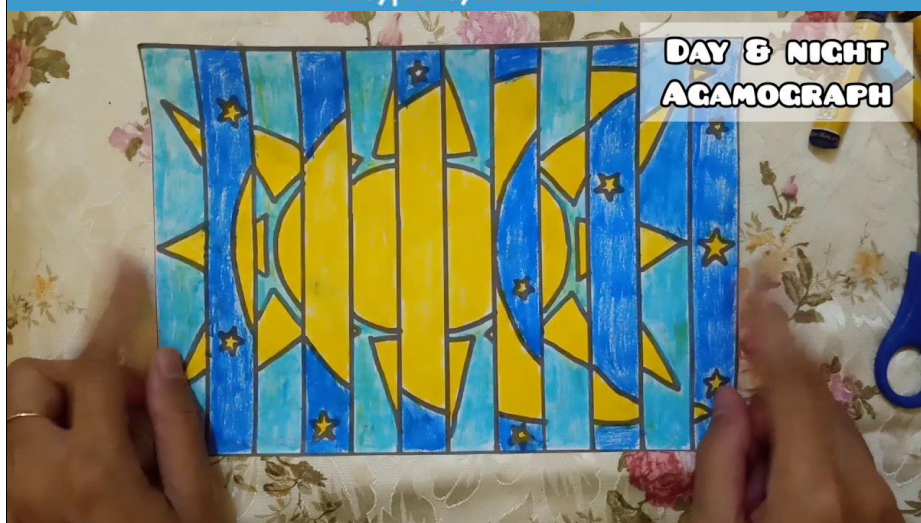
	<i>everyone gets 5 minutes of doodling time on the whiteboard.</i>
Closure:	Reiterate what students learned at the end of lesson 2 and pose the following question to the class and have a brief class discussion: If the Earth is moving at 1600 km/hr, why don't we notice the movement?

Lesson 3

Name & Time (Minutes Allotted):	Secwepemc story of Day and Night and Agamographs: 1 hour – 1 hour 15 mins			
Learning Standards: Curricular Competencies	Science grade 4: - Identify First Peoples perspectives and knowledge as sources of information Arts grade 4: - Choose artistic elements, processes, materials, movements, technologies, tools, techniques and environments using combinations and selections for specific purposes in art making			
Learning Standards: Content	Science grade 4: - the effects of the relative positions of the sun, moon, and Earth including local First Peoples perspectives Art grade 4: - processes, materials, technologies, tools and techniques to support arts activities			
Instructional Objectives	Students will be able to: - Journal about why it's important to have both day and night. - Create an agamograph			
Assessment:	Art will be grades on the following rubric:			
	Emerging	Developing	Proficient	Extending
	Agamograph is incomplete	Agamograph is assembled and original pictures are somewhat defined	Agamograph is correctly assembled and looks effective	Agamograph is exceptionally effective, outstanding use of colour contrast and creative design
	Qualitative feedback will be given in journals.			
Teaching Strategies:	- The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)			
Materials:	- Ken Thomas Secwepemc Day and Night story: Day and Night by Ken Thomas - YouTube - 2 pieces of A4 paper and 1 piece of A3 paper per student - Whatever colouring medium that students prefer, crayons, pencil crayons, or markers - Black marker to outline drawings - Pencil for initial sketch - Agamograph template: Agamograph template - Blank agamograph: Blank agamograph			

	<ul style="list-style-type: none"> - Day and Night agamograph: Day and night agamograph - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing
Lesson Activities:	
Introduction/Hook:	<p>Quick clip of the Game of Night Time Day Time: https://www.youtube.com/watch?v=Ln2Xq8fCNI8</p> <p>In the last two lessons, we learned about the science behind how the Earth rotates. However, science is not the only way of understanding the world around us. Most cultures have their own stories about the Sun, the stars, and day and night. Today we are going to learn about a Secwepemc story about Day and Night.</p>
Body:	<p>Play the video of Ken Thomas Day and Night story: Day and Night by Ken Thomas - YouTube</p> <p>Think, Pair, Share: Why does coyote (sk'elep) think it is important to have both day and night?</p> <p>Like the story, we are going to make an artwork that is made of two different perspectives: the agamograph!</p> <p>After students listen to the story, they will make an agamograph of daytime and night time. They can design their own two pictures to use, or use a template and colour it with their choice of crayons, pencil crayons, or markers. Once the designs are done, students will cut out each strip and paste each picture onto the agamograph template. In this craft, it is important to make the images contrasting in colour. The more different they look, the more each image will show clearly!</p> <p>Examples:</p>

Night and Day Agamograph



Closure:

Exit ticket: Students will answer the following question in their journals:
Why is it important to have both day and night?

