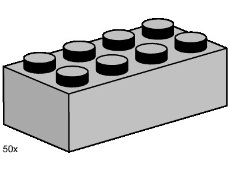
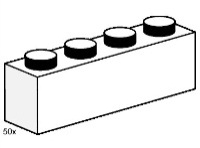
**Enzymes and Legos**

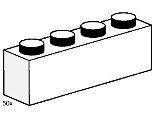
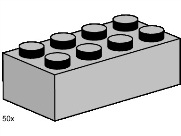
Enzymes are essential to the body; they break down and also form molecules that our cells use. Enzymes have an opening called an active site. The active site is where molecules, called substrates, enter to be processed. Each type of enzyme only interacts with specific substrates, making each type of enzyme unique.

**PART 1**

In the first part of this activity one partner will become an enzyme called “Buildase”. This enzyme uses small micromolecules called “Microlegos” to build complex macromolecules called “Legolarge”. The other partner will be the counter, and record data as the activity proceeds. As a Buildase enzyme your hands are the active site, and the Microlegos are your substrates. Remember, enzymes are blind so you must be blindfolded while operating.

* To form a Legolarge molecule, Buildase must assemble two different Microlegos;





1 and 1 forms 1 After a Legolarge has been formed  
 set it outside the box and continue.  
 **The color of the Microlegos does** **not matter.**

1. Before beginning, write down your prediction for the following;
   1. Predict how many Legolarge molecules will be made without wearing Oven mitts\_\_\_\_\_\_\_
   2. Predict how many Legolarge molecules will be made while wearing Oven mitts\_\_\_\_\_\_\_\_
2. Buildase has 30 seconds to form as many Legolarge molecules as they can. The other lab partner will be timing Buildase using a stopwatch, as well as recording how many Legolarge molecules they can form in 30 seconds. If Buildase removes the wrong Microlegos from the box, they must stop for the time remaining. **DO NOT START UNTIL I SAY “GO”.**
3. After 30 seconds is up, breakdown the Legolarge molecules and mix the Microlegos back into the box.
4. The person who is Buildase will now put on a pair of Oven mitts. Buildase will have 30 seconds to form as many Legolarge molecules as they can while wearing these Oven mitts.

**DO NOT START UNTIL I SAY “GO”.**

|  |  |  |
| --- | --- | --- |
| **BUILDASE** | | |
| **Seconds** | **No Oven mitts** | **Oven mitts** |
| 1-10 |  |  |
| 11-20 |  |  |
| 21-30 |  |  |
|  | Total: | Total: |

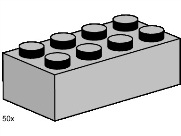
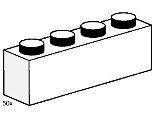
**PART 2**

In the second part of this activity partners will switch. The partner who was timing will now become a new enzyme called “Apartase”. This enzyme **breaks down** the complex macromolecule Legolarge into its smaller Microlego molecules. It performs the opposite function of Buildase.

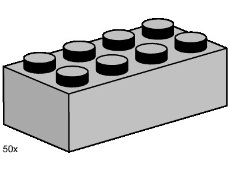
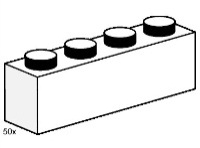
\*\*\*Before we begin, create at least 29 Legolarge molecules and ***carefully*** mix them into the box.

As an Apartase enzyme your hands are the active site, and the Legolarge molecule is your substrate. Remember, enzymes are blind so you must be blindfolded while operating.

* To breakdown a Legolarge molecule, Apartase must take apart a Legolarge;



After a Legolarge has been broken down, set the microlegos outside of the box and continue.



1 will break into 1 and 1

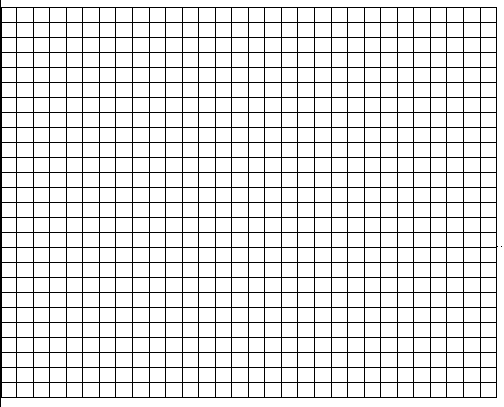
1. Before beginning, write down your prediction for the following;
   1. Predict how many Legolarge molecules will be broken down without wearing Oven mitts\_\_\_\_\_\_\_
   2. Predict how many Legolarge molecules will be broken down while wearing Oven mitts\_\_\_\_\_\_\_\_
2. Apartase has 30 seconds to breakdown as many Legolarge molecules as they can. The other lab partner will be timing Apartase using a stopwatch, as well as recording how many Legolarge molecules they can breakdown in 30 seconds. If Apartase removes anything but a Legolarge from the box, they must stop for the time remaining. **DO NOT START UNTIL I SAY “GO”.**
3. After 30 seconds is up, reform the Legolarge molecules and mix them back into the box.
4. The person who is Apartase will now put on a pair of Oven mitts. Apartase will have 30 seconds to breakdown as many Legolarge molecules as they can while wearing these Oven mitts.

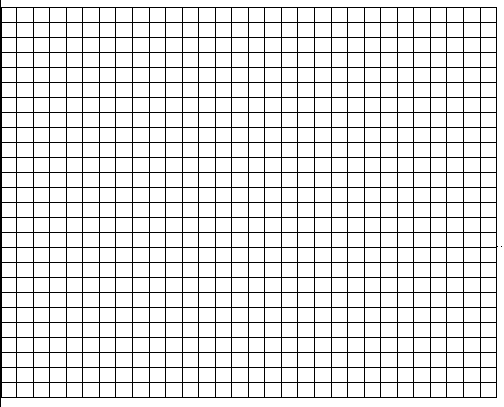
**DO NOT START UNTIL I SAY “GO”.**

|  |  |  |
| --- | --- | --- |
| **APARTASE** | | |
| **Seconds** | **No Oven mitts** | **Oven mitts** |
| 1-10 |  |  |
| 11-20 |  |  |
| 21-30 |  |  |
|  | Total: | Total: |

**Analysis**

Create two line graphs comparing the data for PART 1, and another comparing PART 2 data. On each graph you will plot two different lines. One line will represent the data gathered without wearing the Oven mitts, the other line will represent the data gathered with the Oven mitts on. Create a legend for each graph, using a different color for each line. Don’t forget to label and number your axes and give each graph a title.





1. What did your hands represent?
2. What did the Legos represent?
3. When you were not wearing Oven mitts, what happened to production when you grabbed the wrong substrate? What vocabulary word can we relate this to?
4. Did the Oven Mitts help or hinder production for Buildase and Apartase? What vocabulary word can we relate this to?
5. What information can we gather from our graphs? If you encountered competitive inhibition, what happened to the amount of products you could make?
6. On the graphs, what is the main difference between wearing oven mitts vs. not wearing oven mitts?
7. How can we relate enzymes and enzyme functions to our lives?