Team Members_____

Design a Particulate Matter Detector
Engineering Design Challenge

Problem: Particulate matter in the air can be damaging to human health if it is breathed in. PM 10 can irritate the lungs and cause respiratory problems. PM 2.5 can enter the bloodstream and cause health problems throughout the body. Because particulate matter is hard to see, a device is necessary to detect and measure it.

Goal: Work with a partner to design and deploy a detector for collecting and measuring the amount of particulate matter in the school community.

Criteria: A successful device must...
1. Collect visible particulate matter (PM 10)
2. Limit the amount of non-particulate matter collected (ex. hair and dirt)
3. Include a method for measuring or counting the amount of PM collected (ex. using a magnifying glass and a grid for sampling)
4. Be able to survive intact for at least 2 days outside on its own

Constraints: A successful device can only...
5. Be made of materials provided by the teacher or ones you can get from home
6. Take no more than two periods to build prototypes, test, and create TWO identical final versions for use in monitoring

Materials:
- Cardboard boxes and tubes
- Paper plates
- String
- Tape (regular and double-sided)
- Glue
- Graph paper
- Note cards
- Duct tape
- Coffee filters
- Popsicle sticks
- Pipe cleaners

Brainstorm ideas

Designs – don't forget to label all parts of your design!

I will measure the amount of PM in my monitor by…

Data collection:

Location 1:

Location 2:

Data:

Amount of particulate matter collected at Location 1:

Amount of particulate matter collected at Location 2:

Class Data:

Location with least PM:

Location with most PM:

<u>Analysis Questions</u>

1. Was the PM level on your detectors higher, lower, or close to what you were expecting?

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2. Where were particle levels highest? _____

   Why do you think this was? _____

   _____

3. Where were the particle levels lowest? _____

   Why do you think this was? _____

   _____

4. Where do you think most of the PM near the school is coming from? _____

   _____

<u>Conclusion</u>

Write a Claim-Evidence-Reasoning argument about what areas around your school have the cleanest or most polluted air based on what you know about particulate matter. Make sure to use your class data to support your conclusion.

   Claim: What areas have the cleanest and the most polluted air?

   Evidence: What data do you have to support your claim?

   Reasoning: What do you know about particulate matter that makes your claim true based on the evidence?

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