Lesson 4

Name & Time (Minutes Allotted):	Seasonal Changes and Earth's Axis of Rotation - 1 hour
Learning Standards: Curricular Competencies	Grade 4 science: <ul style="list-style-type: none"> - Observe objects and events in familiar contexts - Make predictions based on prior knowledge - Make observations about living and non-living things in the local environment
Learning Standards: Content	Grade 4 science:

	<ul style="list-style-type: none"> - local changes caused by Earth's axis, rotation, and orbit - the effects of the relative positions of the sun, moon, and Earth including local First Peoples perspectives
Instructional Objectives	<p>Students will be able to:</p> <ul style="list-style-type: none"> - Demonstrate the movement of the Earth around the Sun using a globe - Identify which season a photo was taken in based on evidence from the photo including shadow length and time of day
Assessment:	There is no formal assessment in this lesson. The teacher will be taking note of conversations and level of understanding of the content.
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)
Materials:	<ul style="list-style-type: none"> - Video link 1: How can the Sun tell you the season? (mysteryscience.com) - Video link 2: https://mysteryscience.com/astronomy/mystery-3/seasonal-changes-shadow-length/76#slide-id-1160 - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing - Globe - Bright flashlight
Lesson Activities:	
Introduction/Hook:	Students play a guessing game where they are shown pictures and have to guess which season those pictures were taken.
Body:	<p>After one round of guessing the season from the picture, students watch the following timelapse video: How can the Sun tell you the season? (mysteryscience.com)</p> <p>Then they will Think Pair Share the following question: What daytime differences did you notice through each seasonal change?</p> <p>They will then watch another video showing how the Sun moves up and down in the sky depending on the season: https://mysteryscience.com/astronomy/mystery-3/seasonal-changes-shadow-length/76#slide-id-1160</p> <p>The teacher will then lecture through some slides explaining the Earth's yearly elliptical movement around the Sun and talk about how direct and indirect sunrays affect the Earth differently.</p>
Closure:	The teacher will then get the class to stand in an elliptical shape and pass around a globe to demonstrate the movement while the teacher stands in the middle and shines a bright light on the globe. The teacher will get the students to stop moving the globe in particular spots and get the students to describe which season would occur in our location and why.

Lesson 5

Name & Time (Minutes)	Universe in a Box: 1 hour
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Allotted):	
Learning Standards: Curricular Competencies	Grade 4 science: <ul style="list-style-type: none"> - Represent and communicate ideas and findings in a variety of ways, such as diagrams and simple reports, using digital technologies as appropriate
Learning Standards: Content	Grade 4 science: <ul style="list-style-type: none"> - local changes caused by Earth's axis, rotation, and orbit - the effects of the relative positions of the sun, moon, and Earth including local First Peoples perspectives
Instructional Objectives	Students will be able to: <ul style="list-style-type: none"> - Build and use a model to identify which constellations can be seen at different times of the year - Use evidence to explain how the Earth rotates around the Sun
Assessment:	Informal assessment of conversation and observations during activity and class discussion.
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)
Materials:	<ul style="list-style-type: none"> - Template for activity: https://docs.google.com/presentation/d/16B1eyYh1JFBHW_y_q1dcwS-cQSsOVHGbCM71WRiS05o/edit?usp=sharing - Scissors - Glue stick or tape - ruler - Brad pin for template - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing
Lesson Activities:	
Introduction/Hook:	Students watch a video then guess which constellations correlate with which seasons.
Body:	<p>Think, Pair, Share style class discussion with each following question:</p> <ul style="list-style-type: none"> - Why do we see different constellations each season? Do you have any ideas that might explain it? - My friend Anthony thought it was because the Earth spins. Do you agree with this idea? Why or why not? <p>Students follow a video guide and create a Universe in a Box model! Then they use the model to answer the following questions:</p> <ol style="list-style-type: none"> 1) What time of year can you see Scorpius? 2) What constellations can you see in March? 3) Why can't you see Orion in the summer? <p>They will Think, Pair, Share each question then each table will offer an answer to the class.</p>
Closure:	The teacher will compile a list on the board based on prior lessons by asking the class: What evidence do you have that the Earth orbits the Sun?

