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Culturally Relevant Lesson Plan
10/6/23

A. Lesson Rationale:

Math can be a very challenging subject for some students. Demonstrating how math can be seen in everyday life helps to make it relatable and shows students that it has a purpose. Integrating science into math helps students see how math can be involved in other subjects. It also helps students make connections between science concepts that they enjoy and the need for mathematics when solving problems.

Students in 4th grade have not had any exposure to graphing and coordinate planes which means this is going to be a new topic for 5th graders. This unit starts with the very basics so students develop the necessary vocabulary and begin to explore the coordinate grid system. The beginning lessons will focus on plotting an ordered pair and reading the coordinates for a point already graphed. This will help build the foundation for students to make and interpret line graphs.

By the end of this unit, students will be able to graph data on a coordinate grid. They will be able to look at the graph and interpret what the data is representing.

B. Background information:

This lesson is geared towards 10 and 11-year-old students (5th grade). In my class this year I have 19 students with 14 of them male and the other 5 female. Most of my students are from two-parent households, white and affluent backgrounds. A few of my students are from minority groups. I have one African-American student, one Hispanic student, one Indian student, and one Latino student.

My students come to school with many different cultural beliefs about school and how they should perform compared to their peers. One student has verbally stated in the class that she only gets 100 and anything else is failing. One student is a former ELL student who still struggles with vocabulary in science and math. I have two girls who will not speak in front of the class. They quickly respond "I don't know" as their answer when called upon. In math, I currently have two students approaching grade level and five students on the border of approaching and meeting the grade level expectations. No students have IEPs or 504 plans for Math.

C. Highlighted multicultural components:

This is a new concept for all students. I plan for this to be a difficult topic that will require some reteaching for students. For my ELL students, I would provide picture

prompts to help them with their vocabulary. This will give them a visual to better understand the word. For students who are shy and believe that they are not good at math, I will pull them for small groups to provide additional coaching and lots of encouragement.

Students will be given the opportunity to collaborate with their tables and work with a shoulder partner throughout the various components of the lesson. This will help students rely on each other to answer questions and less on the teacher. For students who may be struggling, I will lessen the amount of data they have to work with but are still able to get the point from the activity.

D. Technology component-

For this lesson, students will use their chromebooks to evaluate the NASA data needed to develop the graph. Since students are in the beginning stages of learning how to develop line graphs, I want them to understand the foundations by doing it on paper first. Students who demonstrate mastery in developing a line graph on paper will then be able to explore developing a line graph in google sheets. During the Elaborate stage, students will learn how to input their data into sheets to generate a line graph. Students will make sure to label the axes and add a title.

<u>Title:</u> Line Graphs and Climate Change	
<u>Grade Level</u>	5th Grade
<u>Length</u>	6 days (80 min period)
<u>Standards</u> (New Jersey State Learning Standards)	Math: 5. G.A- Graph points on the coordinate plane to solve real-world and mathematical problems. Science: 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
<u>Essential Questions:</u>	<ul style="list-style-type: none"> ● How does the coordinate system work? ● How do you generate a point on the coordinate grid? ● How can you use data to develop a line graph? ● How can you use a line graph to solve real-world problems? ● How do the Earth's spheres interact? ● How does climate change impact the organisms on Earth?
<u>Objectives</u>	I can graph points on a coordinate plane to solve real-world problems.

	<p>I can make a claim about how two of Earth's spheres work together by using the NASA data to justify my answer.</p> <p>I can describe how climate change impacts the organisms on Earth by using the NASA data to justify my answer.</p>
<p><u>Materials</u></p>	<p>Graph Paper Pencils Chromebooks Coordinate Grid Practice Worksheets</p> <p>Resources:</p> <p>NASA. (2018, December 1). <i>Educator guide: Graphing sea-level trends</i>. NASA. Retrieved July 2, 2022, from https://www.jpl.nasa.gov/edu/teach/activity/graphing-sea-level-trends/</p> <p>NASA. (2018, November 2). <i>Educator guide: Graphing global temperature trends</i>. NASA. Retrieved July 2, 2022, from https://www.jpl.nasa.gov/edu/teach/activity/graphing-global-temperature-trends/</p> <p>NASA. (2021, November 29). <i>Arctic Sea ice minimum</i>. NASA. Retrieved July 2, 2022, from https://climate.nasa.gov/vital-signs/arctic-sea-ice/</p>
<p><u>Lesson Activities</u></p>	<p>Engage</p> <p>Day 1- Pre-assessment: Students will be completing a pre-assessment for line graphs prior to beginning the unit. Students will be presented with data on the arctic sea ice extent. Using this data, students will analyze the line graph. As a table students will work together to analyze the graphed data and answer the following questions.</p> <ul style="list-style-type: none"> ● When was the lowest ice extent? ● When was the highest ice extent? ● What is the overall trend you observe from looking at the data? Why do you think this might be? <p>After about 15 minutes, we will come back as a class to discuss what we are observing from the data.</p> <p><u>Early finishers:</u> Those who finish early can explore the climate kids website.</p>

Explore-**Lesson 1 (day 2)- Introduction to Coordinate System**

Today students will begin by working on interactive notes on the coordinate System. We will discuss the vocabulary (x-axis, y-axis, ordered pair, x-coordinate, y-coordinate) as a whole class.

