THE VALUE OF A TREE

Energy literacy and the link to STEM

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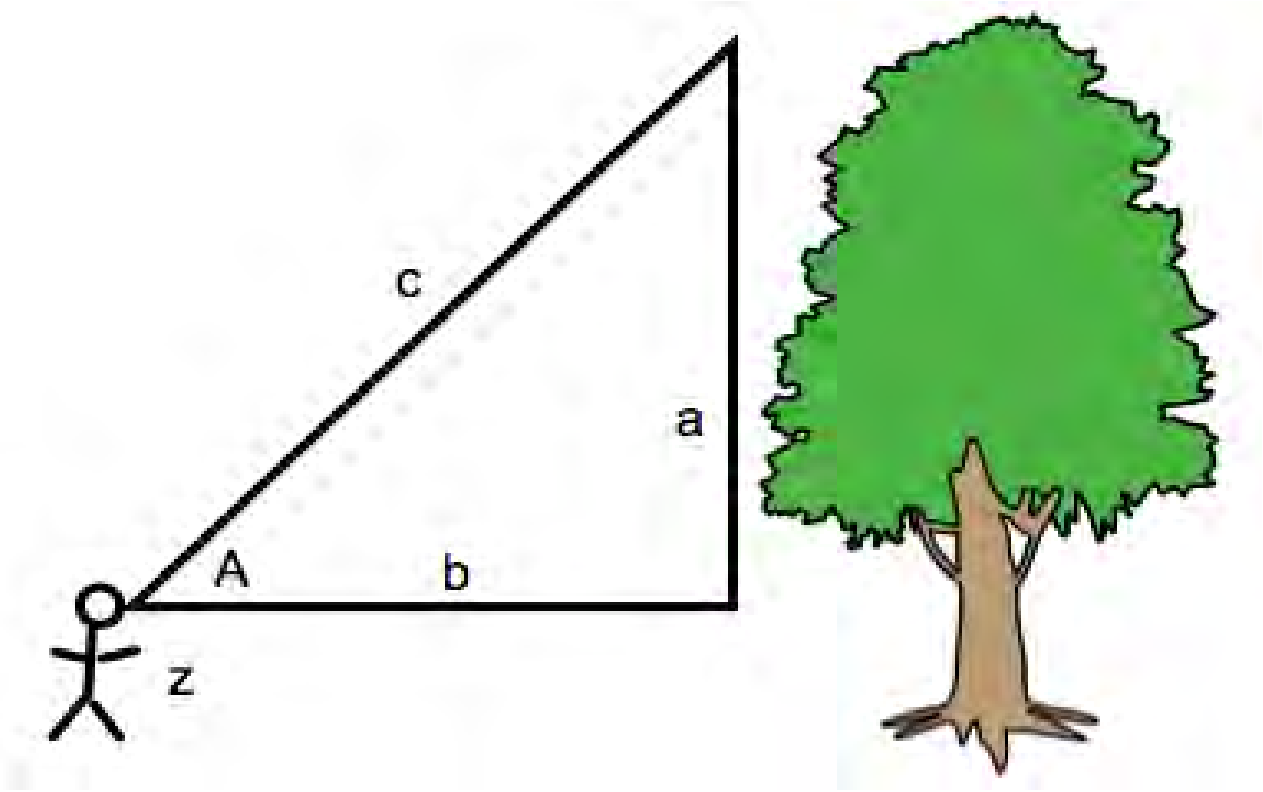
VALUE OF A TREE LESSON

- Objectives:

1. Students will understand how to calculate how much carbon is in a tree by measuring the tree's height, circumference, and age.
2. From this number, students can calculate how much jet fuel can be obtained from that tree and how much carbon it can sequester a year.
3. Students will engage in a complex discussion of deciding how to use our local resources.