Lesson 6

Name & Time (Minutes Allotted):	Polar Day and Polar Night creative writing: 1 hour – 1 hour 20
Learning Standards: Curricular Competencies	Grade 4 language arts: <ul style="list-style-type: none"> - Consider different purposes, audiences, and perspectives in exploring texts - Use personal experience and knowledge to connect to text and deepen understanding of self, community, and world - Exchange ideas and perspectives to build shared understanding - Communicate in sentences and paragraphs, applying conventions of Canadian spelling, grammar, and punctuation
Learning Standards: Content	Grade 4 language arts: <ul style="list-style-type: none"> - paragraph structure: use of a topic sentence and supporting details - literary devices: sensory detail (e.g., imagery) and figurative language (e.g., metaphor, simile)
Instructional Objectives	Students will be able to: <ul style="list-style-type: none"> - Write a paragraph using sensory detail, imagery, and paragraph structure
Assessment:	Students will be assessed on their paragraphs.
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)
Materials:	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing - Globe - Bright flashlight - Polar day video: https://www.youtube.com/watch?v=oGlX9stlTXY - Polar night video: https://www.youtube.com/watch?v=r_g5i2YRC0o - Writing journals
Lesson Activities:	
Introduction/Hook:	The teacher presents a demonstration of polar day and polar night using a big flashlight and a globe. They then prompt discussion by asking students: <ol style="list-style-type: none"> 1) What do you notice about the sunshine in the Arctic? 2) What do you notice about the sunshine in the Antarctic? The teacher then explains that during the equinox's, the poles receive full day light and full darkness, depending on the season. The full length of the polar night depends on your latitude. The average duration for most destinations is around 30 days, but more northerly locations can enjoy as almost two months of darkness.
Body:	Students watch 2 video timelapses: Polar day: https://www.youtube.com/watch?v=oGlX9stlTXY Polar night: https://www.youtube.com/watch?v=r_g5i2YRC0o Then students brainstorm words for how it would feel to experience a

	<p>polar day, and also a polar night while the teacher writes up the words in two different categories.</p> <p>Then students pick to write a paragraph about what it would be like to experience either a polar day or a polar night.</p> <p>The teacher will also show the rubric for the writing activity to reiterate expectations.</p>
Closure:	Students will have an opportunity to share what they wrote with the class, either their whole paragraph or one sentence.

Lesson 7

Name & Time (Minutes Allotted):	Secwepemc Calendar: 1 hour
Learning Standards: Curricular Competencies	<p>Grade 4 science:</p> <ul style="list-style-type: none"> - Identify First Peoples perspectives and knowledge as sources of information
Learning Standards: Content	<p>Grade 4 socials:</p> <ul style="list-style-type: none"> - the history of the local community and of local First Peoples communities <p>Grade 4 science:</p> <ul style="list-style-type: none"> - the effects of the relative positions of the sun, moon, and Earth including local First Peoples perspectives
Instructional Objectives	<p>Students will be able to:</p> <ul style="list-style-type: none"> - Correlate seasonal changes with local First Peoples cultural activities
Assessment:	Informal assessment on participation and level of understanding of connection between seasons and Secwepemc seasonal rounds.
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)
Materials:	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing - Secwepemc calendar: 1 - The Secwepemc Calendar Activity Book - Google Docs
Lesson Activities:	
Introduction/Hook:	Modification on a KWL chart for what students know about seasonal rounds of the Secwepemc. Instead of a KWL chart, The teacher will put on the board a Medicine Wheel with each season placed in one quadrant of the wheel. The teacher will then ask the students what they know about what kind of activities the Secwepemc peoples would do in each season and fill out the chart.
Body:	The teacher will then use the Secwepemc calendar and read out what Secwepemc peoples traditionally have done and continue to do during specific months of the year. While the teacher goes through each of the 13 moon cycles of the Secwepemc calendar, there will be print outs of each of the activities listed below. When one of the activities comes up, the teacher will ask a student volunteer to put that activity into the correct seasonal quadrant on the medicine

