**(AP) ENVIRONMENTAL SCIENCE 2022-23 August 22, 2022**

**Today’s Agenda (Day 4)**

1. Housekeeping Items

🡪 BRING: Plain M & Ms, 100-watt bulb, food coloring

1. Homework Check:

🡪

1. Class Activity:

🡪BEGIN: a) APA Citation Review – refer to msbeland.weebly.com

b) Practice - <https://owl.excelsior.edu/citation-and-documentation/apa-style/apa-activity/>

🡪WEDNESDAY: Rainbow Metrics Measurement Lab – see p. 2 of document below

🡪FRIDAY: Lab – M & M Meltdown & Graphing Review

HOMEWORK:

* READ: Chapter 1 – Environmental Interrelationships
* COMPLETE: Chapter 1 Vocabulary (full template) and Cornell Notes
* STUDY: Chapter 1 Test AND APA Review

REMINDERS:

* Ch 1 Vocabulary – Aug. 25
* Ch 1 Notes – Aug. 29
* **TEST**: **Ch 1 AND APA 🡪 Sept. 1**

**CORNELL NOTES TEMPLATE**

|  |  |
| --- | --- |
| **Name:**  | **Page(s):**  |
| **Chapter # and Title:**  | **Core Concept:** |

|  |
| --- |
| **Key Question:**  |

|  |  |
| --- | --- |
| **Questions/ Vocab/Headings** | **Notes/Charts/Graphs** |
|  |  |

|  |
| --- |
| **Summary:**  |

**(AP) ENVIRONMENTAL SCIENCE 2022-23 LAB ACTIVITY**

***Rainbow Metrics Measurement Lab***

***Part A: Count your drops!***

***Take a guess:*** *How many drops of water will it take to equal 1 milliliter? Drops*

*What does this guess represent according to the scientific method? \*\**

Follow the directions to find the number of drops in 1 milliliter of water and answer the questions. You will need a small, graduated cylinder (25 ml), a beaker of water, and an eyedropper.  Remember

to read the bottom of the meniscus when reading the volume of liquid in a graduated cylinder.

1. Fill a small, graduated cylinder with 10 ml of water.
2. Count the number of drops it takes to raise the water to 11ml. Record your data in **Table 1**.
3. Leave the water in the graduated cylinder and count the number of drops it takes to raise the water to 12ml. Record your data in **Table 1**.
4. Leave the water in the graduated cylinder and count the number of drops it takes to raise the water to 13ml. Record your data in **Table 1**.
5. Calculate your average and round to the nearest tenth.

***Table 1****: Number of Drops in 1ml*

|  |  |  |  |
| --- | --- | --- | --- |
| **# of drops to 11ml** | **# of drops to 12ml** | **# of drops to 13ml** | **AVERAGE** |
|  |  |  |  |

***Analysis of Data:***

1. Based on your average, how close were you to the prediction? \*\*

B. Based on your average, how many drops would it take to make 1 liter? \*\*

***Part B: Volume by Water Displacement***

Follow the directions to find the volume of three marbles using water displacement.

1. Add 20 ml of water to a 100 ml graduated cylinder. Record your data in **Table 2**.
2. Add three marbles to the cylinder and measure the volume. Record your data in **Table 2**.
3. Find the difference between the two measurements and Record your data in **Table 2**.
4. Record the volume of 3 marbles in **Table 2**.

***Table 2****: Volume of 3 marbles*

|  |  |  |  |
| --- | --- | --- | --- |
| **Volume of water before marbles (ml)** | **Volume of water after marbles (ml)** | **Difference in Volume (ml)** | **Volume of 3 Marbles** |
|  |  |  |  |

***Part C: Volume by Formula***

Find the volume of the box. Measure to the nearest centimeter before calculating your answer.  If necessary, round your answer to two decimal places and don’t forget your units!



