



Overview: Integrated Curricular Unit with Differentiation	
Unit Title: Navigation and Mapping	
Theoretical Framework: Constructivism Theory, Theory of Experiential Learning	
Unit Theme: Mapping and Landmarks	
Integration Pathway: Coordinates, Latitude, Longitude	
Problem-Solving Task: Use latitudinal and longitudinal coordinates as points of references, relative/absolute location, as well as to create a scavenger hunt for peers during a presentation based on the location of landmarks	
Unit Objectives: <ol style="list-style-type: none"> 1. Students will understand how latitude and longitude are used to identify places on a map or globe 2. Students will be able to define radius as they relate to circles 3. Students will demonstrate using points on a coordinate plane and its relation to latitude and longitude 4. Students will locate and describe real places using latitude, longitude, and cardinal directions 	
Standards/Guidelines/Expectations by Discipline based on Guam’s State Standards following Common Core State Standards	
SOCIAL SCIENCES: <ol style="list-style-type: none"> 1. 5.3.1. Use maps, globes, photographs, pictures, or tables to locate or recognize the following: <ol style="list-style-type: none"> a. Parallels of latitude and meridians of longitude 	
MATHEMATICS: <ol style="list-style-type: none"> 1. 5.OA.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. 	
Introductory Standards for Exposure at Higher Grade Levels: <ol style="list-style-type: none"> 2. 6.RP.3a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. 	
TECHNOLOGY: <ol style="list-style-type: none"> 1. 5.5.1. Give examples of how technology extends the ability of people to make positive and/or negative changes in the world. 	
Discipline 1: Social Studies	Discipline 2: Mathematics
Desired Unit Results	



EXTENSION LESSON: NAVIGATION AND MAPPING

Six As	
1. Authenticity	<ul style="list-style-type: none">● Students will understand coordinates to identify its purpose and how the axes are used to locate a point on a grid● Students will identify and define the radius of a circle and how measurements can be used in navigation● Students will describe a favorite hiding spot and use markers to draw lines of latitude and longitude. Students will recall coordinates to make connections between latitude and longitude and a coordinate plane
2. Academic Rigor	<ul style="list-style-type: none">● Students will discuss their knowledge of the different ways individuals or groups navigate the world
3. Applied Learning	<ul style="list-style-type: none">● Students will keep journal log of countries described in lessons and use concept maps to demonstrate their learning and what they would like to know more about● Students will use their knowledge of latitude, longitude, and coordinates to develop a scavenger hunt for peers● Students will be introduced to terms such as trilateration and recall the use of a radius to identify how satellites are used to determine one's location
4. Active Exploration	<ul style="list-style-type: none">● Students will demonstrate their understanding of latitude and longitude to create their own scavenger hunt using the absolute location of landmarks of their choice● Students will use a globe to find coordinates of a country, and use latitude and longitude to locate a country● Students will research a landmark of their choice
5. Adult Relationships	<ul style="list-style-type: none">● Professionals and enthusiasts within the fields of navigation will be invited to discuss their experiences with students to make connections with learning relative to the real world



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<p>6. Assessment</p>	<ul style="list-style-type: none"> ● Students will be provided with a rubric for formative, summative, culminating, performance, and student choice assessments <ul style="list-style-type: none"> ○ Students will be provided with exit tickets to demonstrate their learning at different proficiency levels ○ Students will be provided with a summative test at the end of the unit to identify their proficiency levels ○ Student will prepare a scavenger hunt of landmarks to demonstrate their understanding through a media presentation of their choice
<p>Essential Questions</p> <p>These questions will help students discover the natural connections among the specific discipline fields:</p> <ol style="list-style-type: none"> 1. How do individuals or groups find their way around the world? 2. Why is navigation important? 3. What are instruments that can be used to navigate? 4. How does math play a role in navigation? 5. How can technology be used to improve navigation? 	
<p>Learners will know:</p> <ol style="list-style-type: none"> 1. The use of latitude and longitude 2. The relationship between coordinates on a graph/grid and latitude and longitude 	<p>Learners will be skilled at:</p> <ol style="list-style-type: none"> 1. Finding locations on a map or globe using latitude and longitude 2. Using latitude and longitude to independently prepare a scavenger hunt for peers

