Paper Recycling
Argumentation (CER) Prompt

7.MS-ESS.3-4

Construct an argument supported by evidence that human activities and technologies can be engineered to mitigate the negative impact of increases in human population and per capita consumption of natural resources on the environment.

Suggested Progression:

- Keep track of your paper recycling for your classroom for one week. Weigh it!
    - Make sure you subtract the weight of the empty container.
- Recycling Worksheet
- Climate Change Prompt
    - Graphic Organizer
    - Feedback (from peers or teacher)
    - Write prompt in paragraph form
    - Assess using rubric
- Possible Extension:
    - Recycle paper in your classroom (see resources)

Resources:

- Recycling Reading: pg. 101-108 of link below
    - http://www.epa.gov/osw/education/quest/pdfs/sections/u2_chap2.pdf
    - It says “teacher fact sheet” but is appropriate for middle school students
    - Some facts are a little outdated, but it is a good comprehensive source
- http://www.epa.gov/osw/nonhaz/municipal/pubs/2012_msw_fs.pdf
    - In 2012, 70% of all paper waste in the USA was recycled.
        - 91% of corrugated cardboard was recycled in the USA in 2012.
    - 44.4 million tons of paper in the USA were recycled
        - About 280 pounds per person!
            - That’s 56 reams, or 5 ½ boxes of copy paper
        - This saved 130.5 million metric tons of CO_2 equivalent emissions
            - Through energy savings compared to making paper from scratch
            - Through avoided methane emissions in a landfill or CO_2 through combustion
            - Through avoiding cutting down trees--thus increasing CO_2 absorption & storage in forests
            - http://epa.gov/epawaste/conserve/tools/warm/pdfs/Paper_Products.pdf
        - Equivalent to 27 million cars taken off the road (more than 10% of the cars in the USA)

- http://www.epa.gov/solidwaste/conserve/materials/paper/basics/index.htm
    - Every ton of paper we recycle…
        - saves enough energy to power the average US house for 6 months
        - saves 1,000 gallons of water
        - saves 3.3 cubic yards of landfill space
- http://conservatree.org/learn/EnviroIssues/TreeStats.shtml
    - One ton of fresh (virgin) paper takes 24 trees to make
        - based on a mixture of softwoods and hardwoods 40 feet tall and 6-8 inches in diameter
    - one tree makes 16.67 reams of paper, or 8,333 sheets of paper
    - one box of paper (10 reams) uses 0.6 trees
    - one ream of paper uses 0.06 or 6% of a tree
- Video of how paper is recycled:
    - http://www.recyclenow.com/facts-figures/how-it-recycled/paper
- Recycle your own paper in class:
    - http://www.earth911.com/living/art-entertainment/recycle-your-own-paper/

Notes for Teachers:

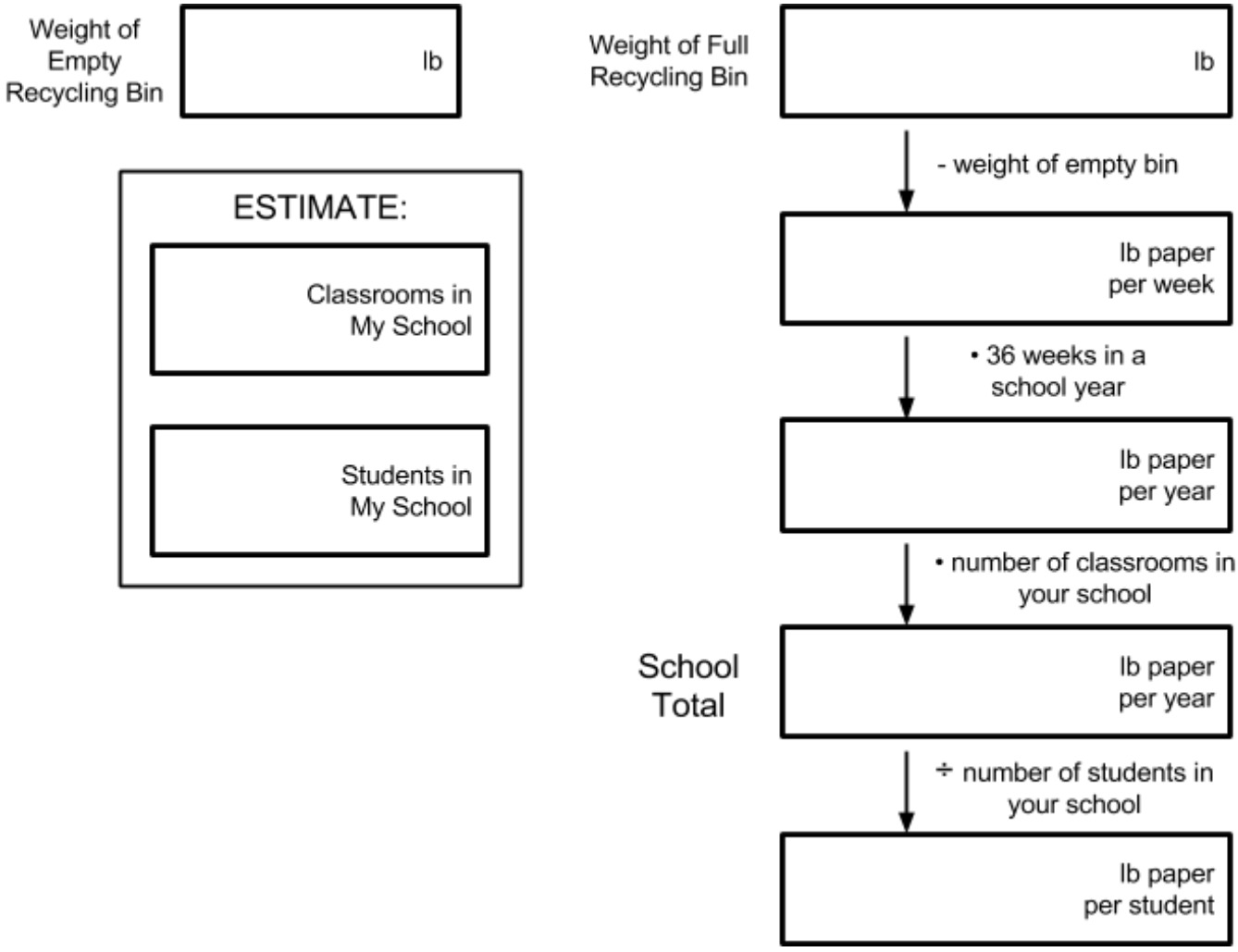
- Graphic Organizers:
    - Try to offer a menu of graphic organizers for prewriting (including a blank page if students have a different structure in mind).
    - When using a graphic organizer, be clear to students about the purpose for the structure.
        - e.g. The reason there is a “Reasoning” box below every “Evidence” box is because we need to explain how each piece of evidence supports the claim.
- Rubrics--there are two different rubrics provided here
    - Teacher Rubric for Assessment
        - Clear outline for teachers of how to assess this particular prompt
        - DO NOT give to students--it clearly lists the expected claim, evidence, and line of reasoning.
    - Student Rubric
        - Share with students
        - Outline of what good claims, evidence, and reasoning are in general

Name_____

Paper Recycling
Calculation Worksheet

How much paper does your classroom recycle? How does your recycling affect the environment?

First, keep track of your paper recycling <u>for one week</u>. Then estimate the number of classrooms and total students in your school. Finally, perform the calculations below to find out! *Use a calculator as needed.*



Turn over to find out more!

