Name:

The Molecular Basis of Inheritance

- Define the following terms, **IN YOUR OWN WORDS, IN AS FEW WORDS AS CLARITY ALLOWS**.

complementary base pairing	
purines	
pyrimidines	
replication	
mRNA	
transcription	
codon	
rRNA	
tRNA	
anticodon	
polysome	
recombinant DNA	
mutagens	
translation	
ribosome	
Genetic Code	

All nucleotides are made of the following three parts:

In RNA, the base _____ is replaced with the base _____.

Mix and match the following bases with their correct partner for base pairings: (2)

	1.	purine	A	adenine
	2.	pyrimidine	B	cytosine
	3.	adenine	C	guanine
	4.	guanine	D	purine
	5.	cytosine	E	uracil
	6.	thymine	F	thymine
	7.	uracil	G	pyrimidine

List 3 differences in structure in RNA, compared to the structure of DNA.

1.	
2.	
3.	

Fill in the following table: (3)

DNA									
mRNA	G	G	U	G	U	A	A	U	U
anticodon									
amino acid									

Protein is produced during the process called _____. This process has three main parts:

Three mutagens are:

Put phrases 1 - 6 in the correct order to describe protein synthesis:

1. mRNA is produced in the nucleus
2. ribosomes move along mRNA
3. DNA has a code
4. polypeptide results
5. tRNA brings amino acids to ribosomes
6. mRNA moves to ribosomes

1. The **adjacent nucleotides** in **DNA** are bonded to each other by
a. covalent bonds.
b. hydrogen bonds.
c. ionic bonds.
d. peptide bonds

2. The **nitrogenous base** in **DNA** are bonded to each other by
a. covalent bonds.
b. hydrogen bonds.
c. ionic bonds.
d. peptide bonds.

Use the table below to answer questions 3 and 4.
mRNA Sequence: **CUC-AAG-UGC-UUC**

Three-letter codons of messenger RNA and the amino acids specified by the codons

AAU, AAC — Asparagine	CAU, CAC — Histidine	GAU, GAC — Asparatic acid	UAU, UAC — Tyrosine
AAA, AAG — Lysine	CAA, CAG — Glutamine	GAA, GAG — Glutamate	UAA, UAG — Stop
ACU, ACC, ACA, ACG — Threonine	CCU, CCC, CCA, CCG — Proline	GCU, GCC, GCA, GCG — Alanine	UCU, UCC, UCA, UCG — Serine
AGU, AGC — Serine AGA, AGG — Arginine	CGU, CGC, CGA, CGG — Arginine	GGU, GGC, GGA, GGG — Glycine	UGU, UGC — Cysteine UGA — Stop UGG — Tryptophan
AUU, AUC, AUA — Isoleucine AUG — Methionine	CUU, CUC, CUA, CUG — Leucine	GUU, GUC, GUA, GUG — Valine	UUU, UUC — Phenylalanine UUA, UUG — Leucine

3. ***Table of Codons above***
Which of the following would represent **the sequence of DNA** from which the mRNA sequence was made?
a. CUC-AAG-UGC-UUC
b. GAG-UUC-ACG-AAG
c. GAG-TTC-ACG-AAG
d. AGA-CCT-GTA-GGA

4. ***Table of Codons above***
The **anticodons** for the codons in the mRNA sequence above are

a. GAG-UUC-ACG-AAG.
b. GAG-TTC-ACG-AAG.
c. CUC-GAA-CGU-CUU.
d. CUU-CGU-GAA-CUC.

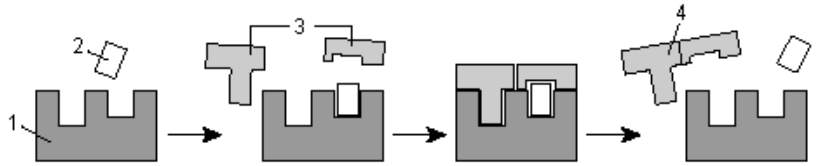
5. The **two chains of the DNA** molecule are **held together by**
a. covalent bonds.
b. hydrogen bonds.
c. ionic bonds.
d. peptide bonds.

6. A section of one **DNA** strand has the sequence **ACCGAGGTT**. What is the sequence of an **tRNA anticodons** from this section of DNA?
a. ACCGAGGUU
b. ACCGAGGTT
c. TGGCTCCAA
d. UGGCUCCAA

Part A: Define the following terms in your own word. Be clear and concise!

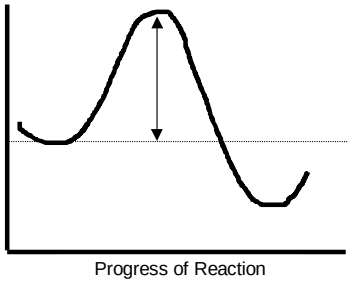
Metabolism	
Substrate	
Enzyme	
active site	
Coenzyme	
metabolic pathway	
activation energy	

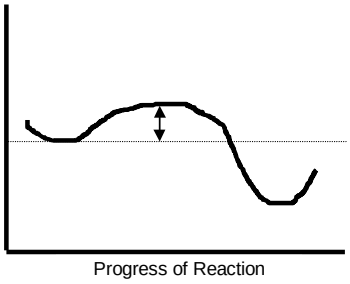
Label the parts on this diagram.