Students will then go work on rotations while the teacher meets with leveled small groups.

Students will complete an exit ticket to check for comprehension of today's lesson.

- What are the coordinates of H?
- Plot (4,0), (1,5) and (0,6)

Lesson 2- (Day 2) Plotting Data

Today students will be plotting data. They will be given small data sets to practice plotting. We will begin whole class to learn how to plot data. Then we will move to small group instruction and rotations. Students who are struggling will be pulled first to help correct misconceptions.

Students will complete an exit ticket to check for comprehension of today's lesson.

- Plot the data on the grid.

Explain-**Lesson 3 - (Day 3) Line Graphs**

Today students will build on what they learned yesterday. Today we will be taking the data and connecting the points. We will practice one as a class. After graphing the data, we will answer questions about what we see. Then students will go work on additional practice. While the teacher pulls small groups to help struggling students.

Students will complete an exit ticket to check for comprehension of today's lesson.

- Look at the line graph, what does the data tell you?

Elaborate-

Lesson 4- (Day 4) Today students will be applying the skills they have learned to a real-world problem. As a class, we will take a look at the Global Warming Data. We will discuss how to approach setting up our graph and labeling the axes. Students will take their time plotting the annual mean temperatures. Once done, students will then use their data to answer questions.

- Is there a trend of global temperature increase or decrease?
- Has this trend been the case over the 136 years? If not, when did the trend change?

Early finishers: Those who finish early can explore the [climate kids website](#) or work on a mystery picture graphing activity.

Lesson 5- (Day 5) Today students will continue practicing graphing data with a new set of data- Sea Level Rise. Students will work with a small group to complete this activity. Students will set the scale, plot the points, and then answer the questions about the data.

[Data](#) will be modified so 5th graders only see the information they need to plot.

The questions will be used as students' exit tickets to assess how they are doing with meeting the standards.

Teacher will pull a small group of struggling students to make sure they are set up for the lesson before circling around to the other groups.

Students who demonstrate mastery with developing a graph on paper will be given the opportunity to learn how to develop a line graph in google sheets. Students will input the data and then turn it into a line graph. Students will need to add titles to the axes and give the graph a title.

Early finishers: Those who finish early can explore the [climate kids website](#) or work on a mystery picture graphing activity.

Evaluate-

Lesson 6- (Day 6) As the assessment for this unit, students will be presented with the same data they were given for the pre-assessment. Students will be asked to develop a line graph using the arctic sea ice extent [data](#). Once they are done they will use their graph to answer questions.

- When was the lowest ice extent?
- When was the highest ice extent?
- What is the overall trend you observe from looking at the data? Why do you think this might be?

Teacher will be rotating around the room and helping answer student questions. Students will be expected to complete this activity independently.

Teacher can compare pre-assessment and final assessment to show student growth with the standards.

<p><u>Differentiation</u></p>	<p>Struggling/ On Level:</p> <ul style="list-style-type: none"> ● Small group instruction to help address misconceptions. ● Lessen the amount of data to prevent students from feeling overwhelmed. ● Frequent check ins to check for comprehension <p>Above Level:</p> <ul style="list-style-type: none"> ● Extension activities <ul style="list-style-type: none"> ○ Graph Global Monthly temperature in Google Sheets.
<p><u>Assessment</u></p>	<p>1) Diagnostic assessment: Students will be given some data on Sea Ice Extent and will be asked to develop a line graph using the data. They will then have a few questions to see if they can interpret the data they just graphed.</p> <p>2) Formative assessment: Teacher observation, class discussions, classwork, exit tickets.</p> <p>3) Summative assessment: As the assessment for this unit, students will be presented with the same data they were given for the pre-assessment. Students will be asked to develop a line graph using the arctic sea ice extent data. Once they are done they will use their graph to answer questions.</p> <ul style="list-style-type: none"> ● When was the lowest ice extent? ● When was the highest ice extent? ● What is the overall trend you observe from looking at the data? Why do you think this might be? <p>By the end of the unit, students will be able to graph data and interpret the line graph to help solve real world problems.</p>

Resources:

NASA. (2018, December 1). *Educator guide: Graphing sea-level trends*. NASA. Retrieved July 2, 2022, from <https://www.jpl.nasa.gov/edu/teach/activity/graphing-sea-level-trends/>

NASA. (2018, November 2). *Educator guide: Graphing global temperature trends*. NASA. Retrieved July 2, 2022, from <https://www.jpl.nasa.gov/edu/teach/activity/graphing-global-temperature-trends/>

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