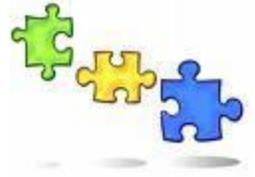


# The Puzzling Nature of Enzymes

Honors



Name: \_\_\_\_\_ Per: \_\_\_\_\_ Date: \_\_\_\_\_

## Mini Phenomena:

Observe the [pictures/video](#) of the Siamese cat. List questions that develop: individually then as a group.

**Directions:** Today you are the enzyme puzzlease. This enzyme is responsible for putting together puzzles. Under different conditions your group will act as the enzyme puzzlease to complete your assigned puzzle. The rate of the enzymatic reaction will be measured by *time per assembled puzzle piece*.

## Procedure guidelines:

- ✓ [Choose a condition](#) to investigate: enzyme concentration, substrate concentration, enzyme denaturation, competitive or non-competitive inhibitors.
- ✓ A cell phone may be used to keep time for puzzle assembly completion.
- ✓ A control group should be used for comparison.
- ✓ Materials: Puzzles (40 piece, 100 piece), clothespins, chips, masking tape, and socks.

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**Group Prediction:** How will the condition affect the rate of reaction (time per assembled puzzle piece)?

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## Investigate:

Design an experiment to explore the effect of a condition on puzzle building enzyme activity.

### Experimental Design

- Independent variable: \_\_\_\_\_
- Dependent variable: \_\_\_\_\_
- Constants: \_\_\_\_\_
- Control Group: \_\_\_\_\_

**Data:** Record below

Title:


**Measuring Math Competency**

In the space provided, construct a formula that will allow you to calculate the speed of the reaction (i.e. time (sec) per assembled puzzle piece) under your chosen condition. Identify your variables, write your formula, and show your calculations **FOR BOTH CONDITIONS.**

**Variable Identification**

**Formula**

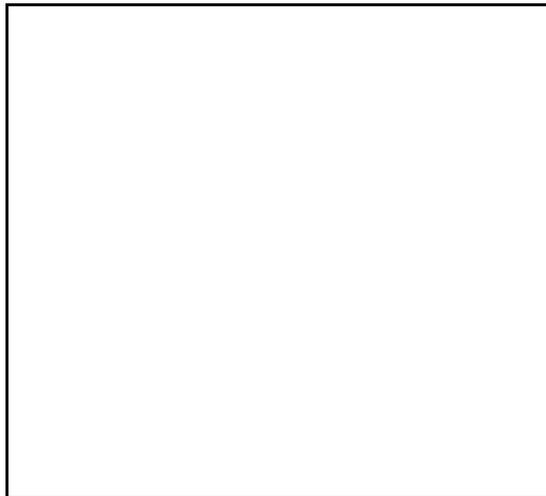
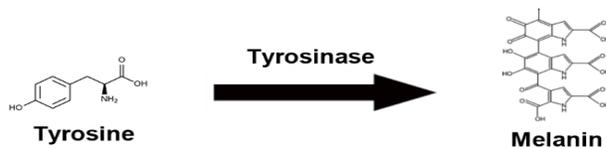
**Calculations:**

High School: Understanding and Applying Number Systems				
I understand the world of numbers and can quantitatively solve problems using a variety of mathematical strategies fluently.				
Indicators	Not Yet	Progressing	Competency	Mastery
Score →	.5 1 4	1.5	2 2.5	3 3.5
1b. Manipulate equations and formulas using arithmetic and algebraic properties.	I can... <ul style="list-style-type: none"><li>identify steps and/or properties that could be used to manipulate an equation or formula.</li></ul>	I can... <ul style="list-style-type: none"><li>use properties to complete some steps toward manipulating an equation or formula.</li></ul>	I can... <ul style="list-style-type: none"><li>manipulate an equation or formula using appropriate properties.</li></ul>	I can... <ul style="list-style-type: none"><li>select and apply properties to efficiently manipulate an equation or formula.</li></ul>

## Analysis Questions

1. Was the prediction supported? What trends were observed? Include data (don't forget units!).
2. How did this activity provide a model for how enzymes function? Thinking about what you just accomplished, identify what part of the activity represents the following: (Enzyme, Active Site, Substrate, Product, etc.)

3. Label and summarize the following chemical reaction with the following: product, reactant or substrate, enzyme. Then, in the space provided, draw and label the proper [energy reaction graph](#) that corresponds to the picture.



The Siamese cat has a mutation in the enzyme tyrosinase making it denature in warm temperatures. How does this help explain the phenomena in the [photos](#)? Alter the graph to the right to show how the optimum activity would be shifted due to the mutation.

