Red Group: Time

Group Summary:	Roles:	Assignment Summary:
This group will compare the pollution levels for ozone (O_3), carbon monoxide (CO), and particulate matter (PM_{10} and $PM_{2.5}$) by time of day.	Assign roles. Each person tracks one pollutant. 1. Ozone Tracker 2. Carbon Monoxide Tracker 3. PM_{10} Tracker 4. $PM_{2.5}$ Tracker If there are more than 4 students, split each day into 2 sections (e.g. 0:00 – 12:00 & 13:00 – 23:00.)	Each student will enter the data for his/her pollutant into a spreadsheet.

Detailed Instructions:

COLLECT DATA: Set-up (1st time)

1. Decide on each of your roles (see above).

2. Decide on the location your group will monitor. *Note: PM_{10} and $PM_{2.5}$ are limited to Green Valley, OR Rose Elementary & Geronimo together)*

3. Go to the activity website (http://www.airinfonow.com/html/airexercise/materials.html) and download the Excel Spreadsheet for the "Red Group: Time."

4. Save the spread sheet onto your disk or computer.

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COLLECT DATA: Everytime

1. Open your saved Excel spreadsheet.

2. Go to the bottom of the spreadsheet and select your pollutant (carbon monoxide, ozone, or particulates). This will open the correct sheet.

3. Go to the activity web site and click on "your data" in the "Red Group: Time."

4. Enter the date you need into the From: and To: boxes.

5. Make sure the time boxes (hh:mm) read 00:00 and 23:59 . (*Note: If you are looking at today's data, the second box will automatically read the current time. To get a full day of data you need to enter yesterday's date – or Friday's date if it is currently Monday*).

6. Select the location you are monitoring, scroll down, and then click on "**show report"**.

(Particulate matter is monitored at the following sites: Green Valley PM_{10} and $PM_{2.5}$, Geronimo PM_{10}, Rose Elementary $PM_{2.5}$.)

7. Write down the data for your pollutant.

8. Enter the date and location you have chosen into the "Red Group: Time" spreadsheet.

9. Enter the data for your pollutant into the spreadsheet.

10. Repeat until all the data is entered.

11. Be sure to save your worksheet!

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PRESENTATION PREP: Find Averages

1. Find the average and standard deviation for each time at the end of each week or month.

2. You will notice there are some squares with the words "#DIV/0!". These squares already have the formula to find the average of your data. (Note: The average changes as you enter the data.)

3. You will need to enter the formula for the average for the remaining squares. There are several ways to do this – try one of each of the ways.

   a. *Go to INSERT Þ FUNCTION Þ select AVERAGE Þ enter the first and last cell numbers you want to average separated by a colon. In the next empty average box that would be (B12:F12).*

   OR

   b. *Type =average(B12:F12) then hit enter. You can also highlight/select the cells you want to include.*

   OR

   c. *Select a cell that already contains an average calculation. Copy the cell and paste the formula into the cell you want. Be sure to double check that the formula includes the correct cells you want the average of.*

4. You will need to find the Standard Deviation (which tells you how variable your data is or how much of a change there is at the same time on different weekdays). There are several ways to do this – try one of each of the ways.

   a. *go to INSERT Þ FUNCTION Þ select STDEV Þ enter the first and last cell numbers you want to average separated by a colon. In the next empty Standard Deviation box that would be (B12:F12).*

   OR

   b. *Type =stdev(B12:F12) then hit enter. You can also highlight/select the cells you want to include.*

   OR

   c. *Select a cell that already contains a Standard Deviation calculation. Copy the cell and paste the formula into the cell you want. Be sure to double check that the formula includes the correct cells for which you want the Standard Deviation.*

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PRESENTATION PREP: Graphing

1. Each student will plot the averages on a graph (pollutant level vs. time).

2. In your spreadsheet, highlight the numbers under "Average" from Midnight (00:00) down to 23:00 hours.

3. Click on the bar graph icon OR go to the "Insert" menu and select "Chart."

4. Select "Column" for chart type then select "Next."

5. Leave the data range alone and select "Series In: Columns" then select "Next."

6. Now click on the "Series" tab (top of gray box).

7. Click in the box "Category (X) axis labels" and then highlight "Midnight, 1:00, 2:00…down to 23:00." (You should see the X axis labels change to Midnight, 1:00, etc. instead of 1, 2, 3…)

8. Select "Next."

9. Enter a "Chart Title" such as "Daily Carbon Monoxide Levels: Dates" (or whatever your pollutant is for whatever time period).

10. Enter a "Category (X) Axis" such as "Hours."

11. Enter a "Value (Y) Axis" such as "PPM" (or whatever units your pollutant is measured in) then select "Next."

12. Select "Place Chart: As New Sheet" and enter a label such as "CO Graph."

13. Select "Finish." Be sure to save your work!

PRESENTATION PREP: Find Trends

1. As a group, analyze trends in air quality based on time. Consider the following (use your graphs to help you):
*   Are there certain times of day with more ozone, carbon monoxide, PM_{10}, or $PM_{2.5}$?
*   Do you have any ideas why certain pollutants may be higher at certain times of day?
*   Are these trends consistent over the month, 2 months, 5 months?
*   Develop one or more hypothesis to describe the trends. Be careful not to draw conclusions or overstate your data.

PRESENTATION

Present your data, graphs, hypothesis, and/or conclusions to your class.