✅ Chemical Reactions & Energy Notebook Check

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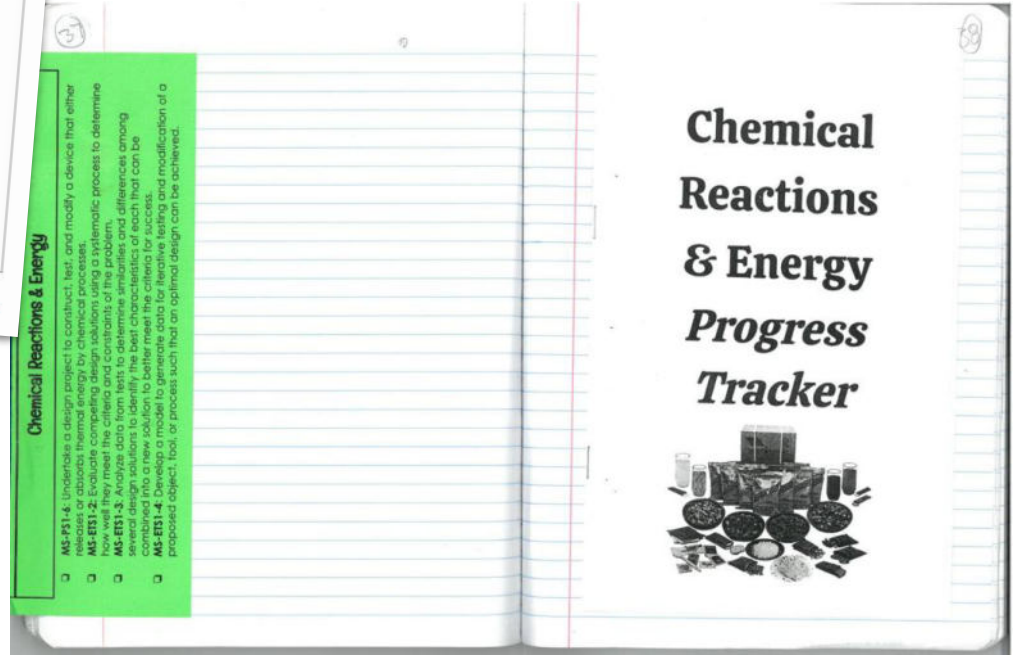

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Progress Tracker pg ___

Unit Question: How can we use chemical reactions to design a solution to a problem?

What did we do as engineers?	What did we figure out that can help us with our design?
we identified our problem	dre expensive • can be hard to get • may not be able to eat the food • not know how to use

Progress Tracker pg ___

Unit Question: How can we use chemical reactions to design a solution to a problem?

What did we do as engineers?	What did we figure out that can help us with our design?
we identified criteria and constraints	criteria for our Homemade Flameless heater: • effective - gets like

Progress Tracker pg 2

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What did we do as engineers?	What did we figure out that can help us with our design?
we test parts of our design solution	• we tested the temperature change when hand hand warmers are activated and the temperaturechange in MRE heaters • MRE heaters get Much warmer • classmates tested different chemical reaction. • we will use copper sulfate (Root Killer) and Aluminum foil in

Progress Tracker pg 3

Unit Question: How can we use chemical reactions to design a solution to a problem?

What did we do as engineers?	What did we figure out that can help us with our design?
we refined what our Solution needs to do	~~• it needs~~ the heater should be under 45 • weigh less then 750 g • needs to be 40- °c (when you ac the heater)

