Instructor: Dr. Daniel Lewis Date: May 2025

This unit, the Scientific Method, introduces learners to the scientific method and introduces them to the study of science. Over the course of completing this unit on the scientific method, the students will begin the process of completing Tennessee Science Standard: 7.ETS2.1 – Use appropriate tools and methods to design and conduct scientific investigations. The unit will move learners from an introduction level (Day 1 and 2), through an intermediate level (Day 3 and 4), and to an advanced level (Day 5). Learning objectives for each day draw from the Cognitive, Affective, and Psychometer domains of learning objectives. Each lesson within the unit increases the level of student's learning about the scientific method. The following learning objectives guide each day's learning activities.

Introduction Level (Day 1 and 2)

A. Cognitive/Understand: Learners will explain each step of the scientific method and its purpose in guiding scientific investigations.

B. Affective/Respond: Students will express curiosity and interest in using the scientific method to explore real-world questions.

C. Psychomotor/Guided Response: Learners will construct and label a diagram illustrating the steps of the scientific method.

Intermediate Level (Day 3 and 4)

A. Cognitive/Analyze: Learners will analyze a scientific study to determine how a scientist applied each step of the scientific method.

B. Affective/Valuing: Students will show respect for data accuracy and organization by practicing systematic data recording.

C. Psychomotor/Guided Response: Students will independently apply the scientific method to conduct a guided classroom experiment and record results.

Advanced Level (Day 5)

A. Cognitive/Evaluate: Students will evaluate the effectiveness of their scientific investigation by identifying strengths, errors, and improvements.

B. Affective/Valuing: Students will express appreciation for the scientific method as a reliable tool for solving complex problems.

C. Psychomotor/Characterization by a Value Complex: Students will demonstrate consistent and independent use of the scientific method in planning a self-directed investigation.

Day1: Introduction to the Scientific Method

I. Grade Level and Subject: 7th Grade Earth Science

II. Tennessee Science Standard: 7.ETS2.1 – Use appropriate tools and methods to design and conduct scientific investigations.

III. Topic: Learning how scientists use the scientific method to conduct a scientific investigations.

IV. Learning Objective:

Introduction Level (Day 1 and 2)

A. Cognitive/Understand: Learners will explain each step of the scientific method and its purpose in guiding scientific investigations.

B. Affective/Respond: Students will express curiosity and interest in using the scientific method to explore real-world questions.

C. Psychomotor/Guided Response: Learners will construct and label a diagram illustrating the steps of the scientific method.

V. Specific Learning Theory: Social Learning Theory and Experimental Learning Theory

A. Social Learning Theory: Peer interaction enhances understanding.
B. Experimental Learning Theory described learning as a cyclical process involving four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

V. Materials: The lesson requires the following Materials:

A. PowerPoint slides for Lesson (Appendix A)
B. Scientific Method Flash Cards/ Matching Game (Appendix B)
C. Möbius strip Literature Review (Appendix C)
D. Lab handouts, paper strips, tape, markers, and scissors (Appendix D)

VI. Technology Connection:

Using videos in the classroom

PowerPoint slides for Bell Work, Literature Review, Six Steps of Scientific Method, and Learning Log

Procedure

Lesson Phase	50 Minute Format	80 Minute Format
Bell Work	**5 Minutes** What does it mean to *think like a scientist*? Write 2-3 sentences.	**5 Minutes** What does it mean to *think like a scientist*? Write 2-3 sentences (5 min).
Set Stage for Learning:	**10 Minutes (15)** Students watch video on the scientific method (4:05) https://www.youtube.com/watch?v=SMGRe824kak **5 Minutes (20)** Matching game of the 6 steps of the scientific methos. Students match the name of each step with what is done in each step.	**10 Minutes (15)** Students watch video on the scientific method (4:05) https://www.youtube.com/watch?v=SMGRe824kak **5 Minutes (20)** Matching game of the 6 steps of the scientific methos. Students match the name of each step with what is done in each step.
Developmental Activities	**15 Minutes (35)** Möbius strip Literature Review (Handout) Möbius strip lab (Marasco, 2021): Do experiments 1, 2, 4, and 5. Answer question 1.	**40 Minutes (60)** Möbius strip Literature Review (Handout) Möbius strip lab (Marasco, 2021): Do experiments 1 through 9. Answer questions 1 to 3.
Closure	**10 Minutes (45)** Group activity: Create a visual model (flow chart) of the scientific method.	**15 Minutes (75)** Group activity: Create a visual model (flow chart) of the scientific method.
Exit Ticket	**5 Minutes (50)** Complete a learning log (see Appendix A, lesson 1)	**5 Minutes (80)** Complete a learning log (see Appendix A, lesson 1)

A.