 Volume of the box: \*\*

***Part D: Mass Mania***

**The gram is the standard unit of mass in the metric or SI system. The instruments that can be used to measure mass are the triple beam balance and the electronic balance.**

1. Check to see that the **Pointer** is pointing to zero.
2. If not, make sure the **Riders (weights)** are to the left at the Zero mark.
3. Adjust the balance by turning the **Adjustment Screw** (under the pan) *slowly*  until it points to zero.
4. Place your metric ruler on the pan and read & record the ruler's mass in **Table 3**.
5. After resetting the balance to Zero, measure and record the mass of the empty 100-ml graduated cylinder and then the 3 marbles in **Table 3**.
6. Reset the balance to ZERO when all items have been massed.
7. Once you have massed your items with the triple beam balance, use the electronic balance and record your data in **Table 3**.

***Table 3****: Comparison of Massing Equipment*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Mass of metric ruler (g)** | **Mass of empty graduated cylinder (g)** | **Mass of 3 Marbles (g)** |
| **Triple beam balance** |  |  |  |
| **Electronic balance** |  |  |  |

Analysis of Data:

Which equipment do you think is more accurate? \*\*

Explain your answer. \*\**Part E: Color Challenge*

1. Obtain the following items from your teacher:

* beakers with colored water- 25 ml of each color (red, blue, and yellow)
* 1 graduated cylinder (25 ml - 50 ml)
* 1 eyedropper
* 6 test tubes labeled A, B, C, D, E, and F

2. Perform each step outlined below using **accurate** measurements.

1. Measure 17 ml of **RED** water from the beaker and pour into test tube A.
2. Measure 21 ml of **YELLOW** water from the beaker and pour into test tube C
3. Measure 22 ml of **BLUE** water from the beaker and pour into test tube E.
4. Measure 5 ml of water from test tube A and pour it into test tube B.
5. Measure 6 ml of water from test tube C and pour it into test tube D.
6. Measure 8 ml of water from test tube E and pour it into test tube F.
7. Measure 5 ml of water from test tube C and pour it into test tube B.
8. Measure 2 ml of water from test tube A and pour it into test tube F.
9. Measure 4 ml of water from test tube E and pour it into test tube D.

3. Complete the chart.

|  |  |  |
| --- | --- | --- |
| **Test Tube** | **Color** | **Final Volume (ml)** |
| **A** |  |  |
| **B** |  |  |
| **C** |  |  |
| **D** |  |  |
| **E** |  |  |
| **F** |  |  |

**Analysis/Results:**

1. Name the colors that you created.
2. How many mL of liquid were in each test tube at the **start** of this lab?
3. Why is it important to follow directions **exactly**?
4. What would have happened if your measurements were not correct?
5. Look at your hands. Do you have any stains on your hands? If so, those stains represent **chemicals** that would be on your skin **right now**!
6. How many mL of liquid did you have at the end of the lab?  How many should you have?  What are some reasons why you may have more or less than when you started?

**Conclusion**:

2-3 sentences on what you learned.

**(AP) ENVIRONMENTAL SCIENCE 2022-23 LAB ACTIVITY**

**M & M Meltdown**

**Purpose**:

To determine the effect of color on the melting rate of candy-coated chocolates.

**Materials**: Plain M&M’s, white paper, lamp (100 watt bulb), stop watch.

**Hypothesis**: Write a hypothesis in proper form that describes what you think will happen.

**Procedure**:

1. Select TWO of each color M & M. They should be as identical as possible in size and shape.

2. Put one of the M & M’s on the piece of white paper. Center the lamp (turned off) over the candy such that the distance from the paper to the top edge of the lamp is 8.5 inches.

3. Turn the lamp on when ready and start the stopwatch.

4. Keep the light over the M & M for about 5 minutes, watching for the first signs of melting (sweating, cracks, running color, etc.). At the point these first signs are observed, record the time (min/sec) and the type of melting indications observed in a chart. Turn the light off and record any final observations. What does it look like? How does it feel? Can you squash it? (Place all of your observations in your data table.)