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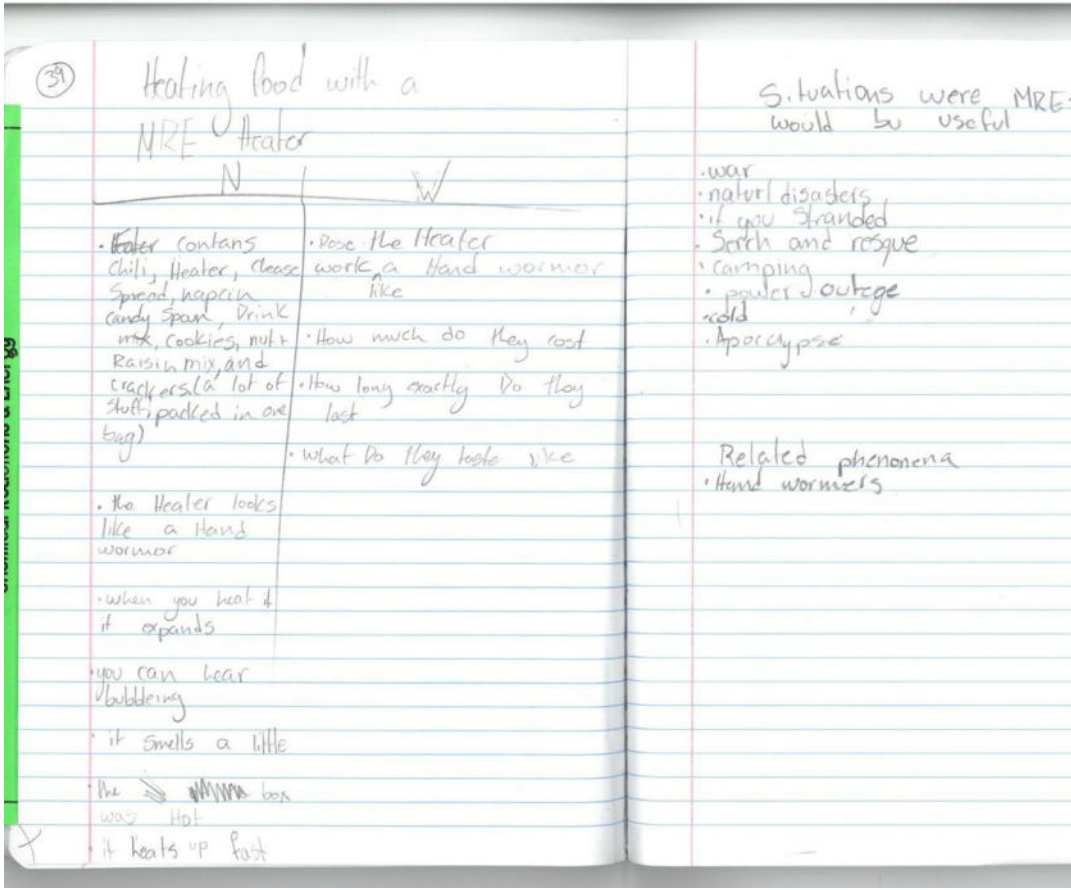

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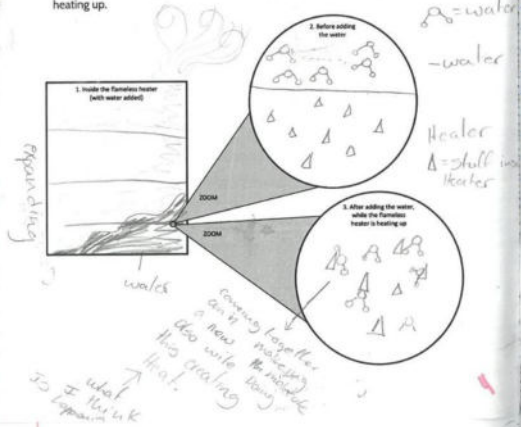
Name: _____ Date: Dec. 8/9, 2022 Per: 3

Initial Model

Develop an initial model to explain: "How does a flameless heater work to heat up food just by adding room-temperature water?"

1. In the rectangle area, draw the parts of the flameless heater we can see when water is added.
2. In the top zoom-in circle, model what you think is happening at a spot inside the flameless heater **at a scale we cannot see *before*** water is added.
3. In the bottom zoom-in circle, model what you think is happening at the same spot inside the flameless heater **at a scale we cannot see *after*** water is added, when the heater is heating up.



Comparing models

Similar	Different
• same symbol to represent water (δ)	• mimi used dots to represent the stuff inside the heater while I used triegls
• we both show how the bag is hot with steam things	• used circles = O and I just combined the Δ + δ

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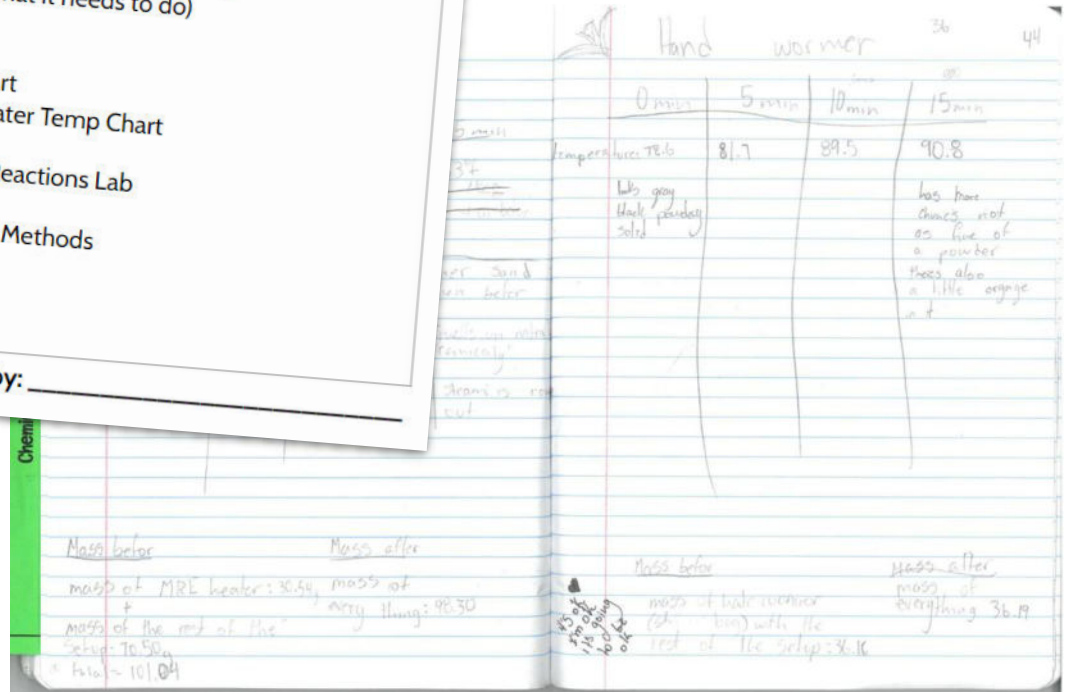

