==Science Project Due the First Week of School to your Chemistry Teacher==
==Chemistry Science STEM Academy Project Expectations & Guidance:==
10th GRADE STUDENT NAME: _____

(First Name & Last Name)

You're entering a year of exciting, hands-on chemistry learning focused on matter, energy, reactions, and real-world applications. This summer project will have <u>two required parts</u> to help you begin thinking like a chemist by conducting a safe home investigation and exploring the global importance of chemistry.

<u>Science Assignment Number 1</u>: Design & Conduct a Chemistry Investigation

Choose one experiment below (or propose your own) to explore a concept related to energy and chemical reactions. These are safe for home use, but always ask a parent/guardian for permission and assistance.

Choose <u>One</u> Investigation:

1. <u>Exothermic vs. Endothermic Reactions</u>
   - Test and compare how a chemical reaction feels when it absorbs vs. releases heat (e.g., vinegar + baking soda vs. calcium chloride + water if available).
   - Use thermometers if possible.- Calcium chloride can be found in some snow ice melts or in dehumidifier containers (Dollar Tree has them).
2. <u>Chemical Reaction Rate</u>
   - How does temperature affect the rate of a chemical reaction? (e.g., Alka-Seltzer in cold vs. hot water)
   - Measure the time to dissolve or record gas production.
3. <u>pH and Acidity Around the Home</u>
   - Test the pH of common household liquids using red cabbage indicator or pH strips.
   - Create a color-coded chart of acids and bases.
4. <u>Homemade Electrolysis</u>
   - Use a 9V battery and salt water to demonstrate water electrolysis. Observe and record bubbles (H_2 and O_2).
5. <u>Homemade Lava Lamp (Density + Reaction)</u>
   - Use oil, water, and Alka-Seltzer to create chemical reaction bubbles and explore density differences.

Your Lab Report Should Include:

Create a Google Slides presentation summarizing your chemistry investigation. You will present this to your STEM Chemistry teacher and may also share it with classmates. Your slides should clearly show what you tested, what happened, and what you learned.

<u>Slide 1</u>- Title of your project- Your full name- Date

<u>Slide 2</u>- Clearly state your investigation question- Example: *"What is the difference between an exothermic and endothermic reaction in terms of temperature change?"*
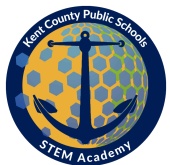
<u>Slide 3</u>- Hypothesis (both null and alternative hypotheses are needed. Find a YouTube video on this to help write this slide.)- This must be a testable statement. Example: <u>*Ha (Alt. Hypothesis)- There is a temperature change in the vinegar and baking soda reaction.*</u> <u>*Ho (Null Hypothesis)*</u> *- There is no difference in the felt temperature change in the vinegar and baking soda reaction."*

<u>Slide 4</u>- Materials List- List everything you used, including brands or measurements (if applicable) and Photos of your setup are encouraged!

<u>Slides 5 & 6</u>- Procedure- Use step-by-step instructions (bullet points or numbers). Be clear enough that someone else could repeat your experiment. You may include pictures of the process.

<u>Slides 7 & 8</u>- Observations/Data -This is where you show what you measured, recorded, or saw. Include at least one of the following:

- A data table with time, temperature, or other variables
- A bar or line graph (insert from Google Sheets or Google Slides chart tool)
- Labeled photos or sketches with descriptions
- For pH or color changes, make a color-coded chart or comparison slide

Data is required. Show at least 2 data points if comparing variables (e.g., hot vs. cold water).

Slide 9- Conclusion- Summarize what you learned. Did the results support your hypothesis? What did the data tell you? Was anything surprising?

Slide 10- Connection to Chemistry- Explain what chemistry concept or reaction your experiment demonstrated. Use science vocabulary where appropriate. Connect your experiment to a real-world situation or issue (e.g., energy use, environmental impact, acid rain, etc.) Example: *"This experiment showed that temperature affects reaction rate. This is important in understanding how chemical reactions work in living organisms or industrial settings."*

Bonus Slide- (impress your teacher!)- If you want, include: What you would change or do next. What questions did this experiment make you wonder about? Why would this be important to learn about in relation to real-world events?

Science Assignment Number 2: Chemistry Research

Research and write a short report on how chemistry is being used to solve a global or local environmental or energy-related issue. Focus on how chemical principles are applied.

