County Implementation Award Program (CIAP) Math and Science Lesson

Unit Title:
Earth's Place in the Universe

Lesson Title:
Can I walk to the Sun?

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Grade Level:
5

Time Frame:
1-2 days

Targeted Standard(s):
5-ESS1 - A: support an argument that the apparent brightness of the sun and stars is due to their relative distance from the Earth.
5NBT.2: Explain patterns in the number of zeros of the product when multiplying by the powers of 10.
5NBT.5: fluently multiply large digits numbers
5MD.1: convert like measurement units within a given measurement system
5MP.2: reason abstractly
5MP.4: model with mathematics

Short Description of Targeted Phenomenon:

Show students the short video of pictures of the Sun. **sun video**

Students can see the sun daily but have little conceptual knowledge about the distance of the earth from the sun. The phenomenon helps students develop the conceptual basis needed to have academic discussions about the earth in relation to the sun.

Three Dimensions of NGSS

Science & Engineering Practice/s (SEP):
Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Support an argument with evidence, data, or a model. (5-ESS1-1)

Crosscutting Concept/s (CCC):

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)

Scale, Proportion, and Quantity

- Natural objects exist from the very small to the immensely large. (5-ESS1-1)

Disciplinary Core Idea/s (DCI):

ESS1.A: The Universe and Its Stars

- The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)

Language Supports:
Students may have difficulty explaining their solutions and strategies for a multistep problem. Consider providing sentence starters to help students communicate their ideas.

- I knew I needed to find_____, so I_____.
- I did _____ because _____.
- The problem asked_____, so I _____.

Materials Needed:
masking tape, yardstick /meter stick or tape measure, calculators, chart paper, markers, stopwatch

Objective(s): Students will be able to:
1. Gain an understanding of the distance between the Earth and the Sun.

2. Use academic discussions to express their ideas about the sun being brighter and hotter the closer they get to it.

3. Gain mastery of converting units of measurement when working with larger numbers i.e. feet - miles, and seconds - minutes - hours - days - weeks - years.

How Math and Science concepts/skills/practices were integrated in this lesson:
Students measure the distance traveled for 10 steps, then they calculate how many steps in a mile. They use their calculations to figure out how many steps to the sun. They also calculate how long it takes them to walk 100 steps and use this information to determine how long it would take them to walk to the Sun. They convert times from minutes-days-weeks-years. They see from the size of their answers the distance to the Sun.

Possible Challenges /Misconceptions:
Students may struggle with the large numbers.
Working in small can pose problems.
Converting within units is a challenging math skill.
Finding a way to present each groups finding to the class.

Formative Assessment:
Students will present their findings to the class and turn in their completed chart. Check the math work and their written explanations on their charts.

Lesson Opening

Teacher Actions	Student Actions
Show students the short video of pictures of the Sun. **sun video** Sort students into groups of 4. This will be the group they will do all this work with. Pass out the 4 corners sheet and colored pencils. Each student should use a different color. Ask students: "What do you know about the sun?" Have students report out what their group came up with.	 Students fill out their corner of the sheet with what they know about the sun. Students share what information their group wrote.
Lesson Introduction	
Teacher Actions	**Student Actions**
"Scientists have just invented an amazing suit that lets you travel through space as if you were still on Earth. You have decided to visit the Sun, but you are not old enough to pilot a spaceship, so you are going to have to walk. " Ask the students: How many steps do you think you would have to take to reach the Sun? How long do you think it would take you to walk to the Sun? Record each student's estimate for a class discussion at the end of the activity.	 Students estimate the number of steps it would take to reach the sun. Students estimate the amount of time it would take them to walk to the Sun.
Body of Lesson	
Teacher Actions	**Student Actions**
How many steps to the Sun? Form groups of four and assign roles (supply coordinator, time manager, note taker, spokesperson).	 Students pick a "walker" for the group and have them walk for 10 steps and measure and record the distance.

Have the supply coordinator pick up a yardstick/ tape measure and 2 pieces of masking tape. Each group uses 1 piece of masking tape as a starting line and uses the second piece of tape to mark where the toes of the "walker" landed at the end of the 10 steps. You need to decide ahead of time if you want the students to measure in centimeters or inches. The note taker needs to record the distance traveled in 10 steps. Distance from Earth to the Sun is 92.96 million miles. Let the students struggle with the math. Productive struggle is a good thing. Do not lead them through the math step by step. You can have a class discussion about what they think they should do. You can give them a simpler problem and have them make the connection to the larger problem. Once the students have determined the number of steps it would take to reach the Sun, they are ready to answer the question, "How long do they think it would take?" The supply coordinator will need to collect and return the yardsticks and throw away the masking tape. The time manager will need a stopwatch to time the 100 steps.	Students use this information to determine the number of steps they would need to take to reach the Sun. Students work as a group to answer the question. The note taker needs to make sure they record all the group's calculations. Determine how many steps the "walker" can take in a minute or how long does it take the "walker" to take 100 steps. Using chart paper record and explain how the group solved this problem.
Lesson Closure	
Teacher Actions Have each group present their work to the class or hang the posters in the room and do a gallery walk where the students take notes about each group's poster. Lead a class discussion with the following questions?	**Student Actions** Students present their work to the class or take notes about the work of the other groups.

How close were you to your estimated answers? Why do you think your estimated answers were so different from your calculated answer? What did you see/feel as you walked closer to the Sun? Is the Sun getting brighter? How do we know? Could you walk to the Sun? Why? Why not? Why are we exploring planets that are farther from the Sun and not closer to the Sun?	Students discuss each question and record their answers.
Summative Assessment: Check each groups poster for the accuracy of their calculations and be on the lookout for common errors. The common errors will make for good math lessons.	
Other Teaching Resources:	
Lab Safety:	
Extensions (if any):	