	<p>wheel.</p> <p>Once the wheel is filled out and each month is read out, students will get into groups of two or three. All the activities will be taken off the board and put into a hat. Each group will then pull an activity from the hat. They then will act that activity out silently while the rest of the class must guess what activity it is and which season it belongs in. The person who guesses correctly must put that activity back up on the medicine wheel in the season it belongs</p> <p>Charades activity based on the calendar separated by season:</p> <p>Fall:</p> <ul style="list-style-type: none"> - Moving into pithouses (kekuli) - Sweathouses - Hunting and trapping - Preparing winter clothing <p>Winter:</p> <ul style="list-style-type: none"> - Deer hunting in large numbers - Sharing food and feasting - Ice fishing <p>Spring:</p> <ul style="list-style-type: none"> - Foraging roots, shoots, and berries - Making and repairing mats of bulrush and tule and making baskets from birch tree bark <p>Summer:</p> <ul style="list-style-type: none"> - Trout fishing in lakes - Salmon fishing
Closure:	<p>With all of the activities back up on the Medicine Wheel on the board, the teacher will ask the students to Think, Pair, Share at their table groups where the Earth would be in relation to the Sun during each season. The teacher will draw a Sun in the centre of the Medicine Wheel and then get one person from each table to bring the globe up to the board to show the angle that the earth would be in beside the season.</p>

Lesson 8

Name & Time (Minutes Allotted):	Moon Phases and Model: 45 mins – 1 hour
Learning Standards: Curricular Competencies	<p>Science 4:</p> <ul style="list-style-type: none"> - Make observations about living and non-living things in the local environment - Experience and interpret the local environment - Observe objects and events in familiar contexts
Learning Standards: Content	<p>Science 4:</p> <ul style="list-style-type: none"> - local changes caused by Earth's axis, rotation, and orbit - the effects of the relative positions of the sun, moon, and Earth including local First Peoples perspectives
Instructional Objectives	<p>Students will be able to:</p> <ul style="list-style-type: none"> - Reenact the phases of the moon using a model - Communicate their learning collaboratively through a KWL chart
Assessment:	The KWL chart will act as a preassessment of students' knowledge

	about the lunar cycle.
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)
Materials:	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing - Moon phases slides and video from mystery science: Why does the Moon change shape? (mysteryscience.com) - One flashlight per pair - One piece of fruit (orange) per student - One wooden skewer per pair - Video demonstration of moon phases model: Why does the Moon change shape? (mysteryscience.com) - Post demonstration video: Why does the Moon change shape? (mysteryscience.com)
Lesson Activities:	
Introduction/Hook:	KWL chart: "Tell me everything you know about the moon's phases." The class will collaboratively fill out the Know and Wonder columns of a class wide KWL chart written on the whiteboard.
Body:	<p>The teacher will go through a series of pictures of the phases of the moon and also a video from mystery science while students discuss what they notice about the moon phases.</p> <p>Then, students get into pairs and create a moon phases model with a piece of fruit (likely an orange), a skewer, and a flashlight to re-create the phases of the moon.</p> <p>After the model, students will watch a video of the moon model demonstration with pictures of the actual moon to reiterate their learning.</p>
Closure:	The teacher will redirect the students back to the class wide KWL chart and ask students to complete the chart by explaining what they learned about the moon's phases.