Evidence of Learning	
<p>Evaluative Criteria</p> <ol style="list-style-type: none"> 1. Rubric with performance indicator 2. Exit tickets with performance indicators 3. Observation 	<p>Assessment Evidence</p> <ul style="list-style-type: none"> ● Formative: Exit ticket ● Summative: End of unit with varying questions related to proficiency levels ● Performance Task: Landmark Presentation ● Other Evidence (student choice): Student will choose type of media for presentation



Lesson Plan 1 Summary of Key Learning Interactions and Instruction			
Lesson 1: Introduction to Navigation and Mapping			
Learning Objectives <ol style="list-style-type: none"> 1. Student can identify navigational terms of latitude and longitude 2. Students will demonstrate using points on a coordinate plane 3. Students will locate and describe real places using latitude, longitude, and cardinal directions 			
Terms <i>Latitude</i> - Latitude is the measurement of distance north or south of the Equator. It is measured with 180 imaginary lines that form circles around Earth east-west, parallel to the Equator. <i>Longitude</i> - distance measured by degrees or time east or west from the prime meridian. Coordinate - each of a group of numbers used to indicate the position of a point, line, or plane. <i>Absolute location</i> - A place's absolute location is its exact place on Earth, often given in terms of latitude and longitude. <i>Relative location</i> -Relative location refers to the position of a place or entity based on its location with respect to other locations.			
Formative Assessment: <ol style="list-style-type: none"> 1. <i>Exit ticket</i> - students will be provided with an exit ticket at the end of lesson to identify latitude and longitude (included at end of lesson description). Students will be provided with a prompt of horizontal and vertical lines to identify the latitude runs horizontally and measured from the equator, and the Prime Meridian runs vertically as a line of longitude. 2. <i>Identifying a country's latitude and longitude</i> - students will be prompted to identify the latitude and longitude of a country based on a presentation 3. <i>Observation</i> 			
Summative Assessment: <ol style="list-style-type: none"> 1. Students will use latitude and longitude to find a country or location 2. Students will provide latitude and longitude of a provided country or location 			
Interactions/Activities	Differentiation	Materials/Resources	Field Experiences/Adult Relationships
Description: Students will identify relative and absolute location. Steps: Ask a student to give directions from a nearby location to the school site. When a student uses geographic landmarks, tell them this is an example of <i>relative location</i> or the use of landmarks or a position relative to other places. Ask students how we can find a location more accurately.			



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<p>Introduce or reintroduce latitude and longitude and points of references used to locate a position or location on the Earth.</p> <p>Demonstrate that the lines are used as coordinates, and the intersection of the lines provides the <i>absolute location</i> or a place.</p>			
<p>Description: Students will be asked to identify the location of countries seen in a presentation beginning with solely latitude. Students will then be shown a country and must find the longitude. Students will then identify the location of a country using both latitude and longitude and in the correct order.</p> <p>Ask students to recall the STARBASE Guam lesson regarding navigation and mapping. <i>Ask what types of technologies did we use to help us find geocaches?</i></p> <p>Steps: Students will be introduced to coordinates and a brief history of why it is used and how points on a grid are determined. Identify the equator that splits the northern and southern hemispheres. Identify the Royal Observatory as a location that runs along the Prime Meridian.</p> <p>Use the provided PowerPoint presentation for students to work as a whole group to identify the latitude and longitude or an unnamed country.</p> <p>Beginning with latitude, have students look for the degree that the country falls on.</p>	<p>Intervention: Use of first quadrant only to find a point, Heterogeneous Grouping (Connections to Discipline)</p> <p>Extension: Finding the location of a point or multiple points using (x,y) (Connections to Experience)</p> <p>Intervention: Use of first quadrant only to find a point (Connections to Experience, Discipline)</p> <p>Intervention: Should students require more practice, use a marker to draw a dot on the grid and have students identify the latitude or longitude, or both</p>	<ul style="list-style-type: none"> Coordinate plane with all four quadrants 	<p>Finding coordinates and demonstrating how it can be used to find a location in student's community</p>



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<p>Following latitude, repeat the same process for students to identify the longitude.</p> <p>Have students identify both latitude and longitude or countries.</p> <p>If time permits, use the blank coordinate slide for students to volunteer and plot a point on the grid. As a whole group, students will identify the latitude and longitude on the plane.</p>			
<p>Description: Students will then take notes of a provided landmark along with its coordinates. For example, The Statue of Liberty's coordinates are 40.6892° N, 74.0445° W, have students write coordinates in their journal and one fact about the landmark. Find a location in your local region for students to make greater connections.</p> <p>Steps: Journal Writing: Have students write coordinates of a landmark of your choice in their journal and one fact about the landmark.</p>	<p>Intervention: Students may draw their landmark or find a picture using digital resources; Use of technology to record their findings (Connections to Experience, Discipline)</p> <p>Extension: Students may choose a new landmark of their choice to add to their journal (Integrated Communication)</p>	<ul style="list-style-type: none"> ● Paper ● Writing utensil ● Laptop or tablet 	