Diversity / Differentiation for Exceptionalities:

A. Learning Styles (modalities / multiple intelligences) – The lesson allows students to complete tasks within auditory, visual, and kinesthetic learning styles.
B. Gender-Friendly Classroom Instructional Approaches – The pictures displayed during the lesson will show both men and women engaged in scientific inquiry.
C. Gifted – Elements of the lesson cater to various gifts. For gifted students in the classroom the lesson will be adapted to allow them to further develop their gifts and explore gifts not yet fully developed. Some more advanced students may be grouped with students who might need help so that they can act as an assistant in learning. Teaching others is a wonderful way to learn.
D. ESL or LEP (Limited English Proficiency) – Electronic documents and websites will be translated using translate.google.com, the Google translate service.
E. LD, ED, ADD or ADHD – The lesson will be modified to meet all IEP requirements for students with special needs.
F. Multicultural Connections – The graphics presented during the lesson will show how people from diverse cultures interact with scientific investigation.

Evaluation/Assessment: Evaluation/Assessment: For this lesson student learning will be evaluated in two main ways. The individual written components and the group task. The following rubric will be used to evaluate student work at the end of the week.

Criteria	20- 15 pts.	14 – 10 pts.	9-5 pts.	< 5 pts.
Accuracy – Does the project contain accurate material?	Fully meets criteria	Mostly meets criteria, but not completely	Barely meets criteria	Fails to meet criteria
Organization – is the project organized in a logical and clear way.				
Completeness - Does the work learning and comprehension.				
Creativity – Did student's work show creativity.				

Biblical Application: For a Christian School setting, the lesson may be intergraded with the concept of the Creation Mandate, Genesis 1:28, the theological concept that outlines humanity's responsibility to care for and manage God's creation. The creation mandate, often understood as a call to explore, develop, and steward the natural world, includes engaging in scientific endeavors. A Science Communicator who understands and embraces the Creation Mandate can effectively convey the wonders of God's creation through scientific discovery while also highlighting the responsibility humans hold to care for our environment. In a secular setting, the need for scientific investigation falls under a general stewardship responsibility for the environment.

Day2: Asking Questions and Forming Hypotheses

I. Grade Level and Subject: 7th Grade Earth Science

II. Tennessee Science Standard: 7.ETS2.1 – Use appropriate tools and methods to design and conduct scientific investigations.

III. Topic: Learning how scientists use the scientific method to conduct a scientific investigations.

IV. Learning Objective:

Introduction Level (Day 1 and 2)

A. Cognitive/Understand: Learners will explain each step of the scientific method and its purpose in guiding scientific investigations.

B. Affective/Respond: Students will express curiosity and interest in using the scientific method to explore real-world questions.

C. Psychomotor/Guided Response: Learners will construct and label a diagram illustrating the steps of the scientific method.

V. Specific Learning Theory: Social Learning Theory and Experimental Learning Theory

A. Social Constructivism: This theory emphasizes that learning is a collaborative process where individuals construct their understanding through interaction and discussion with others.
B. Experimental Learning Theory described learning as a cyclical process involving four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

V. Materials: The lesson requires the following Materials:

A. PowerPoint slides for Lesson (Appendix A)
B. Scientific Method Flash Cards/ Matching Game (Appendix B)
C. Möbius strip Literature Review (Appendix C)
D. Lab handouts (Appendix D)

VI. Technology Connection:

Using videos in the classroom

PowerPoint slides for Bell Work, Literature Review, Six Steps of Scientific Method, and Learning Log

Procedure

Lesson Phase	50 Minute Format	80 Minute Format
Bell Work	**5 Minutes** How do scientists solve problems and answer questions? Write 2-3 sentences.	**5 Minutes** How do scientists solve problems and answer questions? Write 2-3 sentences (5 min).
Set Stage for Learning:	**5 Minutes (10)** Students watch a video on Hypothesis and Rationale (1:40) https://www.youtube.com/watch?v=OvU0qZ4ULZs **10 Minutes (20)** Use PowerPoint slide and flash cards to review the steps of the scientific method.	**5 Minutes (10)** Students watch a video on the scientific method (1:40) https://www.youtube.com/watch?v=OvU0qZ4ULZs **5 Minutes (20)** Use PowerPoint slide and flash cards to review the steps of the scientific method.
Developmental Activities	**15 Minutes (35)** Möbius strip lab (Marasco, 2021): Have students think, pair, and share their results from yesterday's lab. (10 minutes) Read and answer question 4. Read the end of the lab. (5 minutes)	**40 Minutes (60)** Möbius strip lab (Marasco, 2021): Have students think, pair, and share their results from yesterday's lab. (10 minutes) Möbius strip Literature Review (Handout). Students compare their lab results with the literature review and discuss repeatability in science. (10 minutes). Read and answer question 4. Read the end of the lab. (5 minutes) Socratic Seminar about the lab (15 minutes)

