**Topic Review Guide**: Enzyme Structure (Topic 3.1), Enzyme Catalysis (Topic 3.2), and Environmental Impacts on Enzyme Function (3.3)

**To Think About**: The highly complex organization of living systems requires a constant input of energy and the exchange of macromolecules.

**Watch:** [AP Daily Video 3.1 Enzyme Structure](https://apclassroom.collegeboard.org/d/3vforset2c?sui=6,3); [AP Daily Video 3.2 Enzyme Catalysis (Video 1)](https://apclassroom.collegeboard.org/d/9ocatiy2m3?sui=6,3); [AP Daily Video 3.3 Environmental Impacts on Enzyme Function](https://apclassroom.collegeboard.org/d/3i71ggnfyz?sui=6,3)

**Read:** Biology in Focus, Chapter 6.4 - 6.5, pages 125 - 132

Biology for the AP Course, Module 14, pages 196 – 210

Campbell Biology, Chapter 8.4 – 8.5, pages 150 - 157

**Supplementary Resources**: Click the links below for more information to help you learn more about this lesson.

* Guided Notes [3.1](https://docs.google.com/document/d/1P1DJopYQbhF1efNorJPXg9tUtAuayh3HExX55eTEzLA/edit?usp=sharing), [3.2](https://docs.google.com/document/d/1QQKWxAhqhAsgMqvXy6ObegDeftqSg2REoYOanoDPro4/edit?usp=sharing), [3.3](https://docs.google.com/document/d/1bc10n24hVynC8xT2OpLG85Wmje9M8C4wZi6NAOfmAPY/edit?usp=sharing)
* [Mr. Andersen’s Enzymes Video](http://www.youtube.com/watch?v=ok9esggzN18)
* Sumanas: [Activation Energy and Enzymes](http://www.sumanasinc.com/webcontent/animations/content/enzymes/enzymes.html)
* Maricopa College Online Biology Book: [Enzymes](http://www.emc.maricopa.edu/faculty/farabee/biobk/biobookenzym.html)
* Lew-Port’s Biology Place: [Enzyme Activity](http://www.lpscience.fatcow.com/jwanamaker/animations/Enzyme%20activity.html)
* College of DuPage: [Enzymes Review](http://bio1151.nicerweb.com/chap08.html)
* Kimball’s Biology Pages: [Enzymes](http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/E/Enzymes.html)
* Northland College: [Enzymes](http://programs.northlandcollege.edu/biology/Biology1111/animations/enzyme.swf)
* KScience: [Enzymes](http://www.kscience.co.uk/animations/anim_2.htm)
* The Open Door Web Site: [Enzymes](http://www.saburchill.com/IBbiology/chapters01/016.html)

**Recall and Review:** Use the lecture in the video and your textbook to help you answer these questions in your BILL. Before you start, mark your level of understanding. After you have completed the questions, then check to see what level of understanding you have achieved. If you’re still at a level N or level A, it is recommended that you stop in for office hours.

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| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can describe the properties of enzymes (Topic 3.1)* |
| **N** | **A** | **M** | **E** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. **Draw** a diagram that illustrates the relationship between the substrate and an enzyme. Label the following items: enzyme, substrate, active site. |
|  |  |  |  | 1. **Explain** how the structure of an enzyme determines that enzyme’s specificity. |

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| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can explain how enzymes affect the rate of biological reactions. (Topic 3.2)* |
| **N** | **A** | **M** | **E** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. The graph at right illustrates the changes in energy that occur in a chemical reaction with and without an enzyme present. **Explain** what is occurring in the graph. |
| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can explain how changes to the structure of an enzyme may affect its function. (Topic 3.3)* |
| **N** | **A** | **M** | **E** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. **Explain** what is meant by denaturing. |
|  |  |  |  | 1. **Describe** how denaturing an enzyme affects an enzyme’s structure and function. |
| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can explain how the cellular environment affects enzyme activity. (Topic 3.3)* |
| **N** | **A** | **M** | **E** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. **Define** pH. **Explain** how changes in pH affect enzyme activity. |
|  |  |  |  | 1. **Explain** how changes in temperature affect enzyme activity. |
|  |  |  |  | 1. **Describe** how substrate concentration affects enzyme activity. |
|  |  |  |  | 1. **Describe** how enzyme concentration affects enzyme activity. |
|  |  |  |  | 1. **Explain** why enzyme catalyzed reactions reach a maximum velocity. Produce a sample graph that demonstrates what data gathered from an enzyme-catalyzed reaction would look like if plotted. |
| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can explain how the cellular environment affects enzyme activity. (Topic 3.3)* |
| **N** | **A** | **M** | **E** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. **Create** a Venn diagram that illustrates similarities and differences between allosteric and competitive inhibitors. |

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| Learn More: For more examples of enzymes, use the links below:   * Elmhurst College: [Enzyme Inhibitors](http://www.elmhurst.edu/~chm/vchembook/573inhibit.html) * Elmhurst College: [Enzyme Inhibition in Medicine](http://www.elmhurst.edu/~chm/vchembook/651enzymeinhibit.html) * Biotechnology Industry Organization: [Enzymes in Food Production](http://www.bio.org/media/biobytes-enzymes-food-production) * PHSchool.com: [Enzyme Catalysis Lab](http://www.phschool.com/science/biology_place/labbench/lab2/intro.html) |