MiSP Chemical Reactions Worksheet #2, L3

Name _____   Date _____

Hot News About Baking Potatoes

Introduction:

Potato baking, as well as most other cooking, involves changes in food caused by heat. We cook things in an oven, in a microwave oven, or on a stove top. The heat from these appliances changes the food chemicals being cooked. Although it is complicated and involves several types of changes, much cooking involves chemical changes in the substances in the food. Food is "done" when the chemical changes have occurred enough so that the food is ready (and safe) to eat.

Most recipes for baked foods require a particular oven temperature and a particular length of time for the proper cooking chemical reactions to occur. This often presents a challenge for a cook if she or he is cooking several items in the oven that require different temperatures.

Luckily, baking potatoes can be cooked at several different temperatures.

Problem:

How do different oven temperatures affect the rate of potato baking? (When the time is shorter, the rate of reaction/cooking is greater than when the cooking time is longer.)
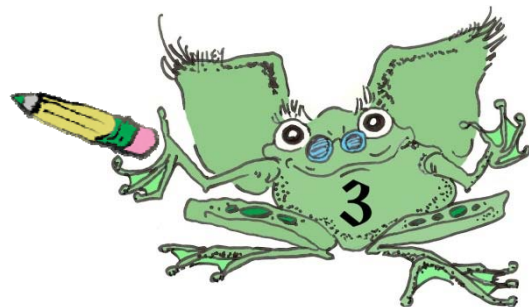
Oven Temperature	Potato Baking Time*
325°F (163°C)	90 minutes
350°F (177°C)	75 minutes
400°F (205°C)	45 minutes

* Of course, this will vary depending on the size of the potato and what type it is!

Graph Your Data:

Graph the data on the next page.
- Label the *x*-axis.
- Label the *y*-axis.
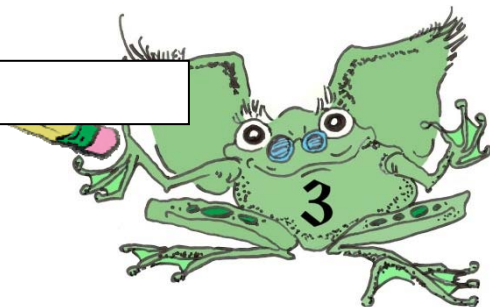- Connect the data points with a straight line

Questions:

1. At which temperature is the *rate* of potato baking greatest?

    a. 325°F (163°C)
    b. 350°F (177°C)
    c. 400°F (205°C)

    Why did you pick that temperature? _____

    _____
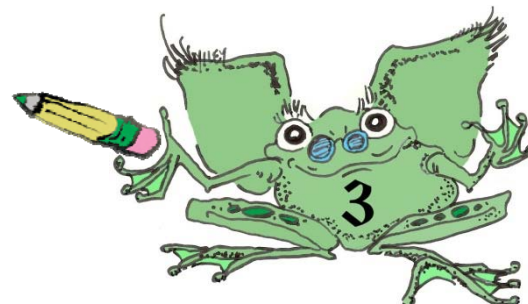
2. Using the graph, determine how long it would take to bake a potato at:

    a. 375°F _____

    b. 425°F _____

3. Conclusion: Complete the sentence below by filling in the blanks.

    When baking a potato, the higher the temperature in the oven, the _____

    the cooking time and the _____ the rate of chemical reactions that

    occur during cooking.

4. See the information from the graph to calculate the unit rate of change (slope) for the potato baking time. Use the formula to complete the chart below.

Unit Rate of Change $= \dfrac{\Delta \text{ Baking Time (minutes)}}{\Delta \text{ Temperature (}^{\circ}\text{F)}} = \dfrac{\Delta y}{\Delta x} = \dfrac{(y_2 - y_1)}{(x_2 - x_1)}$

Ordered Pairs used for calculation (x_1, y_1) (x_2, y_2)	Δ Baking Time (minutes) Δy	Δ Temperature (°F) Δx	Unit Rate of Change (slope) $\Delta y / \Delta x$

5. The unit rate of change you calculated has a negative value. Why does a negative unit rate of change (slope) agree with the answer you gave in #1 and the conclusion you made in #3 on the previous page?

_____

_____

_____

_____
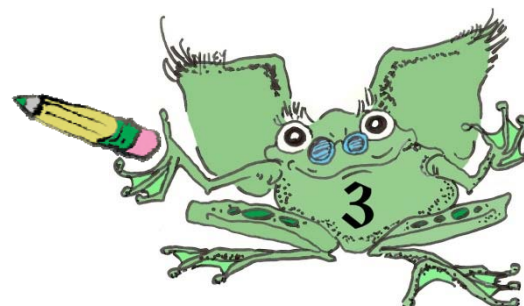
6. Determine the *y*-intercept for the potato baking graph.

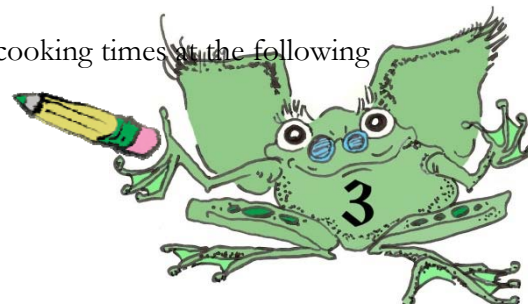   Use the equation for a line to calculate the *y*-intercept. The equation for a line is
   $y = mx + b$, where *m* is the unit rate of change (slope) and
   b is the *y*-intercept

Y-Intercept
m =
Ordered pair $(x, y) = ($ _____ , _____ $)$
$y = mx + b$ Solve for *b*:

7. Based on the unit rate of change that you calculated above and the *y*-intercept, write an equation for the potato baking graph's line. Remember that the equation for a line is **y = mx + b** and *m* is the unit rate of change (slope) and *b* is the *y*-intercept.

Equation — Baking Potatoes Graph

8. Using the equation on the previous page, calculate the potato cooking times at the following temperatures. Show your work:

250ºF	450ºF