Pollution Work Sheet

Read the article that has been assigned to your group and then, as a group, answer the following questions. At the end of class, each group will present on what they read.

Name of Article:

What is (are) the types of pollution discussed in your article?

What is responsible for this pollution?

How does this pollution affect people and the environment?

What efforts were made to prevent or reduce this pollution?

What are the different types of Pollution?

Do Now: Do Now: Think of a way that you are affected by pollution. What kind of pollution is this? What is the source of this pollution?

List the possible sources for each type of Pollution

-Air Pollution

-Water Pollution

-Soil Pollution

-Noise pollution

-Light Pollution

Give a few examples of everyday items that can be reduced, re-used and/or recycled?

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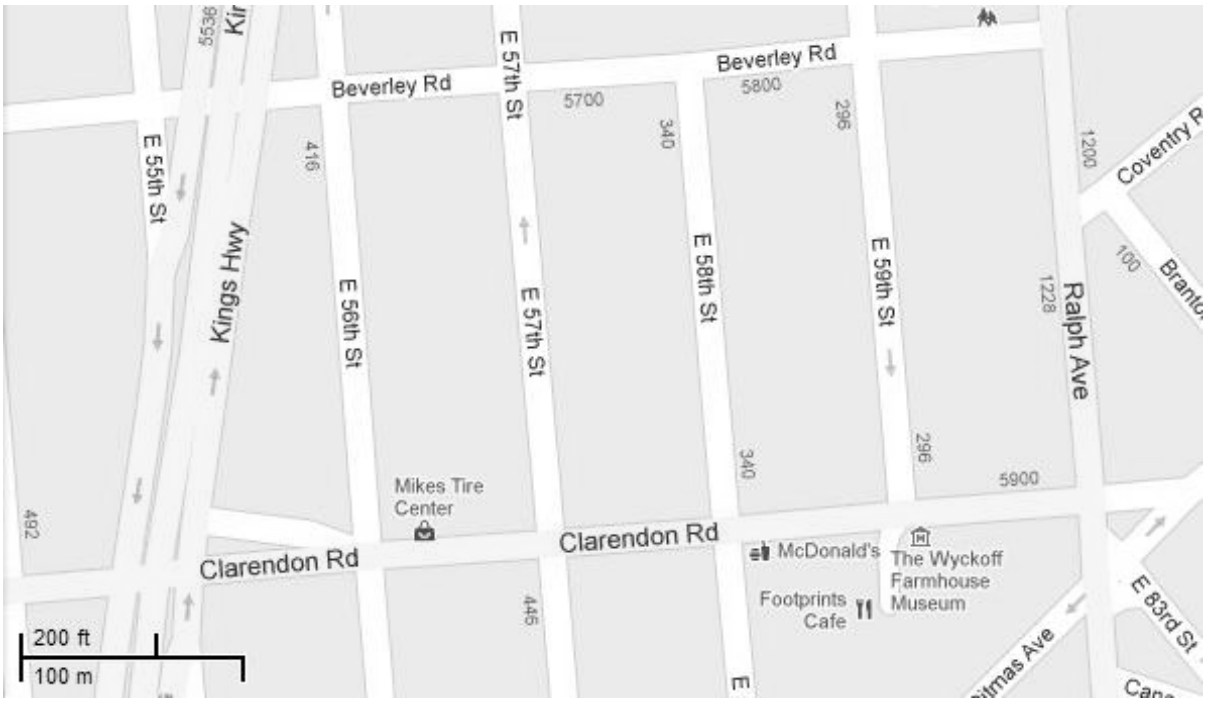
How do we figure out how much CO2 is being emitted by the cars we counted up?

Name: _____

Step 1: Find the Length of the Block we counted cars on.



For this worksheet, measure the length of 58th street.

Length of 58th street (in ft): _____ft

Step 2: Now we must convert Feet to Miles. There are 5280 ft in a mile.

$\frac{5280}{1} = \frac{1000}{?} \rightarrow \frac{1000}{5280} =$ _____miles

Step 3: Through research, we know the Gas Mileage (how far each car goes with one gallon of gas) of each of our car types. So we must figure out how many gallons are being used for each car type on each block.

Small Car = ~22mpg
Large Car = ~18mpg
Box Truck = ~11mpg
Semi-truck = ~6mpg
Bus = ~8mpg

For example, if we know that a small car goes 22 miles per gallon, can figure out how many gallons it uses in the length of the block using this equation.

$$\frac{22 \text{ miles}}{1 \text{gallon}} = \frac{\text{Answer from } \textbf{Step 2} \text{ in miles}}{? \text{ gallons}} \rightarrow \frac{\text{Answer from } \textbf{Step 2} \text{ in miles}}{22 \text{ gallons}}$$

= _____ gallons used on the selected block by a small car

Step 4: By doing more research, we know that approximately 8920 grams of CO2 are created per gallon of gasoline. So, how much is created from just the amount of gasoline used on the block we counted? To do this, use the following equation.