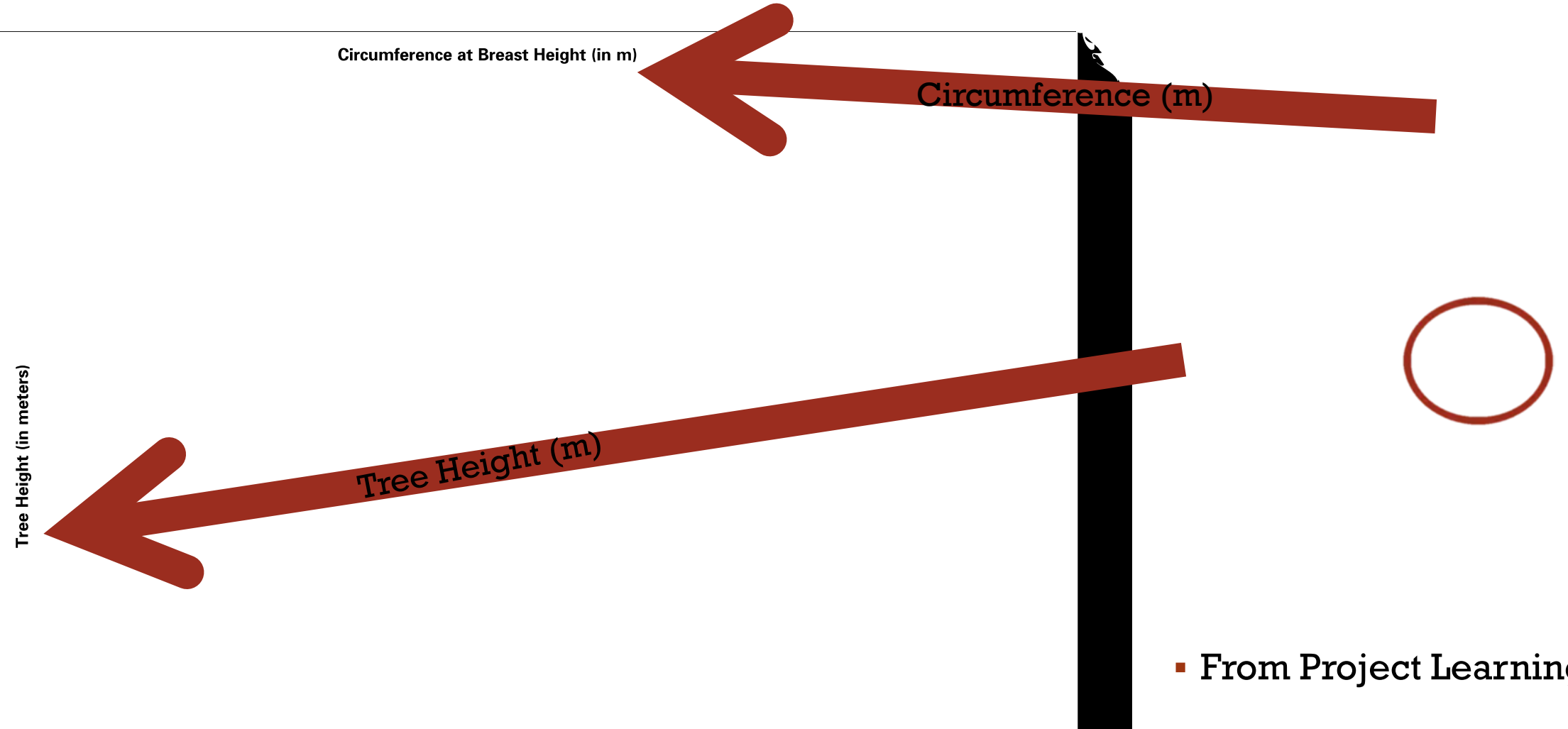
STEP 1: DETERMINE THE HEIGHT OF YOUR TREE



TAN(A)+height(z)=TREE HEIGHT

STEP 2: MEASURE THE CIRCUMFERENCE OF THE TREE

STEP 3: DETERMINE THE AMOUNT OF CARBON IN THE TREE



- From Project Learning Tree

STEP 4: CALCULATE THE WEIGHT OF THE TREE

- Carbon of tree x 2 = W
  - W = _____kg

- Convert to tons: 1kg = 0.0011 ton

  - Wkg x 0.0011=Wton
  - W = _____ tons

STEP 5: DETERMINE AMOUNT OF FUEL AVAILABLE IN TREE

- 1 ton = 50 gallons of jet fuel
  - Wton x 50 = _____gallons of fuel

How Far Can I Fly in a Boeing 747		
Amount of carbon, kg	How far you can fly, miles	Amount of CO2 sequestered, kg
0-500	0-11	1,833
501-1,000	12-22	3,666
1,001-1,500	23-33	5,499
1,501-2,000	34-44	7,333
2,001-2,500	45-55	9,166
2,501-3,000	56-66	10,999
3,001-3,500	67-77	12,832
3,501-4,000	78-88	14,665
4,001-4,500	89-99	16,498
4,501-5,000	100-110	18,331
5,001-5,500	111-121	20,165
5,501-6,000	122-132	21,998
6,001-6,500	133-143	23,831
6,501-7,000	144-155	25,664
7,001-7,500	156-166	27,497

STEP 6: CALCULATE HOW FAR YOU CAN GO!

