Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_\_\_\_

**sciencemusicvideos: Enzymes and Enzyme Regulation**

**Getting to the tutorials.**

* Go to [www.sciencemusicvideos.com](http://www.sciencemusicvideos.com); Use the College Bio, AP Bio, or Learning Guide Menus to find “Enzymes and Enzyme Regulation”
* *Start with “Enzymes Tutorial”*

**Enzymes tutorial, Part 1**

1. Read the introduction. Check the box below when you’re finished.

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In the space below , summarize the effect of amylase on starch.

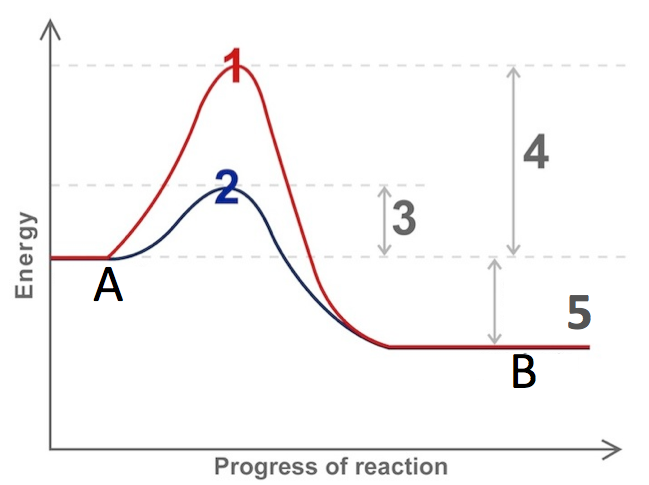
What are enzymes?

2. Complete the interactive reading: Enzymes and Activation Energy. Check the box when you’re done. As you read, answer the following questions.   
☐

a. A catalyst is…

b. Enzymes speed reactions by

c. Complete the key for the diagram below:



A:

B:

1:

2: Course of reaction *with* an enzyme

3:

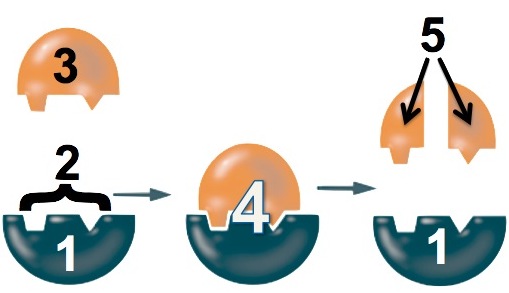
4: Activation energy *without* an enzyme

5:

3. Complete the interactive reading: “Enzymes and Substrates.” Check the box when you’re done.   
☐

a. What’s a substrate?

b. Make a key for the diagram below:



1.

2.

3.

4.

5.

c. What is the “lock and key” model of enzyme action?

d. What is the “induced fit” model of enzyme action.

4. Complete the interactive reading: “Enzymes and their Environment.” Check the box when you’re done.   
☐

a. What is denaturation?

b. Use *denaturation* and *optimum* to explain the two graphs below:

|  |  |
| --- | --- |
| glennSSD:GlennBook_data_6-17-11:Glenn:artist:sciencemusicvideos:www.sciencemusicvideos.com:Tutorial image files:module 09_energy and enzymes:13_activity v. pH graph.png | glennSSD:GlennBook_data_6-17-11:Glenn:artist:sciencemusicvideos:Enzymes:zzz_enzymes curriculum:enzymes quiz images:enzymesTemperature.jpg |
|  |  |

5. Complete the enzymes flashcards. Check the box when you’re done.   
☐

6. Take the enzymes quiz. Check the box when you’re done.   
☐

7. Complete the Enzymes, Interactive Lyrics. Check the box when you’re done.   
☐

PRACTICE RECALLING WHAT YOU KNOW. In the space below, write down everything you’ve learned so far about enzymes.

**Enzymes**

Glenn Wolkenfeld © 2012

They’re the protein catalysts in every organism: ENZYMES!

Through enzymatic action your metabolism’s driven: ENZYMES!

In *staphylococcus*, jellyfish, tarantulas and trees,

They lower activation energy

Enzymes, in you and me now, ENZYMES!

You got ‘em in your cells where they do cellular digestion: ENZYMES!

You got ‘em in your mouth and in your stomach and intestines: ENZYMES!

The thing an enzyme acts upon is called a substrate.

They fit like lock and key with complementary shape

Enzymes, speed up reaction rates: ENZYMES!

An enzyme binds its substrate at its active site: ENZYMES!

Bound together in a complex where they snuggle so tight: ENZYMES!

New bonds will form and break due to the active site’s chemistry

Reactants become products, it’s the enzyme’s specialty,

Product gets release enzyme repeats its action readily: ENZYMES!

Like any molecule an enzyme’s shape defines its function: ENZYMES!