1	
2	
3	
4	

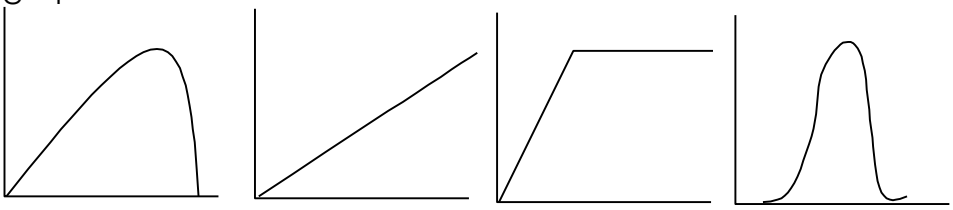
1. Label all missing parts on the graphs to the right. **Highlight the energy of activation** on both graphs.





2. Which graph below best represents a graph of the enzyme activity vs pH? Explain what is occurring at each portion of the graph.

3. Which graph below best represents a graph of the enzyme activity vs temperature? Explain what is occurring at each portion of the graph.



Part C: Answer on separate sheets of paper, in your own words.

1. What advantages can you see in having complex metabolic pathways within body cells to produce various substances, such as amino acids and ATP?

2. How does the "Lock and Key" theory of enzyme action differ from the "Induced Fit" theory? Use diagrams to help your explanation.

3. Why do you think each enzyme has its own preferred pH at which it operates?

4. What is the effect of lowering the temperature on enzyme activity. How about raising the temperature? Draw a graph to show these relationships.

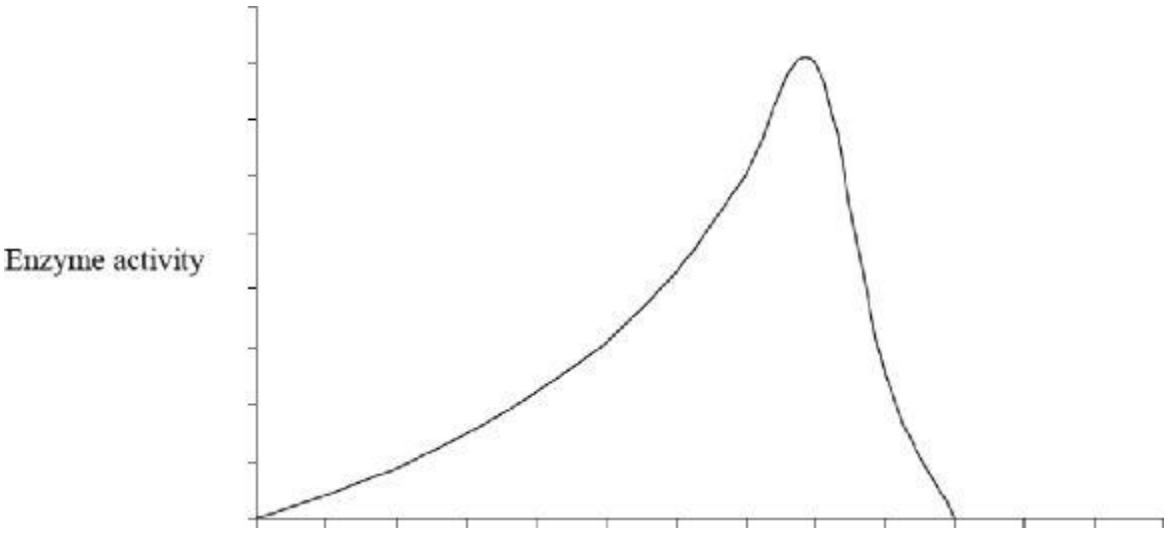
5. Describe three factors that can lead to the denaturing of enzymes. How would denaturing an enzyme affect its activity?

Part D: Multiple choice.

1. When the substrate binds to the enzyme, the active site undergoes a slight alteration to achieve the best fit. This is known as the _____ model. (p. 109)
a. fit-to-be-tied
b. lock-and-key
c. deduced-fit
d. induced-fit
e. reduced-fit

2. Compounds that are needed for enzymes to function properly are
a. heavy metals.
b. vitamins.
c. steroids.
d. buffers.

3. The graph below illustrates the effect of a factor on enzyme activity.



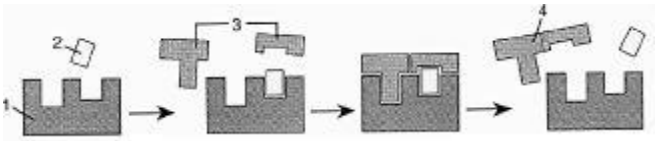
Which factor is most likely to have produced the graph illustrated?
a. Substrate concentration
b. Product concentration
c. Time
d. Temperature

4. The area of an enzyme into which a substrate fits is called the
a. catalyst.
b. product.
c. activated complex.
d. active site.

5. Which of the following situations in an enzyme-catalyzed reaction will produce the **most** product at the **fastest** rate?

	Concentration of Substrate	Concentration of Enzyme
1	Low	Low
2	Low	High
3	High	Low
4	High	High

a. 3 b. 1 c. 4 d. 2



6. In the reaction shown, which number represents a coenzyme?
a. 4
b. 2
c. 3
d. 1

7. The energy that is released from ATP when ATP is broken down comes from the _____.
a. hexose sugar
b. thymine nucleotide
c. phosphate group
d. adenine nucleotide
e. ribose sugar