(Answer from **Step 3** in gallons) x 8920 grams of CO2 emitted per gallon

= _____ grams of CO2 emitted for each small car counted per block

Step 5 : Now we must figure out how many cars we counted on the selected block of the selected type, to multiply it by the number of grams of CO2 being emitted on the block per car, and figure out the total grams of CO2 that was emitted in the 15 minutes you counted.

E56st, E57st, E59st							
600ft							
2:00-2:15							
car type	sm car	lg car	box truck	semi	bus		total
car count	4	11	0	2	2		19

(# of small cars counted) x (Answer from **Step 4**)

= _____ grams of CO2 emitted on this block in 15 minutes by a small car.

Using This Technique we are able to Calculate how much CO2 is being emitted in the area by adding all the grams of CO2 being emitted by each type of car on each block, and adding it all together.

Name_____ Date_____

What is the Balance between CO2 sequestered and CO2 emitted?

Now that you have an Idea on how we calculated the CO2 being emitted and sequestered, to see if there is a balance.

Tilden Area:

Total CO2 being sequestered by trees in a day: 6483146.40 Kg

Total CO2 being emitted by Humans in a day: 178.14832 Kg

Total CO2 Being emitted by Cars in 15 minutes: 28017.20264 Kg

Figure out how much CO2 is being produced versus how much is being sequestered by subtracting the amount emitted from the amount being sequestered to see if there is an imbalance. Remember the car data is in 15 minutes, while the rest is in a day.

Church Ave Area:

Total CO2 being sequestered by trees in a day: 2345089.94 Kg

Total CO2 being emitted by Humans in a day: 786.06675 Kg

Total CO2 Being emitted by Cars in 15 minutes: 9289.591 Kg

Name_____ Date_____

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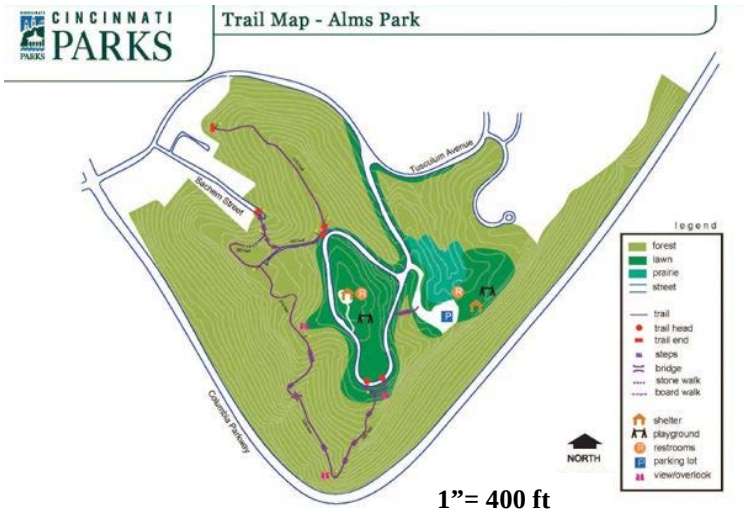
Mapping Worksheet

Do Now: Create a map of anything you want (class room, hometown, city, etc.) in the space provided below.

Circle and mark the following on the map:

- Title
- Legend
- Scale
- North Arrow



1"= 400 ft

Name: Date:

How are we affected by excessive noise?

Do Now: What are the different Types of pollution?