Closure	**10 Minutes (45)** Group activity: Revise a visual model (flow chart) of the scientific method, based on new learning.	**15 Minutes (75)** Group activity: Revise a visual model (flow chart) of the scientific method, based on new learning.	**A.**
Exit Ticket	**5 Minutes (50)** Complete a learning log (see Appendix A, lesson 2)	**5 Minutes (80)** Complete a learning log (see Appendix A, lesson 2)	

Diversity / Differentiation for Exceptionalities:

A. Learning Styles (modalities / multiple intelligences) – The lesson allows students to complete tasks within auditory, visual, and kinesthetic learning styles.
B. Gender-Friendly Classroom Instructional Approaches – The pictures displayed during the lesson will show both men and women engaged in scientific inquiry.
C. Gifted – Elements of the lesson cater to various gifts. For gifted students in the classroom the lesson will be adapted to allow them to further develop their gifts and explore gifts not yet fully developed. Some more advanced students may be grouped with students who might need help so that they can act as an assistant in learning. Teaching others is a wonderful way to learn.
D. ESL or LEP (Limited English Proficiency) – Electronic documents and websites will be translated using translate.google.com, the Google translate service.
E. LD, ED, ADD or ADHD – The lesson will be modified to meet all IEP requirements for students with special needs.
F. Multicultural Connections – The graphics presented during the lesson will show how people from diverse cultures interact with scientific investigation.

Evaluation/Assessment: Evaluation/Assessment: For this lesson student learning will be evaluated in two main ways. The individual written components and the group task. The following rubric will be used to evaluate student work at the end of the week.

Criteria	20- 15 pts.	14 – 10 pts.	9-5 pts.	< 5 pts.
Accuracy – Does the project contain accurate material?	Fully meets criteria	Mostly meets criteria, but not completely	Barely meets criteria	Fails to meet criteria

Organization – is the project organized in a logical and clear way.					
Completeness - Does the work learning and comprehension.					
Creativity – Did student's work show creativity.					

Biblical Application: For a Christian School setting, the lesson may be intergraded with the concept of the Creation Mandate, Genesis 1:28, the theological concept that outlines humanity's responsibility to care for and manage God's creation. The creation mandate, often understood as a call to explore, develop, and steward the natural world, includes engaging in scientific endeavors. A Science Communicator who understands and embraces the Creation Mandate can effectively convey the wonders of God's creation through scientific discovery while also highlighting the responsibility humans hold to care for our environment. In a secular setting, the need for scientific investigation falls under a general stewardship responsibility for the environment.

Day 3: Designing and Conducting Experiments

I. Grade Level and Subject: 7th Grade Earth Science

II. Tennessee Science Standard: 7.ETS2.1 – Use appropriate tools and methods to design and conduct scientific investigations.

III. Topic: Learning how scientists use the scientific method to conduct a scientific investigations.

IV. Learning Objective: Intermediate Level (Day 3 and 4)

A. Cognitive/Analyze: Learners will analyze a scientific study to determine how a scientist applied each step of the scientific method.

B. Affective/Valuing: Students will show respect for data accuracy and organization by practicing systematic data recording.

C. Psychomotor/Guided Response: Students will independently apply the scientific method to conduct a guided classroom experiment and record results.

V. Materials: The lesson requires the following Materials:

A. PowerPoint slides for Lesson (Appendix A)
B. Scientific Method Flash Cards/ Matching Game (Appendix B)
C. How could baby dinosaurs live in the Arctic? (Druckenmiller, et al., 2022)

VI. Technology Connection:

Using videos in the classroom

PowerPoint slides for Bell Work, Six Steps of Scientific Method, and Learning Log