5. Repeat steps 1-4 for each color.

6. Place your timed results on the board to compile as class data.

**Results:**

1. Calculate the mean time it took for each color to melt and record the data in your data table.

2. Construct a proper graph to show the class results for each color.

**Conclusion:**

Describe your results by comparing the mean times for each color. Include a discussion of whether your hypothesis was supported or not, explain why or why not. Discuss the other factors (other than visible light) that could have contributed to your results.

**(AP) ENVIRONMENTAL SCIENCE 2022-23 GRAPHING REVIEW**

# Data for plotting graphs

**Graphing Practice Problem #1: Ethylene is a plant hormone that causes fruit to mature. The data above concerns the amount of time it takes for fruit to mature from the time of the first application of ethylene by spraying a field of trees.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Amount of ethylene in ml/m2**  | **Wine sap Apples: Days to Maturity**  | **Golden Apples: Days to Maturity**  | **Gala Apples: Days to Maturity**  |
| **10**  | **14**  | **14**  | **15**  |
| **15**  | **12**  | **12**  | **13**  |
| **20**  | **11**  | **9**  | **10**  |
| **25**  | **10**  | **7**  | **9**  |
| **30**  | **8**  | **7**  | **8**  |
| **35**  | **8**  | **7**  | **7**  |

1. Make a line graph of the data on a separate graphing paper or on an Excel Spreadsheet/Google Sheets.
2. What is the dependent variable?
3. What is the independent variable?

**Graphing Practice Problem #2: A clam farmer has been keeping records concerning the water temperature and the number of clams developing from fertilized eggs. The data is recorded below.**

|  |  |
| --- | --- |
| **Water Temperature in oC**  | **Number of developing clams**  |
| **15**  | **75**  |
| **20**  | **90**  |
| **25**  | **120**  |
| **30**  | **140**  |
| **35**  | **75**  |
| **40**  | **40**  |
| **45**  | **15**  |
| **50**  | **0**  |

1. Make a line graph of the data on a separate graphing paper or on an Excel Spreadsheet/Google Sheets.
2. What is the dependent variable?
3. What is the independent variable?
4. What is the optimum (best) temperature for clam development?

**Graphing Practice Problem #3:** **The thickness of the annual rings indicate what type of environmental situation was occurring at the time of its development. A thin ring, usually indicates a rough period of development. Lack of water, forest fires, or a major insect infestation. On the other hand, a thick ring indicates just the opposite.**

|  |  |  |
| --- | --- | --- |
| **Age of the tree in years**  | **Average thickness of the annual rings in cm.** **Forest A**  | **Average thickness of the annual rings in cm.** **Forest B**  |
| **10**  | **2.0**  | **2.2**  |
| **20**  | **2.2**  | **2.5**  |
| **30**  | **3.5**  | **3.6**  |
| **35**  | **3.0**  | **3.8**  |
| **50**  | **4.5**  | **4.0**  |
| **60**  | **4.3**  | **4.5**  |

1. Make a line graph of the data on a separate graphing paper or on an Excel Spreadsheet/Google Sheets.
2. What is the dependent variable?
3. What is the independent variable?
4. What was the average thickness of the annual rings of 40-year-old trees in Forest A?
5. Based on this data, what can you conclude about Forest A and Forest B?

**Graphing Practice Problem #4:**

|  |  |
| --- | --- |
| **pH of water**  | **Number of tadpoles**  |
| **8.0**  | **45**  |
| **7.5**  | **69**  |
| **7.0**  | **78**  |
| **6.5**  | **88**  |
| **6.0**  | **43**  |
| **5.5**  | **23**  |

1. Make a line graph of the data on a separate graphing paper or on an Excel Spreadsheet/Google Sheets.
2. What is the dependent variable?
3. What is the independent variable?
4. What is the average pH in this experiment?
5. What is the average number of tadpoles per sample?
6. What is the optimum water pH for tadpole development?
7. Between what two pH readings is there the greatest change in tadpole number?
8. How many tadpoles would we expect to find in water with a pH reading of 5.0?