Possible Topics:
- Clean energy solutions (solar cells, hydrogen fuel, batteries)
- Carbon capture and greenhouse gases
- Ocean acidification and pH changes
- Plastic pollution and bioplastics
- Water purification and filtration technology
- Nuclear energy and radiation safety

Your report (1–2 pages, double-spaced, 12pt. times-new roman font) should include:
- What is the problem? Why does it matter globally or locally?
- What chemistry is involved? Explain reactions, energy, or materials science.
- What solutions are being used or proposed? Cite at least one real-world example.
- Why does this topic interest you? (Personal reflection)

DUE DATE FOR SUMMER WORK IS: Thursday, August 28, 2025
-You will need to turn in everything to your STEM Chemistry teacher on this date.

If you have questions regarding summer work, please send an email to the KCPS STEM Coordinator, Amelia Markosian at amarkosian@kent.k12.md.us
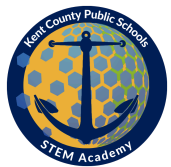
10th GRADE STUDENT NAME: _____

(First Name & Last Name)

Algebra 2 STEM Summer Assignment: Compare and Contrast

You may complete the assignment on the paper album template you've been provided, or you may complete it on the Google Slides template you can find online by entering **http://bit.ly/4mvQcMN** in a web browser or by using the QR code to the right. *You will need to make a copy of the Google Slides deck of your own to edit. (Need help making a copy? Type **https://bit.ly/4mAg1uY** in your browser/phone.) If you would like to create your own Google Slides, that is fine–just be sure to include all the requirements!*

Slide 2: Choose one compare/contrast scenario below to explore. You may either compare / contrast:

- A **linear** function and an **exponential** function
- A **linear** function and a **quadratic** function
- A **quadratic** function and an **exponential** function

1. **Slide 3:** Describe a real-life scenario that can be modeled by each of your chosen functions. (Note: This just means "write a word problem.") Include the following:

    ○ **Slides 4 & 6:** The **equation of the situation** in an appropriate form. Suggestions for the form are below, but you may use another form if it better suits your model.

linear	exponential	quadratic
$y = mx + b$	$y = a(b)^x$	$y = a(x - h)^2 + k$

    ○ **Slides 4 & 6**: Identification of the **independent (x) and the dependent (y) variable** in each of your chosen scenarios.
    ○ **Slides 4 & 6**: Identify **all possible x-values** that can realistically be used in your scenario (domain)
    ○ **Slides 4 & 6**: Identify **all possible y-values** that can realistically result from your scenario (range)

2. **Slides 5 & 7:** Sketch a **graph** of each function.

    ○ Clearly **label the x- and y-axes** and provide an **appropriate scale** for your axes.
    ○ Include a **table of values** choosing at least 5 input values: 2 negative, 2 positive, & zero.
    ○ Describe any **one point on each graph in context**. For example, the point (0,15) represents the height of the ball, x, is 15 feet, just before it is thrown, when y (time) is 0.

Slides 8 & 9: Rewrite each equation using function notation. (Enter bit.ly/44RDuBB into your browser or phone for an explanation of function notation.) Then use your creativity to represent each of your functions as a "machine." Show the steps for finding one output given an input for each function using your creative "function machine." (Enter https://tinyurl.com/4pbjhnjj into your browser or phone for some inspiration.)

4. Answer the following questions about your functions:

   ○ **Slide 10:** Name two ways the two graphs of your two equations are **similar**.
   ○ **Slide 11**: Name two ways the two graphs of your two equations are **different**.
   ○ **Slide 12**: Find the **rate of change** between any two points on each graph. That is, choose any two points on each graph and find the slope between them.

$$\text{Remember:} \quad \text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

5. **Slides 13 - 15:** In this project, you've explored a linear, quadratic, and/or exponential function. **Reflect on your learning** by responding to at least two of the questions below.

   ○ Which type of function was the **most intuitive** for you to understand, and which was the most challenging? Why?
   ○ How has your understanding of **real-world applications** of these functions grown?
   ○ If you had to **explain the differences** between your chosen functions to someone who was learning about them for the first time, what would you say?

QR Codes / Links for Support if needed:

QR Code for Google Slides Template for Digital Work:	How to copy a Google Slides deck to make it your own:	Learn more about function notation:
bit.ly/44RDuBB	bit.ly/4mAg1uY	https://bit.ly/44RDuBB
Learn More About a Function as a Machine	A Creative Function Machine Example	Feel free to email Mrs. Tolbert- jtolbert@kent.k12.md.us with any questions for this project. See you soon!
tinyurl.com/5n887z27	tinyurl.com/4pbjhnjj	