[Math] Mini-Lesson: Scaling Impact of Trees

*This lesson comes from the **Carbon Sinks** project- found in the A Climate for Change Educator's Toolkit. Visit www.hiclimateprojects.org to view the whole project.*

Jump to:

Teacher Instructions	Standards + Rubric	Student Handouts

Teacher Instructions:

In this lesson, students will use the math skill of "scaling" to scale the impact of different types of carbon sinks.

1. Review the definition of a **Carbon Sink: a forest, ocean, or other natural environment viewed in terms of its ability to absorb (or sequester) carbon dioxide from the atmosphere.**

***Bonus Resource:** Watch the film clip from A Climate to Change and learn from Professor Camilo Mora as he embarks on an ambitious tree-planting project.*

2. Introduce the math skill: ***scaling*** by practicing the scaling impact activity with the following example:

Type of Carbon Sink	**Estimated Amount of CO2** (in pounds) **Sequestered in 1 year by a tree***	**Estimation of Sequestered CO2 in 5 years**	**Estimation of Sequestered CO2 in 10 years** *(this is how long it takes for a tree to get to its most productive stage of carbon!)*	**Average person's CO2 Footprint (worldwide)**	**How big does your carbon sink need to be to offset an average person's footprint?**
Native Hawaiian Tree		240 pounds		4 tons/year	4 Trees = 1 ton/year I need to plant 12 trees to offset 1 person's footprint

**Assumes a constant rate of change*

3. Let students work through the different examples of scaling impact to demonstrate their understanding of the following. As a bonus challenge, they can create their own examples.
   a. *The skill of scaling*
   b. *Visual representation of numbers*
   c. *The difference between the impact of various types of trees planted*

Extension resources for educators to support this thinking:

- How non-native trees actually accelerate the release of carbon
- Understanding how backyard carbon sequestration works
- Research reveals how climate change may affect Hawaiian fishpond aquaculture
- DLNR Environmental Assessment of Loko I'a
- Two brothers talk carbon sequestration

**Please note that this is an area of ongoing research in science. Quantifying carbon sequestration was based on general numbers available with the purpose of giving students a chance to grapple with modeling in mathematics.*

Standards + Rubric:

The following standards can be assessed during this mini-lesson:

CCSS.MATH.CONTENT.7.RP.A.2
Recognize and represent proportional relationships between quantities.

CCSS.MATH.PRACTICE.MP4
Model with mathematics

Use the following single-point rubric to give feedback on, or assess, the Scaling Impact assignment:

Standard/Content/Skill Being Assessed	Feedback for Improvement	Succeeding - Proficient	Feedback Where Work Exceeds the Standard
Formative Assessments			
Recognize and represent proportional relationships between quantities. **(CCSS.MATH.CONTENT.7.RP.A.2)**		Recognized and represented proportional relationships between quantities.	
Model with mathematics. **(CCSS.MATH.PRACTICE.MP4)**		Made assumptions and approximations to simplify complex problems.	

Student Handouts:

Follow the steps to scale the impact of different carbon sinks:

1. Practice calculating Carbon Sink Sequestration Amounts. Follow the steps below:
    a. Complete the estimation chart to calculate your unique carbon sink's impact over time. Fill in the blank boxes
    b. Calculate impact over time using proportional relationships.
        i. **2000 pounds = roughly 1 ton CO2/year**

Type of Carbon Sink	**Estimated Amount of CO2** (in pounds) **Sequestered in 1 year by a tree***	**Estimation of Sequestered CO2 in 5 years**	**Estimation of Sequestered CO2 in 10 years** *(this is how long it takes for a tree to get to its most productive stage of carbon!)*	**Average person's CO2 Footprint (worldwide)**	**How big does your carbon sink need to be to offset an average person's footprint?**
Native Hawaiian Tree		240 pounds		4 tons/year	4 Trees = 1 ton/year I need to plant 12 trees to offset 1 person's footprint
1 x 1 sq. ft Loʻi (Kalo) Patch			22 pounds		
1 x 1 sq. ft garden bed with regenerative garden practices	1.2 pounds				

**Please note that this is an area of ongoing research in science. Quantifying carbon sequestration was based on general numbers available with the purpose of giving students a chance to grapple with modeling in mathematics.*
**Assumes a constant rate of change*

2. Create visual representations of data
    a. Represent projections using a bar graph

TITLE:

Y

A
X
I
S

X AXIS:

3. Calculate the scaled and collective effect of multiple/many carbon sinks. What kind of long term impact might this type of carbon sink have?