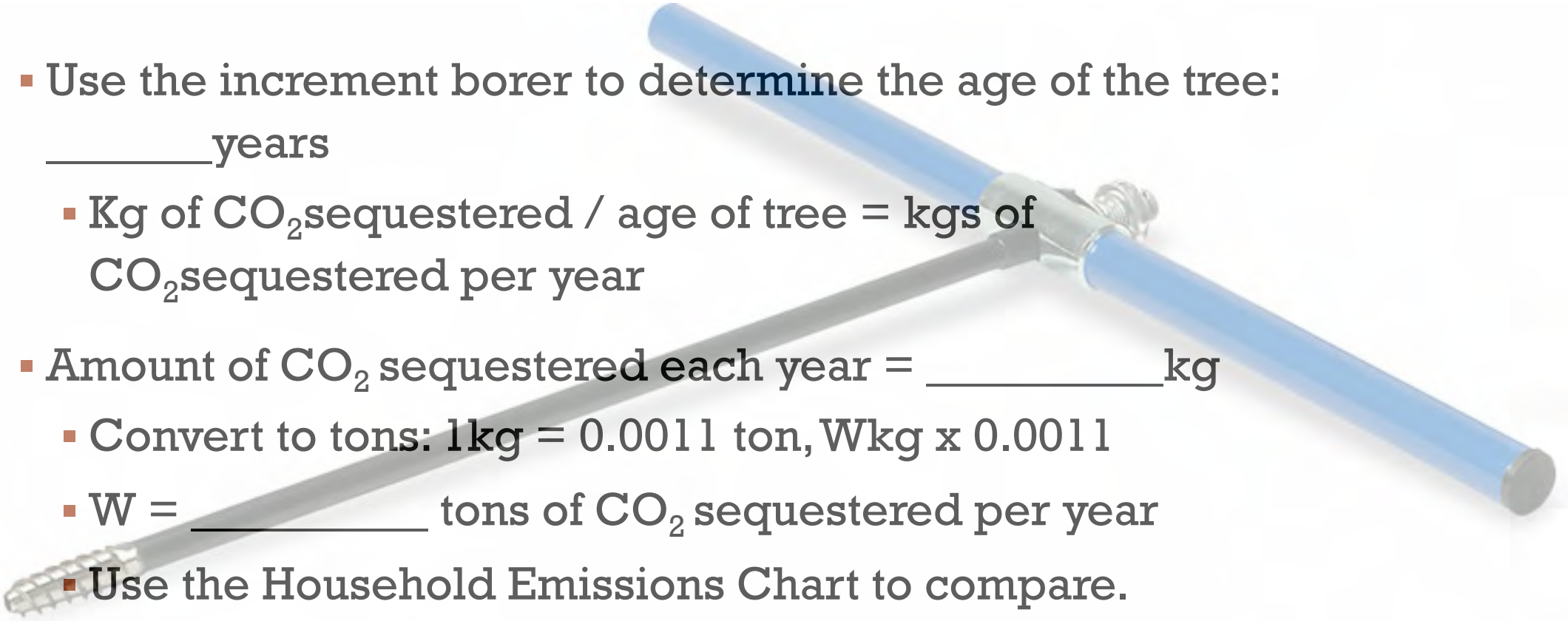
- A Boeing 747 burns 5 gallons per mile and can carry about 450 people
  - Use the Miles from McCall Chart
- How far can your tree get you? _____miles
- Half of a tree is used for other purposes (wood, paper), half is used for jet fuel.
- Divide the above number by 2 _____miles

STEP 7: CALCULATE THE AMOUNT OF CARBON DIOXIDE SEQUESTERED

- Weight of CO_2 = weight of carbon x 3.6663
  - Weight of CO_2= _____ kg of CO_2sequestered

STEP 8: DETERMINE THE AGE OF YOUR TREE

STEP 8 CONTINUED: CALCULATE THE AMOUNT OF CO_2 SEQUESTERED PER YEAR



- Use the increment borer to determine the age of the tree: _____years
  - Kg of CO_2sequestered / age of tree = kgs of CO_2sequestered per year
- Amount of CO_2 sequestered each year = _____kg
  - Convert to tons: 1kg = 0.0011 ton, Wkg x 0.0011
  - W = _____ tons of CO_2 sequestered per year
  - Use the Household Emissions Chart to compare.

SCHOOL BUS EXAMPLE

- A school bus travels on average 80 miles per trip
- The average school bus gets 5 miles to the gallon
- 1 gallon of diesel = 0.0099 tons or 9.05 kg of CO_2 emitted
- 80 miles per day/5miles per gallon = 16 gallons of gas per day consumed
- 16 gallons x 9.05 kg = 144.8 kg of CO_2 emitted per school day
- Compare to how much CO_2 your tree sequesters per year.

DISCUSSION

- How should we use our natural resources?
- Is it better to leave the tree in the forest to sequester CO_2 or to use the forest products to offset petroleum usage?
- What if the forest residuals are available from logging practices?

STEM TO THE RESCUE

QUESTIONS?