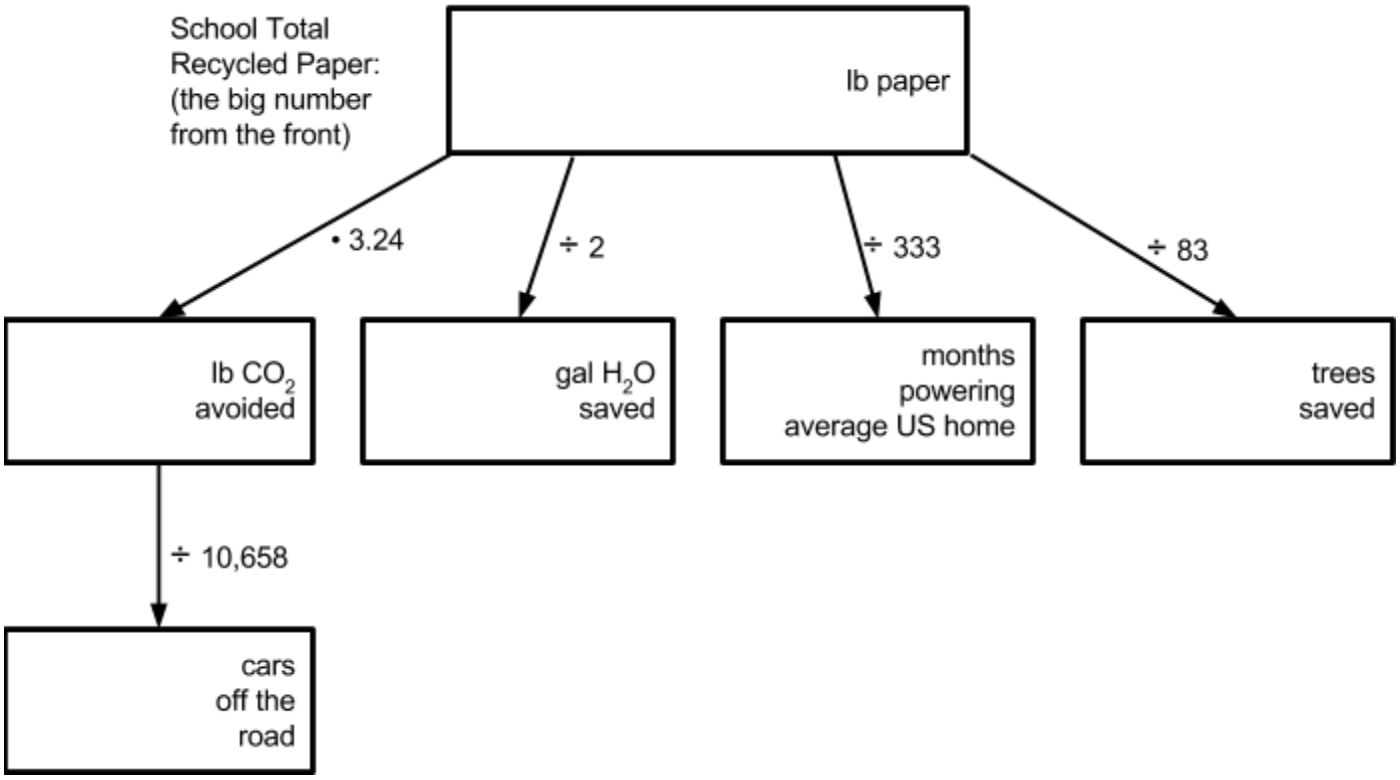
Now let's find out the impact your recycling had on the environment.

CO_2: Making fresh paper produces a lot of CO_2, which impacts the climate. When you recycle paper, this CO_2 isn't produced. One way to understand how much CO_2 is saved is by thinking about taking a certain number of cars off the road, given that an average car produces a little more than 10,000 pounds of CO_2 per year.

Water: Making paper from scratch uses a lot of water that we can save by recycling paper. One ton of recycled paper saves 1,000 gallons of water.

Energy: Recycling paper also saves a lot of energy. We can help understand the amount of energy by comparing it to the amount of time we could power an average US home for.

Trees: Trees are cut down to make new paper. One average tree (40 ft tall) can make 8,333 sheets of paper.



Name_____

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Construct an argument supported by evidence that human activities and technologies can be engineered to mitigate the negative impact of increases in human population and per capita consumption of natural resources on the environment.

The superintendent of Boston Public Schools has heard about your recycling unit and wants to know what you think about recycling paper. The superintendent wants to know:

Should all Boston Public Schools recycle paper?

Remember to include:

- *Claim: Answer the question.*
- *Evidence: Use data from your calculations worksheet to support your claim.*
- *Reasoning: Use information from readings or notes to explain why your evidence supports your claim.*

Name_____

Paper Recycling
Argumentation Prompt

Answer the question:

Should all Boston Public Schools recycle paper?