Lesson Phase	50 Minute Format	80 Minute Format
Bell Work	**5 Minutes** How do scientists use experiments? Write 2-3 sentences.	**5 Minutes** How do scientists use experiments? Write 2-3 sentences
Set Stage for Learning	**1 Minutes (6)** Students watch: Discovery about the Möbius strip! (1:00 min) https://www.youtube.com/shorts/d9wFmZl_-Nc **14 Minutes (20)** Use the scientific method step flash cards to have the students discuss how the scientific method was used to make a new discovery about the Möbius strip!	**1 Minutes (6)** Students watch: Discovery about the Möbius strip! (1:00 min) https://www.youtube.com/shorts/d9wFmZl_-Nc **14 Minutes (20)** Use the scientific method step flash cards to have the students discuss how the scientific method was used to make a new discovery about the Möbius strip!
Developmental Activities	**20 Minutes (40)** How could baby dinosaurs live in the Arctic? (Druckenmiller, et al., 2022). Read Article as a class (5 minutes). Have students relate the Abstract, Introduction, Methods, Results, and Discussion sections to the steps of the scientific method (15 minutes)	**40 Minutes (70)** How could baby dinosaurs live in the Arctic? (Druckenmiller, et al., 2022). Read Article as a class (5 minutes). What questions were asked in the methods section? How were those questions answered (10 minutes) Have students relate the Abstract, Introduction, Methods, Results, and Discussion sections to the steps of the scientific method (15 minutes) What conclusions were drawn from the results? (10 minutes)

	Closure	**5 Minutes (45)** Students create a concept map of how scientists used scientific methods to learn about baby dinosaurs in the artic. The map should show which observations led to which conclusions.	**5 Minutes (75)** Students create a concept map of how scientists used scientific methods to learn about baby dinosaurs in the artic. The map should show which observations led to which conclusions.	
	Exit Ticket	**5 Minutes (50)** Complete a learning log (see Appendix B. lesson 3)	**5 Minutes (80)** Complete a learning log (see Appendix B, lesson 3)	

A.

Diversity / Differentiation for Exceptionalities:

A. Learning Styles (modalities / multiple intelligences) – The lesson allows students to complete tasks within all multiple intelligences. It also has students do some work in multiple intelligences in which they may not be strong. The show and tell exercise at the end of independent practice showcases the abilities and gifts each student brings to the learning environment.
B. Gender-Friendly Classroom Instructional Approaches – As the teacher discusses the Creation Mandate as a central reason that we study earth science he will emphasize that this was a role for both men and women. The pictures displayed at the start of the lesson will show both men and women engaged in learning about the earth.
C. Gifted – Elements of the lesson cater to various gifts. For gifted students in the classroom the lesson will be adapted to allow them to further develop their gifts and explore gifts not yet fully developed. Some more advanced students may be grouped with students who might need help so that they can act as an assistant in learning. Teaching others is a wonderful way to learn.
D. ESL or LEP (Limited English Proficiency) – Electronic documents and websites will be translated using translate.google.com, the Google translate service.
E. LD, ED, ADD or ADHD – The lesson will be modified to meet all IEP requirements for students with special needs. The activities during the lesson will accommodate students with ADD and ADHD. Components of the lesson will be kept to short time intervals and the types of activities alternated. Gifted students will be paired with special needs children to enhance the learning for both.
F. Multicultural Connections – The graphics presented at the start of the lesson will show how different cultures uses resources found on the earth. Videos also show individuals from

different cultures. During the discussion the teacher will incorporate information on how different worldviews (such as pantheism) can influence how individuals view their relationship to the creation.

Evaluation/Assessment: Evaluation/Assessment: (100 words) For this lesson student learning will be evaluated in two main ways. The task based on student's preferred learning style/ multiple intelligences will be graded using a rubric.

Criteria	20- 15 points	14 – 10 points	9-5points	< 5 Points
Accuracy – Does the project contain accurate material?	Fully meets criteria	Mostly meets criteria, but not completely	Barely meets criteria	Fails to meet criteria
Organization – is the project organized in a logical and clear way.				
Completeness - Does the work show we learn about the earth for practical reasons and it is a responsibility given to us by God.				
Creativity – Did the students use their gifts to express what they had leaned.				

The teacher will also use the learning logs completed during the closure of the lesson to evaluate student understanding and develop further teaching strategies. The first question checks for student's understanding of the purpose of the lesson. The second question has students identify what they learned from the lesson. The third question allows students to ask questions without having to identify themselves. The teacher can answer these questions at the end of the class or the start of the next class. The final question allows the students to give feedback on what worked for them in the lesson and what did not. This allows the teacher to adjust learning to meet student's needs.

Biblical Application: For a Christian School setting, the lesson may be intergraded with the concept of the Creation Mandate, Genesis 1:28, the theological concept that outlines humanity's responsibility to care for and manage God's creation. The creation mandate, often understood as a call to explore, develop, and steward the natural world, includes engaging in scientific endeavors. A Science Communicator who understands and embraces the Creation Mandate can effectively convey the wonders of God's creation through scientific discovery while also highlighting the responsibility humans hold to care for our environment. In a secular setting, the need for scientific investigation falls under a general stewardship responsibility for the environment.

