Enzymes & Substrates

HS_ LS1-6: Construct and revise an explanation based on evidence for the role of enzymes in life processes.
HS – LS1-6: Analyze data to determine the factors that influence enzyme activity.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	LS1.C: Organization for Matter and Energy Flow in Organisms The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.	Energy and Matter Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.

Day 1

TIME	TASK	DESCRIPTION	NEEDS
10 min	**Sticky Discussion**	**Directions:** Take a look at the picture. There are two scenarios here. First there is the picture of Ana. Ana grew 4" over the summer. Second, is Matt. Matt loves ice-cream, and discovered that he gets sick every time he eats ice cream. Take 3 stickies. Offer one reason they are both experiencing these changes. Do not put your name on the stickies	Each student will need 3 stickies and a pen/pencil.
5 min	**Sticky Exchange**	**Directions**: working in small groups, stack all of your stickies in a pile. Exchange your stickies with another group.	Have stickies prepared
15 min	**The Wall of Ideas**	**Directions:** Every student will have 3 new stickies they did not create. Working quickly, every student will read a sticky aloud and position them on the board in groups. The goal is to hear EVERY idea and to sort they by group.	Have slides prepared
10 min	**Video Introduction**	**Directions:** To clarify our understanding of Enzyme and activation energy, we will watch	(LINK)

		the video and work with a partner to answer the questions. Add your question to the google slide.	
10 min	**Application**	**Directions:** Working with a partner, share your ideas on how Protease Enzymes, Lipase Enzymes, and Carbohydrase Enzymes impact our body. Work with your partner to conduct a google search to define them and identify one example.	Have slides
15 min	**Translate**	**Directions:** We will share what each group came up with. Use a Chat GPT or Claude to come with the explanations of (1) Lipase, (2) Carbohydrase, & (3) Protease. Share a simple explanation	

Day 2

TIME	TASK	DESCRIPTION	NEEDS
5 min	**Introduce Enzyme Comic Think, Pair, Share**	**Directions:** You will work in 5 groups to learn a key component of the Enzyme process. Each group will lean 1 topic and will teach the entire class. **Group 1**: How Enzymes, Substrates, Activation Sites & ending with "ase" **Group 2:** Activation Energy & reusable products **Group 3:** The Lock & Key Model **Group 4:** 3 types of digestive enzymes (lipase, Carbohydrase, & protease) **Group 5:** How factors like heat, temperature and inhibitors impact enzymes	Have slide ready and houndout prepared
10 min	**Learn**	Each group will learn the concept and prepare to teach them to the students. (2) Video + Comic	Have text ready
15 min	**Teach**	**Directions:** Each group will have a member form groups (1-5). Using the comic handout, students will update their comic with correct information.	Have slide ready
15 min	**Teacher Lecture & Edit**	The teacher will use the lecture notes to teach the 5 concpets. Compare your notes to the teacher's to make sure you have accurate content.	Have slides ready
20 min	**Quick Read**	**Directions:** Students will read a short text about Enzyme interactions and will produce summary notes	Have Text embedded in handout
10 min	**Questions & Answer**	We will ask questions of the teacher.	

Day 3

TIME	TASK	DESCRIPTION	NEEDS

5 min	**Microscope Review**	**Directions:** You will watch a brief video to review how to use your microscope	Have the video embedded in the slide
10 min	**Working Pairs**	Prepare your microscope and your application for the	Have a slide prpeared
40min	**Laboratory**	**Directions:** work with a partner to compete the steps of the laboratory. Be sure to have a conversation with the learning app and to see every aspect of the microscopic experimentation.	Have 20 3D printed Labs Have lab protocol in lab
15 min	**Debrief**	**Directions:** Working with your partner answer the following questions: (1) What evidence from the laboratory proved the relationship between enzymes and the rate fo reaction? (2) How did the shape of the enzymes and substrate impact the interactions. (3) What factors changed the outcome of the experiences.	Have the question in a google fomr
20 min	**Quick Read**	**Directions:** Students will read a short text about Enzyme interactions and will produce summary notes	Embed text in the handout