Name_____

Paper Recycling
Ideal Student Response

Answer the question:

Should all Boston Public Schools recycle paper?

Note--students can pick either an affirmative or negative claim as long as they support it with valid and relevant evidence and reasoning!

Boston Public Schools should absolutely recycle paper! In my classroom, we recycled 12 pounds of paper in a week, which means that in a school year, our entire school recycles about 16,000 pounds. Recycling this much prevents about 5 cars worth of CO_2 emissions, saves 7,992 gallons of water, saves enough energy to power an average US home for 4 years, and saves 193 trees. All of these savings are from just one school in one year, and clearly we have a positive impact on the environment. Preventing CO_2 emissions slows down climate change, and saving water and trees conserves valuable natural resources. If every school in Boston would recycle, these numbers would add up quickly, causing a significant positive effect to the environment.

OR

Boston Public Schools should not recycle paper. In my classroom, we only recycled 12 pounds of paper in a week. Even if every other classroom recycled the same amount every week for the entire school year, this comes out to less than 16,000 pounds of recycled paper in a year. This would save 7,992 gallons of water over the entire year. But the average household uses 400 gallons of water a day, so our entire school saved less than three weeks' worth of water for just one house. We prevented less than 5 cars' worth of CO_2 emissions, and could only power a single home for 4 years. I think that for all of the effort emptying an entire school's recycling bins every week all year long, we should be able to contribute more back to the environment. Instead, we should put the same effort into making sure lights and fans are off, making sure teachers aren't making extra copies, copying double-sided, or even using digital resources rather than paper worksheets!

Teacher Rubric for Assessment: Paper Recycling

	4-Exemplary	*3-Proficient*	*2-Needs Improvement*	*1-Critical Area*
Claim	❑ States either that BPS should or should not recycle paper, using specific language that corresponds to the question. ❑ Written in complete, easy to understand sentence(s).	❑ States either that BPS should or should not recycle paper, using language that generally corresponds to the question. ❑ Written in complete, easy to understand sentence(s).	❑ Answers the question but uses vague or unclear language. ❑ Inaccurately or incompletely answers the question. ❑ Not written in complete, easy to understand sentence(s).	❑ Does not make a claim, or makes a completely inaccurate claim.
Evidence	❑ Provides specific, appropriate, and ample data or observations that supports claim, including 4-5 of the following: ❑ Weight of recycled paper ❑ Prevented CO_2 emissions ❑ Water Saved ❑ Energy saved ❑ Trees saved	❑ Provides specific, appropriate, and sufficient data or observations that supports claim. May include some inappropriate evidence ❑ Addresses 2-3 bullet points from Exemplary.	❑ Provides appropriate, but insufficient or unclear data or observations to support claim. May include some inappropriate evidence ❑ Addresses only 1 bullet point from Exemplary.	❑ Does not provide data or observations, or only provides inappropriate evidence (evidence that does not support claim).
Reasoning	❑ Correctly and clearly connects the evidence to the claim, showing how it supports the claim. ❑ Discusses in depth the greenhouse effect. ❑ Applies concepts that go beyond the prompt, as appropriate	❑ Correctly and adequately connects the evidence to the claim, showing how it supports the claim. ❑ Discusses the greenhouse effect.	❑ Correctly connects the evidence to the claim, but leaves out important details, and/or ❑ Restates the evidence without connecting it to the claim ❑ Partially discusses the greenhouse effect.	❑ Does not provide reasoning, or only provides reasoning that does not connect evidence to the claim, and/or ❑ Provides an incomplete generalization or does not apply appropriate scientific concepts.
Writing: *Use appropriate structure, grammar, and mechanics to communicate your argument.*	❑ Writing contains no grammatical or spelling errors. ❑ Writing is clear, concise, and persuasive.	❑ Writing contains very few grammatical or spelling errors. ❑ Writing is clear, mostly concise, and well developed.	❑ Writing is fairly clear, with some grammatical or spelling errors. ❑ Writing could be more concise.	❑ Writing is difficult to follow, with many grammatical errors and no clear structure. ❑ Writing is either too wordy or too incomplete.