Day4: Analyzing Data and Drawing Conclusions

I. Grade Level and Subject: 7th Grade Earth Science

II. Tennessee Science Standard: 7.ETS2.1 – Use appropriate tools and methods to design and conduct scientific investigations.

III. Topic: Learning how scientists use the scientific method to conduct a scientific investigations.

IV. Learning Objective: Intermediate Level (Day 3 and 4)

A. Cognitive/Analyze: Learners will analyze a scientific study to determine how a scientist applied each step of the scientific method.

B. Affective/Valuing: Students will show respect for data accuracy and organization by practicing systematic data recording.

C. Psychomotor/Guided Response: Students will independently apply the scientific method to conduct a guided classroom experiment and record results.

V. Specific Learning Theory: Social Learning Theory and Experimental Learning Theory

C. Social Learning Theory: Peer interaction enhances understanding.

D. Experimental Learning Theory described learning as a cyclical process involving four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

V. Materials: The lesson requires the following Materials:

A. PowerPoint slides for Lesson (Appendix A)

B. Article: How Could Dinosaurs Live in the Arctic

C. Article: Nesting at extreme polar latitudes by non-avian dinosaurs

VI. Technology Connection:

Using videos in the classroom

PowerPoint slides for Bell Work, Literature Review, Six Steps of Scientific Method, and Learning Log

Procedure

Lesson Phase	50 Minute Format	80 Minute Format
Bell Work	**5 Minutes** Why do scientists collect data? Write 2-3 sentences.	**5 Minutes** Why do scientists collect data? Write 2-3 sentences.
Set Stage for Learning:	**10 Minutes (15)** Students watch a video on Let's Learn About Data (1:31) https://youtu.be/MKP_N9Ipm7Y Discuss how the students collected data and the importance of accurate data (data validity and data reliability) **5 Minutes (20)** Matching game of the 6 steps of the scientific methos. Students match the name of each step with what is done in each step. Discuss the role of data in each step.	**10 Minutes (15)** Students watch a video on Let's Learn About Data (1:31) https://youtu.be/MKP_N9Ipm7Y Discuss how the students collected data and the importance of accurate data (data validity and data reliability) **5 Minutes (20)** Matching game of the 6 steps of the scientific methos. Students match the name of each step with what is done in each step. Discuss the role of data in each step.
Developmental Activities	**15 Minutes (35)** Have students review how data was used in How Could Dinosaurs Live in the Arctic (5 minutes).	**40 Minutes (60)** Have students review how data was used in How Could Dinosaurs Live in the Arctic (5 minutes).

		Have students construct a Vin Diagram comparing and contrasting How Could Dinosaurs Live in the Arctic with Nesting at extreme polar latitudes by non-avian dinosaurs (10 minutes)	Discuss the use of data in that article (10 minutes). Have students construct a Vin Diagram comparing and contrasting How Could Dinosaurs Live in the Arctic with Nesting at extreme polar latitudes by non-avian dinosaurs (10 minutes) Discuss how the second article used data (15 minutes).	**A.**
	Closure	**10 Minutes (45)** Group activity: Create a visual model (flow chart) of the ways scientists use data.	**15 Minutes (75)** Group activity: Create a visual model (flow chart) of the ways scientists use data.	
	Exit Ticket	**5 Minutes (50)** Complete a learning log (see Appendix A. lesson 4)	**5 Minutes (80)** Complete a learning log (see Appendix A, lesson 4)	

Diversity / Differentiation for Exceptionalities:

A. Learning Styles (modalities / multiple intelligences) – The lesson allows students to complete tasks within auditory, visual, and kinesthetic learning styles.
B. Gender-Friendly Classroom Instructional Approaches – The pictures displayed during the lesson will show both men and women engaged in scientific inquiry.
C. Gifted – Elements of the lesson cater to various gifts. For gifted students in the classroom the lesson will be adapted to allow them to further develop their gifts and explore gifts not yet fully developed. Some more advanced students may be grouped with students who might need help so that they can act as an assistant in learning. Teaching others is a wonderful way to learn.
D. ESL or LEP (Limited English Proficiency) – Electronic documents and websites will be translated using translate.google.com, the Google translate service.
E. LD, ED, ADD or ADHD – The lesson will be modified to meet all IEP requirements for students with special needs.
F. Multicultural Connections – The graphics presented during the lesson will show how people from diverse cultures interact with scientific investigation.

Evaluation/Assessment: Evaluation/Assessment: For this lesson student learning will be evaluated in two main ways. The individual written components and the group task. The following rubric will be used to evaluate student work at the end of the week.