Formative Assessment

<p>Exit Ticket</p>	<p>Performance Indicator Provided to Student</p>
<p>FILL IN THE BLANKS</p> <p>The line that moves horizontally and measures north or south of the equator is called _____ . The line that moves vertically and measures west or east of the Prime Meridian is called _____ .</p>	<p>Proficiency Level : 1 Student can identify navigational terms</p>



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Observation

Summative Assessment

Finding location of countries, finding the coordinate of a given country using a globe or map

Proficiency Level : 1 Student can identify navigational terms
Proficiency Level : 2 Student can identify the location of a country given coordinates
Proficiency Level : 2 Student can identify the location of a country given coordinates
Proficiency Level : 3 Student can provide the latitude and longitude of a country identified independently using coordinates
Proficiency Level: 4 Student can explain concepts within the lesson and can identify the relationship between disciplines

Formative Assessment:

1. *Use terminology such as latitude, longitude, coordinate, absolute location, relative locatoin - students will recall latitude and longitude throughout the lesson*
2. *Observation*

Culminating Assessment

	Performance Indicator Provided to Student
Student will utilize terminology discussed within the unit	Proficiency Level : 1 Student can use navigational terms
Student will utilize a globe or map to find hidden objects or locations using latitude and longitudinal coordinates. Group work optional, students will be assessed for individual contributions.	Proficiency Level : 2 Student can use a GPS unit with some assistance
Student will utilize a globe or map to find hidden objects or locations using latitude and longitudinal coordinates. Group work	Proficiency Level : 3 Student can use a GPS unit



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optional, students will be assessed for individual contributions.	independently
Student will utilize a globe or map to find hidden objects or locations using latitude and longitudinal coordinates. Group work optional, students will be assessed for individual contributions.	Proficiency Level: 4 Student can perform previous proficiencies and concepts within the lesson and can speak beyond the topic and can assist others

Lesson Plan 2 Summary of Key Learning Interactions and Instruction

Lesson 2: Reflection and Assessment

Learning Objectives

1. Students will understand how latitude and longitude are used to identify places on a map or globe
2. Students will be able to define radius as they relate to circles
3. Students will demonstrate using points on a coordinate plane and its relation to latitude and longitude
4. Students will locate and describe real places using latitude, longitude, and cardinal directions

Formative Assessment: Using Think-Pair-Share, students will explain a new landmark discussed in lessons using terminology and write down key points of their discussion to be used as an exit ticket

Summative Assessment: Students will respond to questions at different proficiency levels to demonstrate learned knowledge

Culminating Assessment: Students will create a concept map to identify what they have learned based on the main topic of navigation

Performance Assessment/Student Choice: Students will present their project after developing a scavenger hunt using researched landmarks for their peers to find on a globe.

Interactions/Activities	Differentiation	Materials/ Resources	Field Experiences/ Adult Relationships
<p>Description: Students will discuss a new landmark researched using terminology found throughout lessons or prior to discussion, students may research a new landmark of their choice</p> <p>Steps: Students will be given a set amount of time to research and prepare 2-5 sentences describing a new location they found using terminology discussed within</p>	<p>Intervention: Use of digital resources to type responses and research a new landmark; Video; Other Digital Resources (Integrated Communication)</p>	<ul style="list-style-type: none"> ● Paper ● Writing utensil ● Laptop or tablet 	<p>Finding coordinates and demonstrating how it can be used to find a location in student's community and the real world</p>