- -

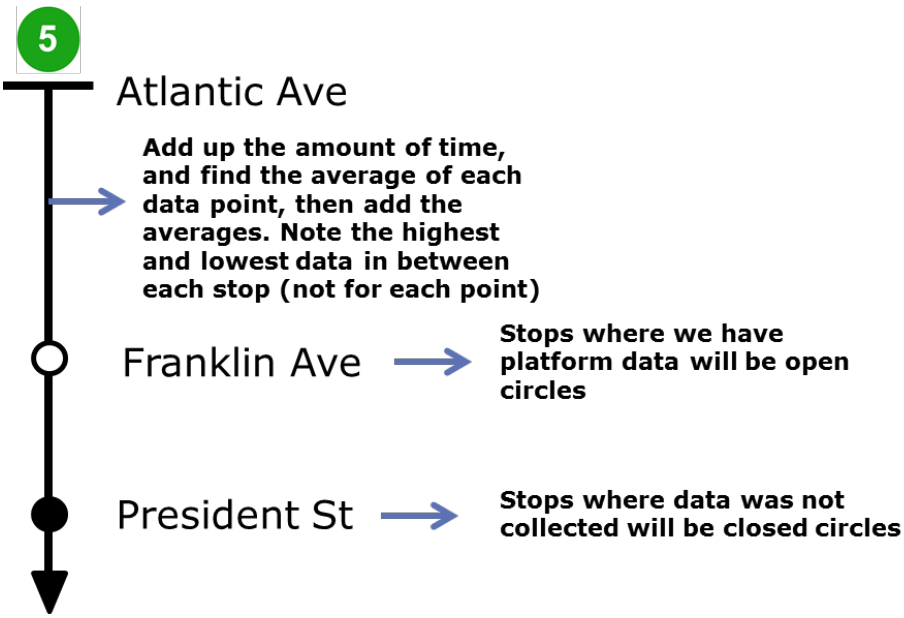
- -

-

What causes hearing loss?

At what decibel level does noise become permanently damaging?

Use a blank sheet of paper to start organizing your data using the following format.



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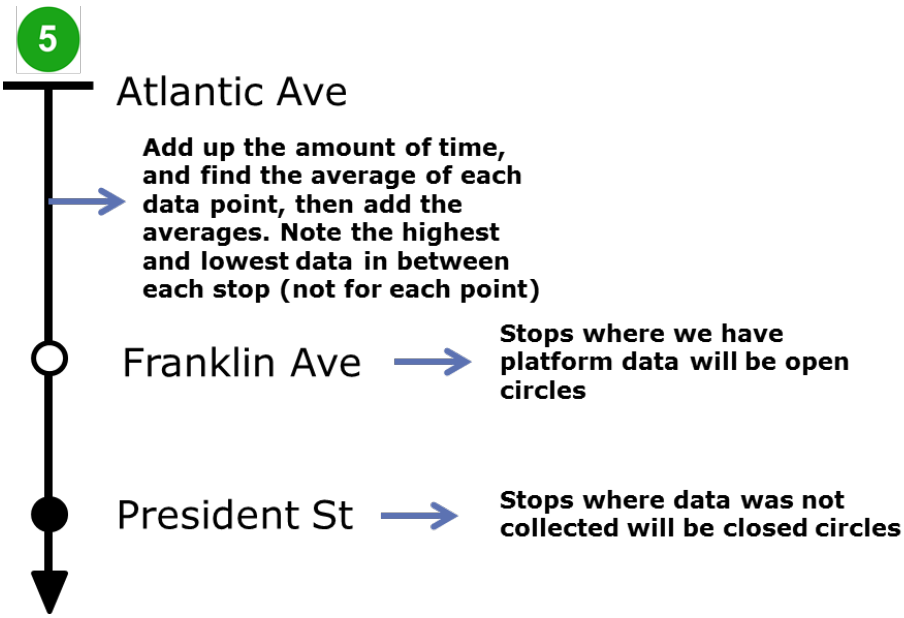

Subway Line Noise Level Survey

Subway Line: ____

Instructions: Fill out the train stations as you go along the subway line. Measure the lowest and the highest noise level value every 20 seconds between each train station, starting at 0 seconds at each station (just when the train starts to leave the station). If you have remaining less than 20 second before next stop (for example 10 seconds), record that time and the appropriate noise level values.

Train Stop	Time	Lowest Value	Highest Value	Average

Name: _____ Date: _____

Calculating Human CO_2 Emissions

Photosynthesis:

Schematic representation of the photosynthetic reaction is given by:

$$6CO_2 + 6H_2O \xrightarrow{\text{Sun}} C_6H_{12}O_6 + 6O_2$$

$C_6H_{12}O_6$ – represents one of the simplest sugars – glucose

From the photosynthetic reaction 0.264 kg of CO_2 are sequestered to produce 0.18 kg of tree. The weight of the Carbon Dioxide that needs to be sequestered to produce the tree is:

The Carbon Footprint of the tree (in kg) = (0.264kg x weight/0.18kg) = **1.5kg x weight**

Respiration:

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{biological stored energy}$$

Average person eats around 2000 Food Calories/ Day. Assuming that he gets all of his needed energy from eating sugar (glucose). The person will produce his needed energy through the respiration reaction. He will need 0.52kg/day to produce the energy that he needs and in the process he will release 0.7kg of CO_2/day.