Criteria	20- 15 pts.	14 – 10 pts.	9-5 pts.	< 5 pts.
Accuracy – Does the project contain accurate material?	Fully meets criteria	Mostly meets criteria, but not completely	Barely meets criteria	Fails to meet criteria
Organization – is the project organized in a logical and clear way.				
Completeness - Does the work learning and comprehension.				
Creativity – Did student's work show creativity.				

Biblical Application: For a Christian School setting, the lesson may be intergraded with the concept of the Creation Mandate, Genesis 1:28, the theological concept that outlines humanity's responsibility to care for and manage God's creation. The creation mandate, often understood as a call to explore, develop, and steward the natural world, includes engaging in scientific endeavors. A Science Communicator who understands and embraces the Creation Mandate can effectively convey the wonders of God's creation through scientific discovery while also highlighting the responsibility humans hold to care for our environment. In a secular setting, the need for scientific investigation falls under a general stewardship responsibility for the environment.

Day 5: Summary and Review

I. Grade Level and Subject: 7th Grade Earth Science

II. Tennessee Science Standard: 7.ETS2.1 – Use appropriate tools and methods to design and conduct scientific investigations.

III. Topic: Learning how scientists us the scientific method for conduct scientific investigations.

IV. Specific Learning Theory: Social Learning Theory and Experimental Learning Theory

E. Social Learning Theory: Peer interaction enhances understanding.
F. Experimental Learning Theory described learning as a cyclical process involving four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation .

V. Learning Objective:
Intermediate Level (Day 5)

A. Cognitive/Evaluate: Students will evaluate the effectiveness of their scientific investigation by identifying strengths, errors, and improvements.

B. Affective/Valuing: Students will express appreciation for the scientific method as a reliable tool for solving complex problems.

C. Psychomotor/Characterization by a Value Complex: Students will demonstrate consistent and independent use of the scientific method in planning a self-directed investigation.

V. Materials: The lesson requires the following Materials:

A. PowerPoint slides for Lesson (Appendix A)
B. Note cards and writing pens

VI. Technology Connection:

Using videos in the classroom

PowerPoint slides for Bell Work

Diversity / Differentiation for Exceptionalities:

Learning Styles (modalities / multiple intelligences) – The lesson allows students to complete tasks within auditory, visual, and kinesthetic learning styles.
Gender-Friendly Classroom Instructional Approaches – The pictures displayed during the lesson will show both men and women engaged in scientific inquiry.

Gifted – Elements of the lesson cater to various gifts. For gifted students in the classroom the lesson will be adapted to allow them to further develop their gifts and explore gifts not yet fully developed. Some more advanced students may be grouped with students who might need help so that they can act as an assistant in learning. Teaching others is a wonderful way to learn.

ESL or LEP (Limited English Proficiency) – Electronic documents and websites will be translated using translate.google.com, the Google translate service.

LD, ED, ADD or ADHD – The lesson will be modified to meet all IEP requirements for students with special needs.

Multicultural Connections – The graphics presented during the lesson will show how people from diverse cultures interact with scientific investigation.

Evaluation/Assessment: (100 words) Evaluation/Assessment: (100 words) For this lesson student learning will be evaluated in two main ways. The task based on student's preferred learning style/ multiple intelligences will be graded using a rubric.

Criteria	20- 15 points	14 – 10 points	9-5points	< 5 Points
Accuracy – Does the project contain accurate material?	Fully meets criteria	Mostly meets criteria, but not completely	Barely meets criteria	Fails to meet criteria
Organization – is the project organized in a logical and clear way.				
Completeness - Does the work show we learn about the earth for practical reasons and it is a responsibility given to us by God.				
Creativity – Did the students use their gifts to express what they had leaned.				

The teacher will also use the learning logs completed during the closure of the lesson to evaluate student understanding and develop further teaching strategies. The first question checks for student's

understanding of the purpose of the lesson. The second question has students identify what they learned from the lesson. The third question allows students to ask questions without having to identify themselves. The teacher can answer these questions at the end of the class or the start of the next class. The final question allows the students to give feedback on what worked for them in the lesson and what did not. This allows the teacher to adjust learning to meet student's needs.