Lesson 9

Name &Time (Minutes Allotted):	Lunar Cycle Model Art! : 1 hour – 1 hour 15 mins
Learning Standards: Curricular Competencies	<p>Science grade 4:</p> <ul style="list-style-type: none"> - Represent and communicate ideas and findings in a variety of ways, such as diagrams and simple reports, using digital technologies as appropriate <p>Arts grade 4:</p> <ul style="list-style-type: none"> - Choose artistic elements, processes, materials, movements, technologies, tools, techniques and environments using combinations and selections for specific purposes in art making

Learning Standards: Content	Art grade 4: <ul style="list-style-type: none">- processes, materials, technologies, tools and techniques to support arts activities Science 4: <ul style="list-style-type: none">- the effects of the relative positions of the sun, moon, and Earth including local First Peoples perspectives																								
Instructional Objectives	Students will be able to: <ul style="list-style-type: none">- Demonstrate their knowledge on the moon phases by creating a watercolour resist art piece.- Assess their work using a rubric																								
Assessment:	Watercolour paintings will be self-assessed with the following rubric: <table><tr><th></th><th>Emerging</th><th>Developing</th><th>Proficient</th><th>Extending</th></tr><tr><td>Moon Phases</td><td>0 – 4 of the moon phases are coloured correctly and in the correct positions.</td><td>The Sun and Earth are in the correct positions. Some of the moon phases are out of order.</td><td>Moon phases, Sun, and Earth are in the correct positions and moon phases are painted correctly according to the model</td><td></td></tr><tr><td>Labels</td><td>0 – 4 of the moon phases are labelled correctly</td><td>5 or more of the moon phases are labelled correctly</td><td>Every moon phase is correctly labeled.</td><td></td></tr><tr><td>Watercolour Resist Technique</td><td>I am beginning to understand the watercolour resist technique and can do it with help</td><td>I understand how to use the watercolour resist technique and it mostly worked</td><td>I am able to use the watercolour resist technique and it worked really well</td><td></td></tr></table>						Emerging	Developing	Proficient	Extending	Moon Phases	0 – 4 of the moon phases are coloured correctly and in the correct positions.	The Sun and Earth are in the correct positions. Some of the moon phases are out of order.	Moon phases, Sun, and Earth are in the correct positions and moon phases are painted correctly according to the model		Labels	0 – 4 of the moon phases are labelled correctly	5 or more of the moon phases are labelled correctly	Every moon phase is correctly labeled.		Watercolour Resist Technique	I am beginning to understand the watercolour resist technique and can do it with help	I understand how to use the watercolour resist technique and it mostly worked	I am able to use the watercolour resist technique and it worked really well	
	Emerging	Developing	Proficient	Extending																					
Moon Phases	0 – 4 of the moon phases are coloured correctly and in the correct positions.	The Sun and Earth are in the correct positions. Some of the moon phases are out of order.	Moon phases, Sun, and Earth are in the correct positions and moon phases are painted correctly according to the model																						
Labels	0 – 4 of the moon phases are labelled correctly	5 or more of the moon phases are labelled correctly	Every moon phase is correctly labeled.																						
Watercolour Resist Technique	I am beginning to understand the watercolour resist technique and can do it with help	I understand how to use the watercolour resist technique and it mostly worked	I am able to use the watercolour resist technique and it worked really well																						
Teaching Strategies:	<ul style="list-style-type: none">- The teacher will have materials prepared prior to lesson.- The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour- Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)																								
Materials:	<ul style="list-style-type: none">- Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1tvwk/edit?usp=sharing- Watercolour paper- Watercolours- Paintbrushes- Small cups and large cups for tracing- Cups of water- Yellow construction paper- Pencils- Sharpies for outlining moon phase names- White crayons- Coloured crayons- Glue																								