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<p>lessons. Students will write their findings on a sheet of paper to be turned in as an exit ticket at the end of the lesson.</p>			
<p>Description: Students will work collaboratively to develop a concept map prior to taking a summative assessment</p> <p>Steps: Students will use a concept map to work together and identify the concepts they learned prior to taking a summative assessment as a review</p>	<p>Intervention: Collaboration; Heterogeneous Grouping; Choice of graphic organizer (Connections to Disciplines, Reflection on Learning, Integrated Communication)</p>		<p>Demonstrating how coordinates can be used to find a location in student's community and the real world</p>
<p>Description: Summative Assessment</p> <p>Steps: Students will answer questions that demonstrate proficiency based on tiered levels 1-4.</p>	<p>Intervention: The goal of the assessment will indicate that 85% of students will perform at the level 3 indicator. If students fall below this, the lesson will be extended to bring them to the expected performance before moving onto the next lesson. (Connections to Disciplines, Reflection on Learning)</p> <p>Extension: Pending data from assessment and what concepts need to be revisited</p>	<ul style="list-style-type: none"> ● Assessment tool 	<p>Finding coordinates and demonstrating how it can be used to find a location in student's community and the real world</p>
<p>Description: Performance Assessment and Student Choice (Rubric Scale)</p> <p>Steps: Throughout the lesson, students kept a journal log of landmarks presented at the end of each lesson, with opportunities to choose their own. Students will present their findings to create a scavenger hunt for their peers to find</p>	<p>Intervention: Students will be able to choose their type of media to present to classmates; Reduce number of landmarks needed for final presentation based on students' (Integrated Communication)</p>	<ul style="list-style-type: none"> ● Student choice 	<p>Finding coordinates and demonstrating how it can be used to find a location in student's community and the real world</p>



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the landmarks they are describing. Students will recall latitude and longitude and how to use the paired system to find a location on a globe or map.	Extension: Pending data from assessment and what concepts need to be revisited; Video journal logs or use of other digital resources		
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Formative Assessment - Concept Mapping/Exit Ticket

Proficiency Level : 1 Student can identify navigational terms
Proficiency Level : 2 With assistance, student can identify the location of a country using some terms
Proficiency Level : 3 With some assistance, student can use majority of the terms taught throughout lessons
Proficiency Level : 4 Student can explain the use latitude and longitude and other terms, and explain beyond topics

Summative Assessment

1. The line that moves horizontally and measures north or south of the equator is called _____.	Proficiency Level : 1 Student can identify navigational terms
2. The line that moves vertically and measures west or east of the Prime Meridian is called _____.	Proficiency Level : 1 Student can identify navigational terms
3. Using the globe provided, identify the country with the absolute location 10°00 N, 70°00 W	Proficiency Level : 2 Student can identify the location of a country given coordinates
4. Using the globe provided, identify the country with the absolute location approximately 20°00 N, 160°00 W	Proficiency Level : 2 Student can identify the location of a country given coordinates
5. Find the absolute location of the city of Darwin in Australia.	Proficiency Level : 3 Student can provide the latitude and longitude of a country identified independently using



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	coordinates
6. Explain how latitude and longitude are used in navigation, technology, or other systems of your choice.	Proficiency Level: 4 Student can explain concepts within the lesson and can identify how the relationship between disciplines

Culminating Assessment - See Lesson 2

Performance/Student Choice Assessment

	Rubric Scaled Items Provided to Student
Student kept track of landmarks in a journal to present at the end of the unit, choosing three of their favorite locations for their final project.	3 - indicates student kept a log of all landmarks presented in the lesson 2 - indicates student kept a journal less than one is missing 1- indicates student kept a journal but had two or less landmarks documented 0 - student did not keep a journal
Student researched locations of landmarks of their choosing	3 - indicates student researched at least three landmarks 2 - indicates student researched at least two landmarks 1- indicates student researched at least one landmark 0 - student did not research any landmarks
Student created a global scavenger hunt using three locations of their choosing	3 - indicates student identified coordinates of three landmarks 2 - indicates student identified coordinates of two landmarks 1- indicates student identified coordinates of one landmarks 0 - indicates student did not locate any landmark
Student presented information to their class in a media format of their choosing using landmarks and coordinates	3 - student presented three landmarks and coordinates 2 - student presented two landmarks and coordinates



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	1- student presented one landmarks and coordinates 0 - student did not present (absences may be made up)
Total Possible Points	12





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References:

DuFour, R., DuFour, R., Eaker, R., Many, T. W., & Mattos, M. (2016). *Learning by Doing: A Handbook for Professional Learning Communities at Work*. Solution Tree.

Thoma, J., Hutchison, A., Johnson, D., Johnson, K., & Stromer, E. (2017). Planning for technology integration in a professional learning community. *The Reading Teacher*, 71(2), 167-175. <https://doi.org/10.1002/trtr.1604>

Upu, H., & Bustang. (2021). *Constructivism versus Cognitive Load Theory: In Search for an Effective Mathematics Teaching*.