References

Druckenmiller, P., Erickson, G., Brinkman, D., Brown, C. and Eberle, J. (2021). Nesting at extreme polar latitudes by non-avian dinosaurs. *Current Biology*. https://www.sciencedirect.com/science/article/abs/pii/S0960982221007399

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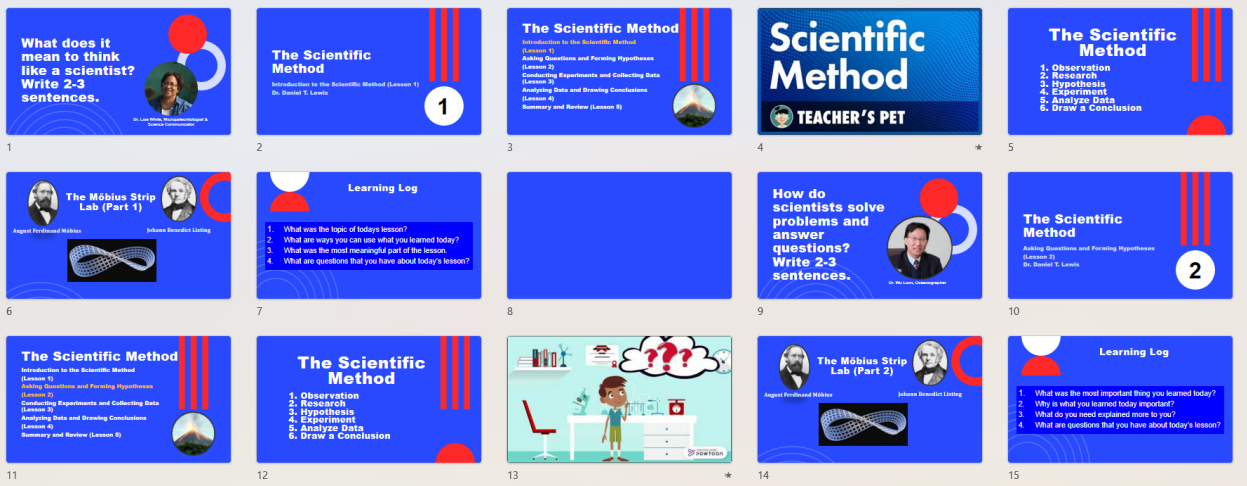
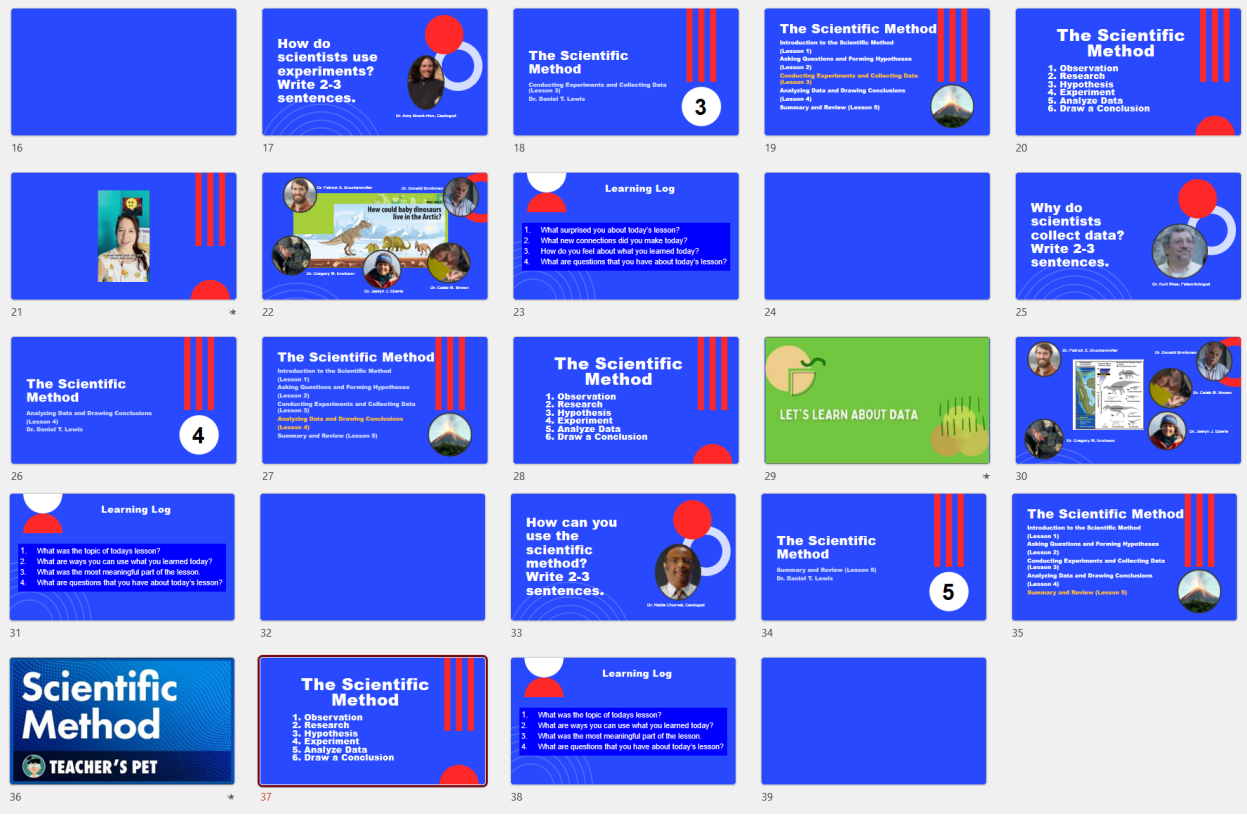
Appendix A:
PowerPoint Slides