The Population Density for East Flatbush (close to ITAVA) is 86,253.
The Population Density for East Flatbush (close to Caton St.) is 66,864.

Name:_____ Date:_____

Calculating Human CO_2 Emissions

Instructions: Using the attached explanation and your knowledge of carbon footprint, calculate the following:

1. The amount of CO_2 (in kg) being released in both neighborhoods by humans per day:

Step 1: Figure out the average population of the specific areas we measured using proportions based on the Total Population Density for the whole neighborhood.

Step 2: Figure out how much CO_2 is being emitted in that area using the data from the first sheet.

a) East Flatbush (close to ITAVA)
Measured Area: 0.0217 $Miles^2$

Step 1: $\frac{86253 \text{ people}}{1 \text{ mile}^2} = \frac{X \text{ people}}{0.0217 \text{ miles}^2}$

Step 2: (Population density for specific area) x (grams of CO_2 Emitted by a human)

= Total CO_2 emissions by humans in this specific area.

Answer:

b) East Flatbush (close to Caton St.)
Measured Area: 0.0225 $Miles^2$

Step 1: $\frac{66864 \text{ people}}{1 \text{ mile}^2} = \frac{X \text{ people}}{0.0225 \text{ miles}^2}$

Step 2: (Population density for specific area) x (grams of CO_2 Emitted by a human)

= Total CO_2 emissions by humans in this specific area.

Answer:

Name: _____ Date: _____

Calculating Tree Sequestration

Photosynthesis:

Schematic representation of the photosynthetic reaction is given by:

$$6CO_2 + 6H_2O \xrightarrow{\text{Sun}} C_6H_{12}O_6 + 6O_2$$

$C_6H_{12}O_6$ – represents one of the simplest sugars – glucose

Calculating weight:

Measure the height (h) and the circumference (c), both in meters. From the circumference, calculate the area of the cross section of the bark (assuming circular) by using the following conversion: $A = c^2/12.6$

Calculate the "volume" of the tree (taking only a uniform bark):

V = h x A

Take the density of the tree to be = 700kg/m^3 (0.7 gm/cm^3)

Weight of the tree: = volume × density in kg.

From the photosynthetic reaction 0.264kg of CO_2 are sequestered to produce 0.180 kg of tree.

The weight of the Carbon Dioxide that needs to be sequestered to produce the tree is:

The Carbon Footprint of the tree (in kg) = (0.264kg x weight/0.18kg) = **1.5kg x weight**

Name:_____ Date:_____

Calculating Tree Sequestration

Instructions: Using the attached explanations, calculate the carbon footprint of the following trees in our neighborhood. Pay attention to units, and use conversions when needed.

*IMPORTANT: Circumference and height must be in **meters**.*

Tree 1: Located on Caton
Circumference: 142cm
Height: 1700cm
Step 1: Convert both to meters
Step 2: Plug into the correct equations to find the Carbon Footprint (in kg). Show your work below

Tree 2: Located on Tilden
Circumference: 31.5 inches
Height: 138 inches

Equations Needed:
Area = $\mathbf{c}^2/12.6$
c=circumference
Volume = hxA
h=height
Weight= volume × 700kg/m^3
Carbon Footprints
of the tree (in kg) =1.5xweight

Conversions Needed:
1 meter (m) =100 centimeters (cm)
1 inch = 2.54 centimeters (cm)

Name:_____ Date:_____

What makes a good Science Poster?

List the essential parts of a poster:

- -
- -
- -
-

What are some tips to consider when making a poster?

You will see an example of two posters that are about the same topic. Look at the posters for a little bit, and then decided which one is the better poster. In the space below, make a list of reasons why you think one poster is better than the other. What does is have that the other one doesn't? What does it do better than the other one?

Which poster did you pick? _____

List of Reasons:

Now, look at the example poster your group has been given, of past ITAVA GK-12 posters that were actually presented at the Brooklyn College Science Day. Take a look at the poster with your group members, and answer the following questions.

-What is the main topic of the poster? What question were they asking, and what results did they get? How clearly is this displayed in the poster?

-Does the poster look good? Why or why not (name specific reasons)?

-If you could change something about this poster to make it better, what would you do?

-What ideas from this poster are done well, that you might want to do on your own poster?

Now it is time for you to start thinking of how you want to make your poster. First make a list of the items you want to include in the poster (abstract, maps, graph, etc). Then, in the rectangle provided below, draw a rough sketch of ideas for the layout of your poster. Try to label the parts, and come up with a layout that is both aesthetically pleasing, and that will display all the necessary information that you want people to walk away with.

List of items: