ENZYMES

Answer Key (PDF)

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ENZYMES
(answers)

1. Enzymes are chemicals that act as biological **catalysts**, meaning that they speed up **chemical reactions** without being used up themselves. Enzymes are extremely important because without them, our various internal reactions would occur too **slowly** to keep us alive and healthy.
Enzymes are **proteins**, consisting of one or more polypeptide chains. They work by reducing the amount of **activation energy** required to 'kick-start' a reaction. This makes the reaction go **faster**.
Enzymes are highly specific, that is, each one has a particular type of substance that it acts on, referred to as its **substrate**. An enzyme binds to its **substrate** at a specialized region known as the **active site**.
Enzymes tend to have **optimal** conditions under which they work best, such as particular temperatures or pH. They can be **denatured** at high temperatures, meaning that the shape of the **active site** has been permanently changed and can no longer bind to the **substrate**. They can also be **inactivated**, or their activity may be **slowed**, by cold temperatures or changes in pH.

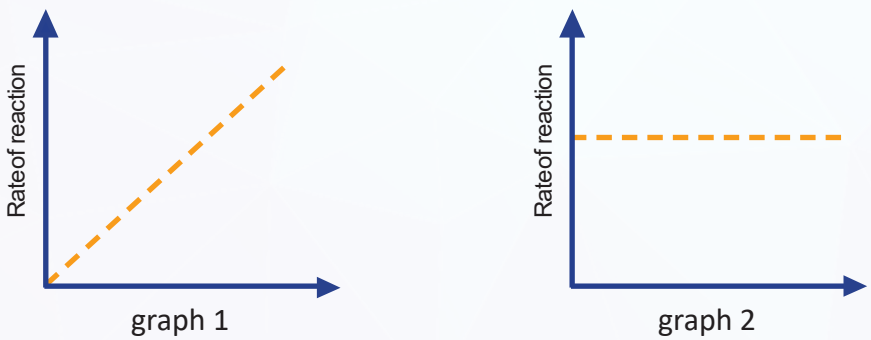
2. **Model 1**: Lock-and-key.

Model 2: Induced fit.

(a) See above diagrams.

(b) In the lock-and-key model, the active site of the enzyme fits to the substrate with jigsaw precision, that is, they are a perfect fit. In the induced fit model, the active site of the enzyme does *not* fit perfectly to the substrate, but changes slightly to accommodate it (at the end of the reaction, the active site returns to its original shape).

3.



(a) (i) Graph 2 (ii) Graph 1

(b) Increasing the substrate concentration (graph 2) does not increase the reaction rate because once all enzyme active sites are occupied, the speed at which they work remains steady (assuming that all other factors, such as temperature, pH etc. remain constant). On the other hand, if you increase the enzyme concentration (graph 1), more and more active sites become available for the substrate to bind to, so the reaction gets faster.

4.

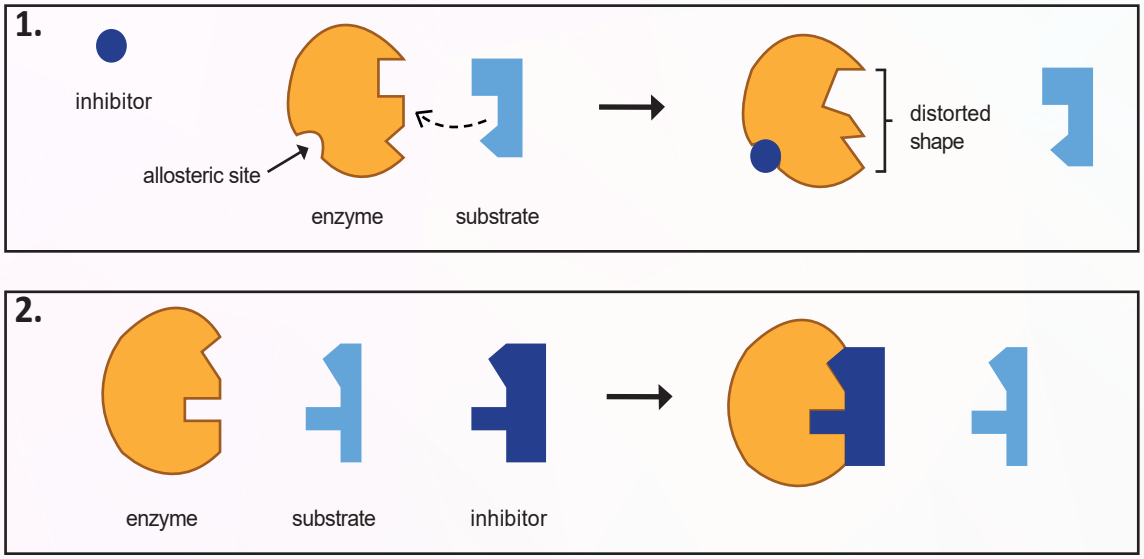
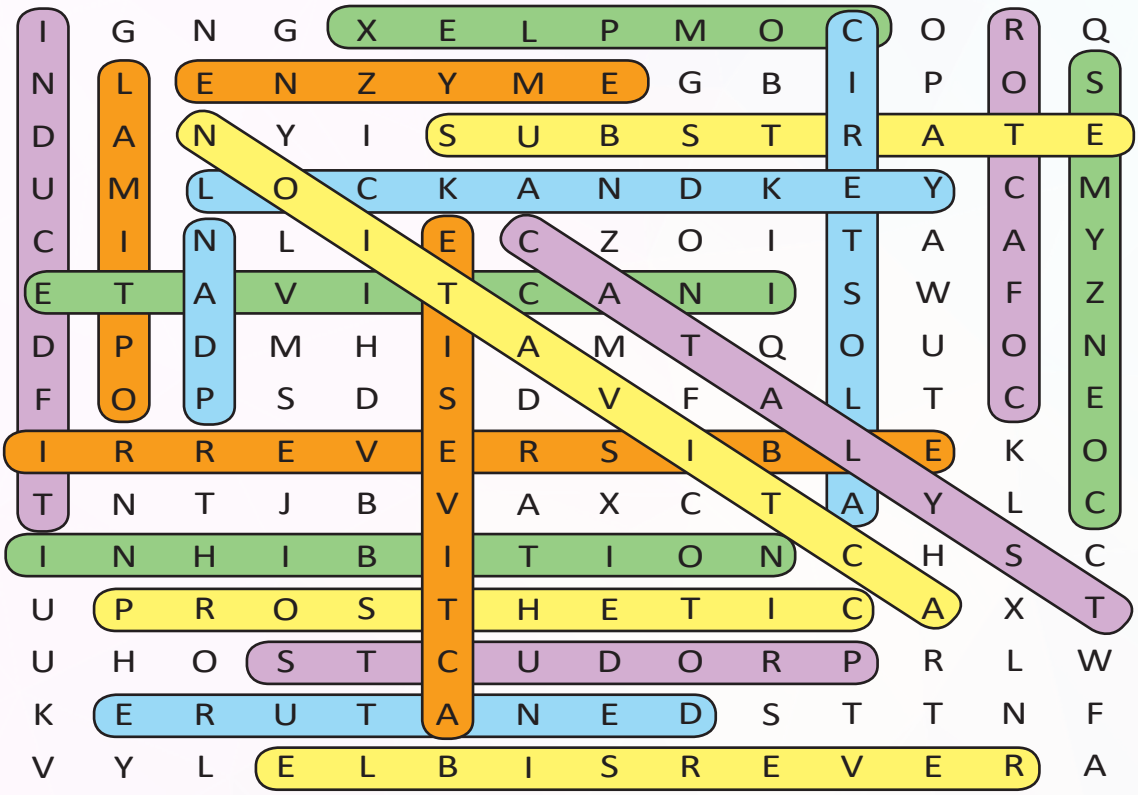


Diagram 2 shows *competitive inhibition* because, as the name suggests, the inhibitor is competing with the substrate for the enzyme's active site. The inhibitor is able to bind to the enzyme because it has a similar shape to the substrate.

Diagram 1 shows *non-competitive* inhibition because in this case, the inhibitor binds to the enzyme not at the active site, but at another point, the allosteric site. This has the effect of changing the shape of the active site so that the substrate can no longer bind to it.

ENZYMES WORD FIND
(answers)



Answers to clues:

1. Denature
2. Irreversible
3. Cofactor
4. Activation
5. Catalyst
6. Lock and key
7. Active site
8. Allosteric
9. Prosthetic
10. Inhibition
11. Substrate
12. Induced fit
13. Coenzymes
14. Complex
15. Products
16. Inactivate
17. Enzyme
18. Reversible
19. Optimal
20. NADP

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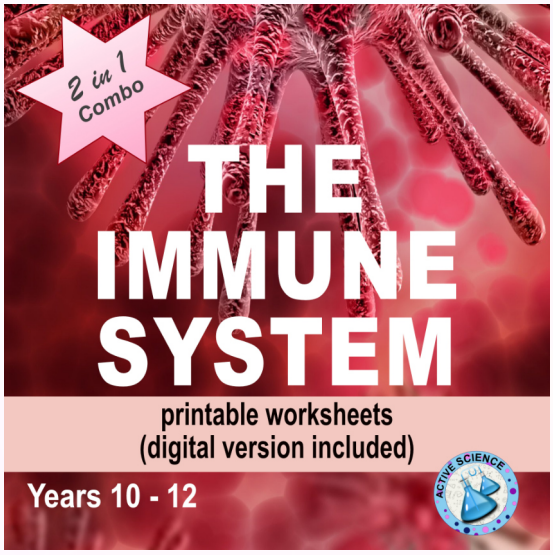

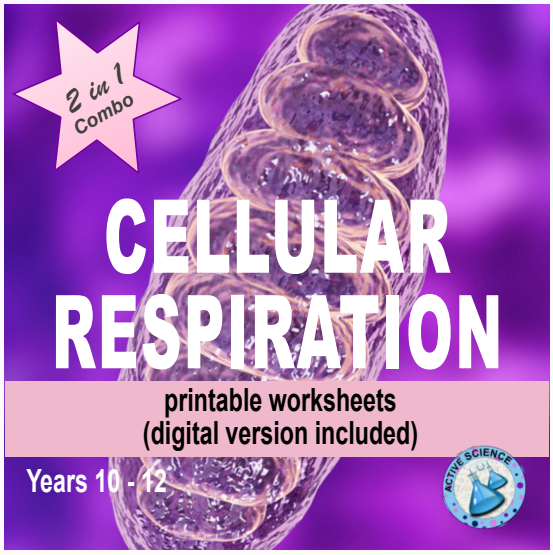

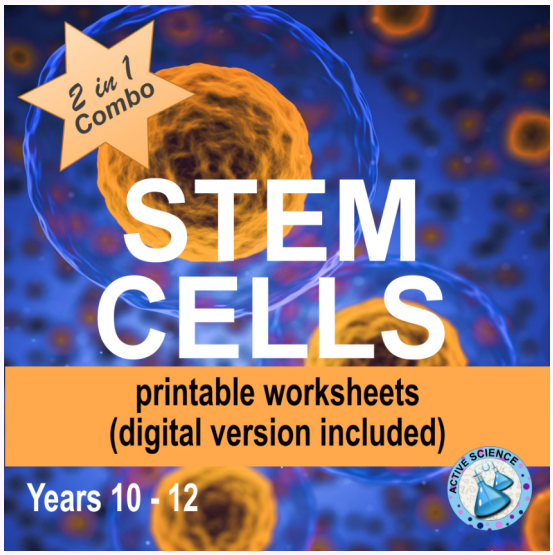

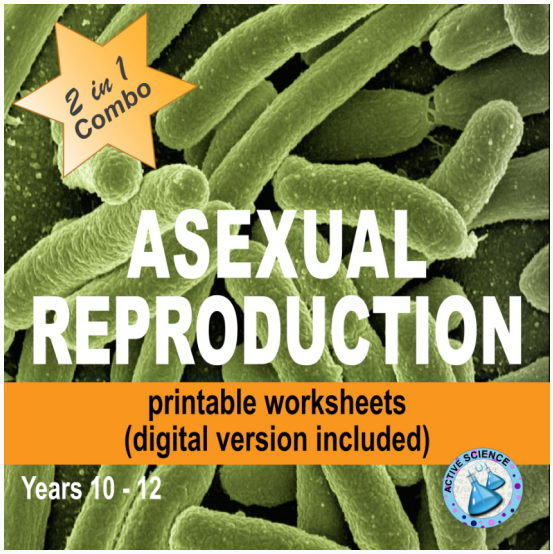

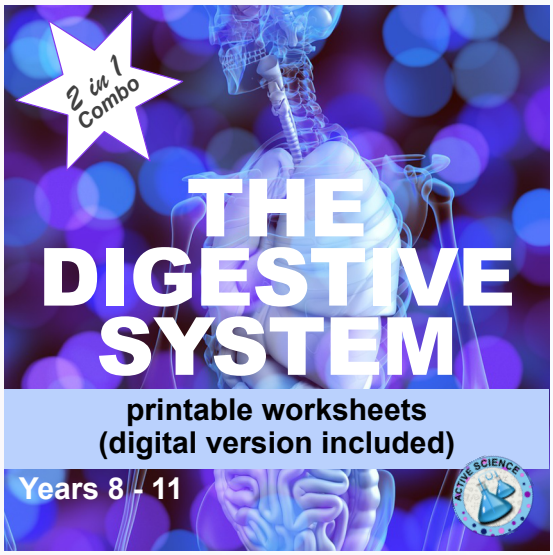

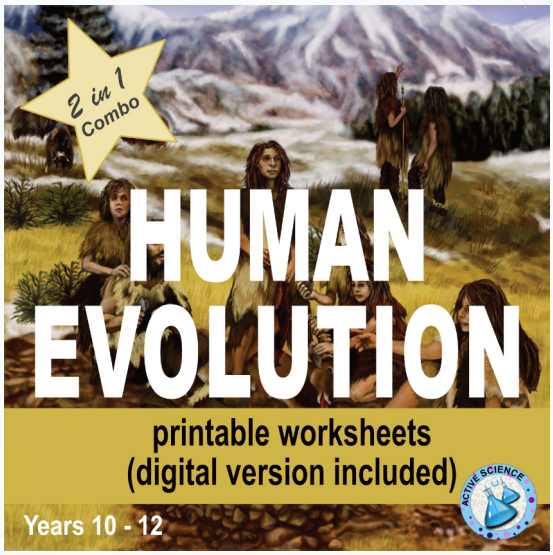

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