Appendix B:
Scientific Method Reading Cards

Overview of the 6 steps of the scientific method
The six steps of the scientific method are:

1. **Observation:** Identify a problem or something you want to learn more about. Often this is based on something you have read and researched. What is a question left unanswered by previous research?
   Example: What is the impact of the rate of burial on fossil preservation?

2. **Research:** Gather information to understand the topic and help form a hypothesis. This is called a literature review. Scientists try to do as much background research as possible, and they try to use as many primary (original) sources as possible.
   Example: Read about how fossils get formed.

3. **Hypothesis:** Based on your research, make an educated guess or prediction that can be tested.
   Example: Would a rapidly buried organism be more likely to become a fossil or a slowly buried organism?

4. **Experiment:** Test the hypothesis with a controlled experiment. Identify variables and use a procedure.
   Example: Collect data on what happens to an unburried organism and a buried organism.

5. **Analyze the Data:** Examine the data from the experiment to see what happened.
   Example: Measure decay of buried and unburried organisms.

6. **Draw a Conclusion**
   Decide whether your hypothesis was supported or not. Communicate the results.
   Example: Rapid burial of organisms helps them get preserved as fossils.

These steps help students understand that science is a systematic way to explore questions and find answers through observation and experimentation. Print them and paste them on cards to create flash cards. Create one set of cards for each group of four students.

Observation	Identify a problem or something you want to learn more about. Often this is based on something you have read and researched. What is a question left unanswered by previous research?
Research	Gather information to understand the topic and help form a hypothesis. This is called a literature review. Scientists try to do as much background research as possible, and they try to use as many primary (original) sources as possible.
Hypothesis	Based on your research, make an educated guess or prediction that can be tested.
Experiment	Test the hypothesis with a controlled experiment. Identify variables and use a procedure.
Analyze the Data	Examine the data from the experiment to see what happened.
Draw a Conclusion	Decide whether your hypothesis was supported or not. Communicate the results.

Appendix C
(Möbius Strip – Short Literature Review)

The Möbius Strip: A Strange and Amazing Shape

The Möbius strip is one of the most fascinating shapes in math and science. It looks like a simple loop, but it has very special and surprising properties. People have been studying the Möbius strip for more than 150 years, and it still amazes scientists, artists, and even magicians!

The History of the Möbius Strip

The Möbius strip is named after a German mathematician named August Ferdinand Möbius. In 1858, he and another mathematician, Johann Benedict Listing, both discovered this strange shape around the same time. They didn't work together, but both noticed that a strip with a half twist had very different properties than a regular loop. Since Möbius wrote more about it, the shape was named after him.

Before Möbius and Listing, people didn't really think much about surfaces like this. Their work helped people understand "topology," which is a part of math that studies the shapes of surfaces and spaces.

What Is a Möbius Strip?

It might look like a regular loop, but it is not. **The Möbius strip has only one side and one edge**. If you start drawing a line along the surface, without lifting your pencil, you will end up where you started—and you will have drawn on both sides of the paper! This shows that the Möbius strip really only has one side.

Also, if you cut a Möbius strip down the middle (longways), something amazing happens. Instead of getting two loops, **you get one bigger loop with a twist in it**. If you cut it again, you get two twisted loops linked together. This surprises a lot of people and makes the strip seem like a magic trick!

Why Is the Möbius Strip Important?

The Möbius strip is not just fun—it is also useful. Scientists and engineers study it to understand surfaces in 3D space. Conveyor belts can use Möbius strips because the twist helps the belt wear evenly on both sides.

Artists like the Möbius strip because it looks interesting and plays tricks on the eye. The famous artist M.C. Escher made drawings inspired by the Möbius strip. Even in science fiction, the Möbius strip shows up as a symbol of infinity or endlessness.

Conclusion

The Möbius strip may look simple, but it has a deep and exciting story. From its discovery in the 1800s to its use in art, math, and engineering today, the Möbius strip continues to inspire people. It teaches us that sometimes, things are not always what they seem—and that even a piece of paper can hold amazing secrets.

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