Environmental change that changes shape leads to malfunction: ENZYMES!

Every enzyme has a pH where it catalyzes best,

a pH change will set enzyme activity to rest.

Enzymes are so sensitive they’re easily upset: ENZYMES!

More heat until a certain point increases their efficiency: ENZYMES!

But too much heat denatures them destroying their activity: ENZYMES!

That’s why a fever running high’s a dangerous situation,

All that heat can alter enzymatic conformation.

Keep it 98.6 for enzyme optimization: ENZYMES!

Enzymes in saliva will break starch into glucose: ENZYMES!

If you lack the enzyme lactase then you won’t enjoy milk lactose: ENZYMES!

Tay-sachs, galactosemia and PKU disease,

All caused by inherited enzyme deficiencies

ENZYMES, they’re what everybody needs: ENZYMES!

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_**

**Enzymes tutorial, Part 2 (Enzyme Inhibition and Regulation**

Access this biology180.com tutorial by going to the AP Biology Menu, then *Module 9, Energy and Enzymes*, then the “Enzyme Inhibition and Regulation Tutorial.”

1. Read the introduction and the section on Enzyme Inhibition. . Check the box below when you’re finished.

☐

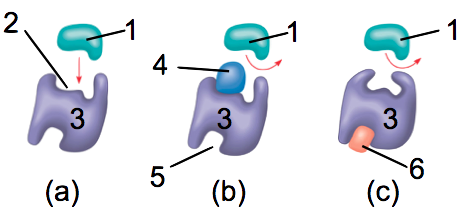
In the space below , summarize the difference between competitive and non-competitive inhibition.

Take the “Enzyme Inhibition” Quiz.

☐

CONSOLIDATING YOUR LEARNING

Make a key to the diagram below. Try to do this without looking at the page. Then go back and check your work.



a:

b:

c:

1:

2:

3:

4:

5:

6:

2. Read the section on enzyme regulation. Check the box when you’re done.

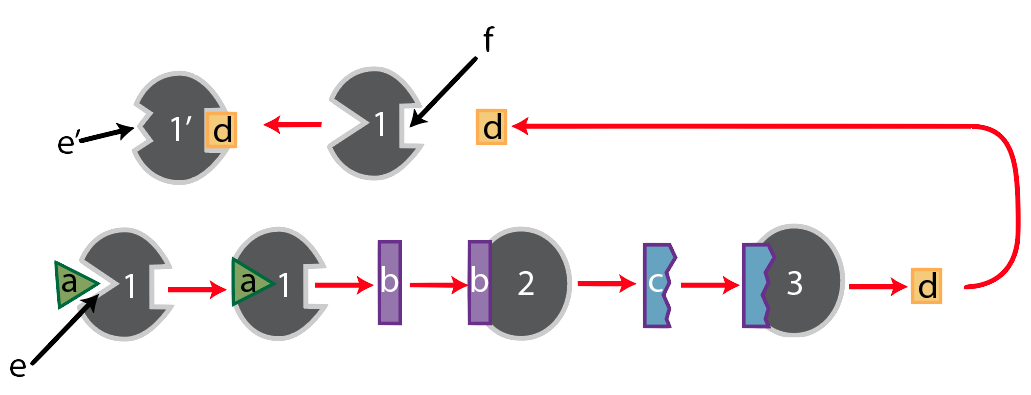
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Briefly define the following terms:

* Metabolic pathway:
* Feedback inhibition:
* Intermediate compound
* Feedback inhibition
* Allosteric site
* Allosteric inhibitor
* Allosteric activator

Take the “Enzyme Regulation” Quiz.

☐

Make a key to the diagram below:

1:

1’:

2:

3:

a:

b:

c:

d:

e:

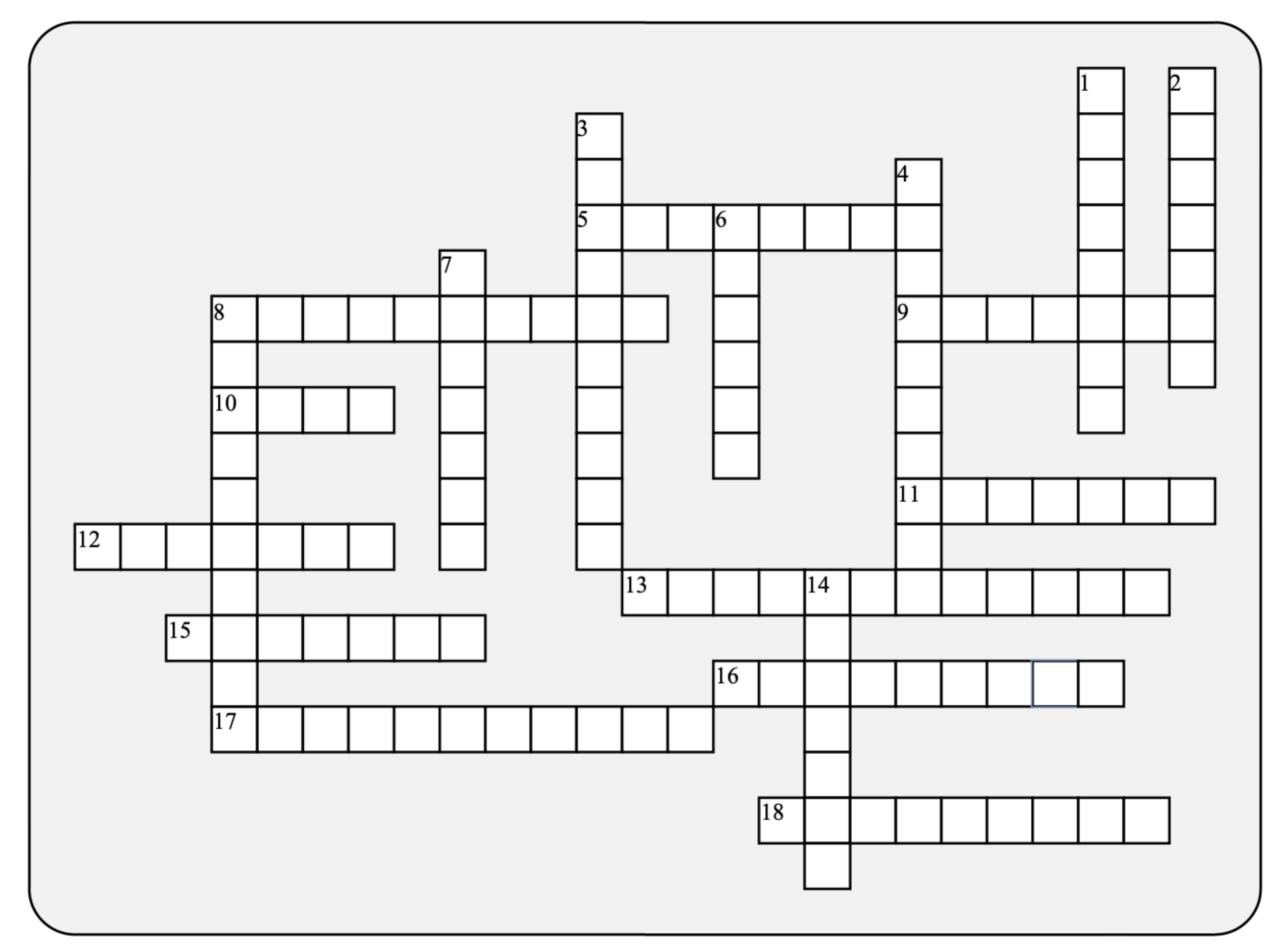
e’:

f:

Reflect: how are allosteric inhibition and non-competitive inhibition similar? How do they differ?

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**Enzymes!**



|  |  |
| --- | --- |
| **Across:** | **Down:** |
| 5 - Too much heat can \_\_\_\_\_\_\_\_\_\_ an enzyme  8 - Enzymes work by lowering \_\_\_\_\_\_\_\_\_\_\_ energy  9 - An enzyme required for digesting starch  10 - Enzymes fit substrates like a key fits a  11 - The changed shape an enzyme acquires after binding its substrate is known as \_\_\_\_\_\_\_ fit  12 - The class of macromolecule that most enzymes belong to  13 - The three dimensional shape of an enzyme is known as its  15 - Measuring the appearance of \_\_\_\_\_\_\_\_ is one way to measure the rate of enzyme activity.  16 - The name of substances that speed up a chemical reaction without being changed by that reaction  17 - The kind of inhibition that occurs when an inhibitor blocks the active site.  18 - The thing an enzyme acts upon | 1 - Inhibition that involves the product of a pathway interfering with one of the pathway's enzymes  2 - They're the protein catalysts in every organism  3 - \_\_\_\_\_\_\_\_\_\_ enzymes break polymers into monomers  4 - Enzymatic action drives your \_\_\_\_\_\_\_\_\_\_\_\_\_\_.  6 - The \_\_\_\_\_\_\_\_\_\_site is where an enzyme binds with its substrate  7 - An enzyme required for digesting milk sugar  8 - A binding site away from the active site that can change the shape of the active site.  14 - Every enzyme has a pH \_\_\_\_\_\_\_\_\_\_\_\_ where it operates most efficiently |

**Possible Answers:**

Activation, Enzymes, Induced, active, allosteric, amylase, catalysts, competitive, conformation, denature, feedback, hydrolytic, lactase, lock, metabolism, optimum, product, protein, substrate