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Chemical Reactions & Energy

HEAT & TEMPERATURE

BEAKER Mystery

Before color: Make 3 observations about each beaker:

Beaker 1:
1. clear
2. pretty sure it's water
3.

Beaker 2:
1. looks pretty much the same
2. clear
3. there is steam

After color: Make 3 observations about each beaker and draw a sketch of the beakers:

Beaker 1:
1. it turns purple
2. the colors kind of
3.

Beaker 2:
1. stays more neutral
2. it mixed faster
3.

1. Based on your observations, what do you think the difference is between the two beakers?
I think B1 is cold water, B2 is hot water

2. What could be the reasoning for the difference in how the food coloring dispersed in the liquid? (Explain the science. Why did this happen?)
when a substance is hot the atoms move fast so that would move the atoms of food coloring faster than cold atoms would move slower.

Data Table for Chemical Reactions Lab

Group: A+B My Role: _____ Date: _____

Substances used:

A. Baking Soda
B. Vinegar
C.

Time (min)	Low amounts used A. 1g B. 50 mL C. _____ Temperature data (°C)	Medium amounts used A. 3g B. 50 mL C. _____ Temperature data (°C)	High amounts used A. 3g B. 50 mL C. _____ Temperature data (°C)
0.0 (start temp)	22.2	21.2	21
0.5	19.9	17.5	17.1
1.0	20.1	17.5	17.1
1.5	20.3	17.5	17.5
2.0	20.4	17.8	18
2.5	20.6	17.8	18.3
3.0	20.7	18	18.1
3.5	20.9	18.2	19
4.0	21.1	18.5	19.1
4.5	21.0	18.6	19.2
5.0	21.5	19.2	19.3

Observations:

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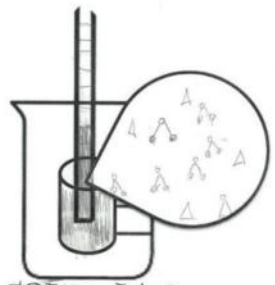
Chemical Reactions & Energy

Build your own thermometer:

1. Fill the bottle half full with the red rubbing alcohol and water mixture.
2. Use an index card and permanent marker to mark the straw with equal increment marks
3. Put the straw in the bottle.
4. Use the modeling clay to wrap around where the straw enters the bottle. Position the straw so that the liquid does NOT touch the bottom or the side of the bottle.
5. Use a pipette to drop liquid into the straw so that the liquid is visible above the bottle.
6. Your thermometer is now ready to record some data!
7. Draw a sketch of your thermometer in both the hot and cold water.
8. Sketch the zoom-in (on a scale you cannot see) to show the differences in water molecules.



HEAT & TEMPERATURE

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Name: _____ Date: 1/26/23

Energy Transfer Models

Systems description and data	Model	Caption
1X Rxn 1X Food Δ Food temperature 2.9°C	Reaction System → Food System	There is one Reaction system going tow to one food system making a little Difference
2X Rxn 1X Food Δ Food temperature 4.8°C	R system, R system → food system	there are dubble the reactions so that means the the energey would be dubble make the temp go up.
1X Rxn 2X Food Δ Food temperature 2°C	Reaction → Food, Food	There is only one Reaction system and two food systems so the energy has to spred out making the heat less

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Small-Group Data Table

Group: A Grams of aluminum (Al): 1 Grams of Root Killer: 5.9 copper sulfate ($CuSO_4$)

Time (min/sec)	Temp (°C)	Observations
0/0 (starting temp)	19.6	Observations about the ***solid*** collected in the coffee filter:
0.5/30	19.8	
1.0/60	20.4	
1.5/90	26.8	
2.0/120	29.8	
2.5/150	30.2	Observations about the ***liquid*** collected after filtering:
3.0/180	30	
3.5/210	29.8	
4.0/240	29.5	
4.5/270	29.3	
5.0/300	29	
Max temp change	9.4	

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