	<ul style="list-style-type: none"> Self-assessment: https://docs.google.com/document/d/1f61D_LYBCgVfkt8w9hwlmrM8U_Y_r-R7Mx5FJt2ZrL4/edit?usp=sharing
Lesson Activities:	
Introduction/Hook:	The teacher will draw blank circles on the board in the formation of the diagram that will be used in this lesson. They will label the Sun and the Earth and then ask students where each moon phase would belong. As the phases get identified the teacher will label them appropriately.
Body:	<p>Students build a model of the lunar cycle with a glue-resist technique using watercolour paints, construction paper, and crayons.</p> <p>The teacher will demonstrate the activity at the front of the room step by step with accompanying slides while students follow along. A summary of the steps is as follows:</p> <ol style="list-style-type: none"> 1) Start with the paper horizontal. With a pencil, outline a half Sun on the left side edge of the paper by outlining the big cup at your table. Then put the same cup just right to centre on the paper and outline the entire cup to represent planet Earth. Then take the small cup and use it to outline 8 small circles 2) With a white crayon, fill in all of the bright spaces of each moon phase (the parts that you would see in the night sky!) 3) With crayons, colour in your planet Earth! 4) First, with a paintbrush, dampen your entire paper with just water. Then, choose dark colours like black, purple, and blue to colour in the night sky around your Earth and moon phases. 5) Using the yellow construction paper, cut out a circle using the cup as a tool to outline the sun. 6) Write down the name of each cycle on the yellow construction paper. 7) Then, once your painting is dry, glue the sun onto the edge of the page where you outlined the Sun on step 1. Also, cut out each name and glue it beside the correct moon phase
Closure:	Students self-assess their artwork based on the given rubric.

Lesson 10

Name & Time (Minutes Allotted):	Spinning Earth 50 mins
Learning Standards: Curricular Competencies	<p>Science grade 4:</p> <ul style="list-style-type: none"> Represent and communicate ideas and findings in a variety of ways, such as diagrams and simple reports, using digital technologies as appropriate <p>Arts grade 4:</p> <ul style="list-style-type: none"> Choose artistic elements, processes, materials, movements, technologies, tools, techniques and environments using combinations and selections for specific purposes in art making
Learning Standards: Content	<p>Art grade 4:</p> <ul style="list-style-type: none"> processes, materials, technologies, tools and techniques to support arts activities <p>Science 4:</p> <ul style="list-style-type: none"> local changes caused by Earth's axis, rotation, and orbit
Instructional Objectives	Students will be able to:

Assessment:	Assessment will be casual and based on participation.
Teaching Strategies:	<ul style="list-style-type: none"> - The teacher will have materials prepared prior to lesson. - The teacher will use relational behaviour management strategies and point out students who are modelling appropriate behaviour - Students staying on task will be chosen to pull a straw from the Kerplunk game (once all the marbles fall the whole class receives free time)
Materials:	<ul style="list-style-type: none"> - Slides: https://docs.google.com/presentation/d/1oRdw-ViHzbiQCDL3rTFq5cxm7fJHpyScFBenrA1twk/edit?usp=sharing - Earth templates - Scissors - Glue - Pencil crayons - String - beads
Lesson Activities:	
Introduction/Hook:	The teacher will show the students a model of the craft before students begin. They will then front-load students with the instructions before allowing them to collect materials.
Body:	<p>First, by table groups, students will pick up their templates, beads, yarn, glue, and scissors.</p> <p>Then, students will colour the template with pencil crayons. Then they will cut out each Earth template, fold and glue them in the correct order according to the lettering on the template. Before gluing the last template together, students will place a string in the middle of the template then glue it together. At the top of the string students will tie a loop and at the bottom they will add beads to weigh it down.</p>
Closure:	<p>The teacher will ask the students to Think Pair Share what would make this model more accurate?</p> <p>Looking to spark discussion about the angle of the axis of rotation.</p>

Resources:

- Mystery Science unit on Spaceship Earth: <https://mysteryscience.com/home>
- Secwepemc Calendar Activity Book: https://docs.google.com/document/d/1SW6_0QS1AL5-OEM4rqGIMwIEWDjjwaCfiECZD15LCrc/edit

Extensions to Unit:

This unit could be extended to include lessons on the Earthly effects of the lunar cycle. This unit is a natural progression to talk about waves and tides.

Reflections and Revisions

It is difficult to say how long each lesson will take. I imagine that when I teach this in my practicum class that some things will need more time and that is okay because I will be able to adjust depending on how things are going. Because this is an interesting topic and there are so many ways to teach each aspect of it, if it seems as though students aren't absorbing the material, it would be easy to do another lesson that is similar immediately after a lesson that maybe didn't allow the content to translate for students.