MiSP Chemical Reactions Assessment L3

Name _____ Date _____

Scientists and engineers are always studying the process of rusting in iron. Iron is an element made only of iron (Fe) atoms. Oxygen is also an element, made only of oxygen atoms (O). The oxygen atoms are bonded together in pairs (O_2). Rust (iron oxide) is a compound made up of iron and oxygen atoms bonded (joined) together. Although not a simple reaction, rusting can be summarized as:

Iron metal + oxygen = rust (iron oxide)

$4Fe + 3O_2 \rightarrow 2Fe_2O_3$

Rusting occurs more when the air is humid (moist).

1. Why is rusting a chemical change?

_____

_____

_____

2. List two (2) evidences of chemical change.

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3. As you know, an iron nail can be hit with a hammer and bent. Why is bending a nail a physical change?

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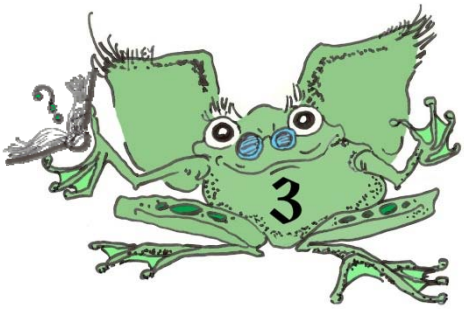
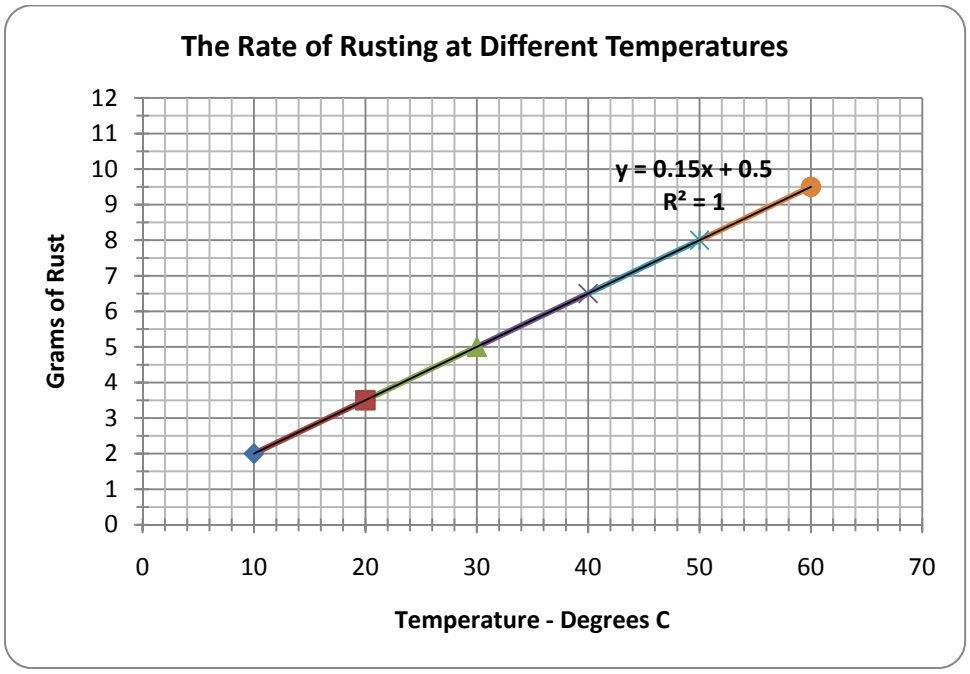


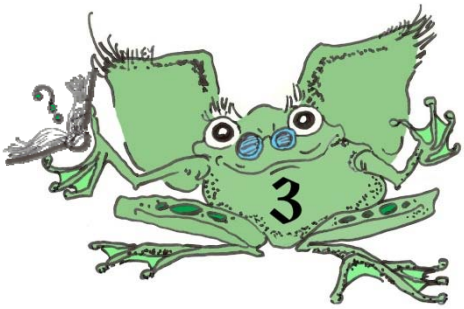
A student did a science fair experiment. She placed iron nails in containers with a wet sponge to keep the air humid. Air (oxygen) could get into the containers. She placed the containers in different temperature locations. After seven days, she measured the amount of rust produced on each nail and recorded the data. The amount of rust produced was a measure of how fast the rusting occurred.

Temperature (°C)	Rust produced in seven days (grams)
10	2.0
20	3.5
30	5.0
40	6.5
50	8.0
60	9.5

Below is a graph of the data:



4. How did increased temperature affect the rate of rusting?



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_____

5. Using the graph, predict the amount of rust produced at the following temperatures.

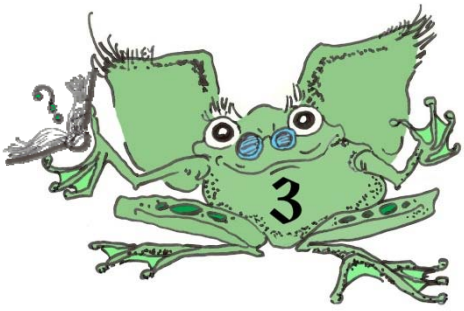
   a. 15°C _____

   b. 65°C _____

6. What is the unit rate of change (slope) of the line in the graph on the previous page?

7. Put the calculated unit rate of change into words by filling in the blanks below.

   In the rate of rusting at different temperatures graph, for every _____degree increase in the Celsius temperature, the amount of rust increased by _____ grams.



8. Determine the *y*-intercept for the graph above. Using the *y*-intercept and the unit rate of change, write the formula for the line in the rate of rusting graph.

9. Using the formula made in 6a, calculate the amount of rust that would be produced at 90°C.