

Biol1107 Armstrong S12 11 am

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## Short Answer Questions

UUU	Phe	UCU	UAU	Tyr	UGU	Cys
UUC		UCC	UAC		UGC	
UUA	Leu	UCA	UAA	Stop	UGA	Stop
UUG		UCG	UAG	Stop	UGG	Trp
CUU		CCU	CAU	His	CGU	
CUC	Leu	CCC	CAC		CGC	Arg
CUA		CCA	CAA	Gln	CGA	
CUG		CCG	CAG		CGG	
AUU		ACU	AAU	Asn	AGU	Ser
AUC	Ile	ACC	AAC		AGC	
AUA		ACA	AAA	Lys	AGA	Arg
AUG	Met or start	ACG	AAG		AGG	
GUU		GCU	GAU	Asp	GGU	
GUC	Val	GCC	GAC		GGC	Gly
GUA		GCA	GAA	Glu	GGA	
GUG		GCG	GAG		GGG	

## Sequence #1

5' ACGGGCCATGTCAACTGCCATCTAG 3'  
3' TGCCCGGTACAGTTGACGGTAGATC 5'

## Sequence #2

5' ACGGGCCATGTGTTAACTGCCATCTAG 3'  
3' TGCCCGGTACAATTGACGGTAGATC 5'

The DNA fragments shown above contain the complete sequence for a small gene. Sequence #1 is a typical gene. Sequence #2 contains a point mutation.

21. Give the sequence and polarity of two DNA primers 6 nucleotides long that would allow you to amplify the entire fragment. (6 pts)

① 5' ACGGGC 3' ✓  
② 3' TAGATC 5' ✓

22. Assuming the bottom strand is the DNA template used for transcription, what is the amino acid sequence of the protein that is produced by sequence #1? (10 pts)

5' ACGGGC CAA GUC AAC CAA GUC CAA G

Met - Ser - Thr - Ala - Ile - Stop

23. For Sequence #2

a. **On Sequence #2:** circle the nucleotide change that has occurred. (2 pts)

b. Name the type of mutation that has occurred. (2 pts)

Missense

c. **BRIEFLY** explain how this mutation will affect the protein produced. (3 pts)

This mutation will still result in the correct amino acid being produced.

24. The sequence recognized by the restriction enzyme Hae-III is shown at the right. The vertical line indicates where the enzyme cuts the DNA strands.

**Hae-III**

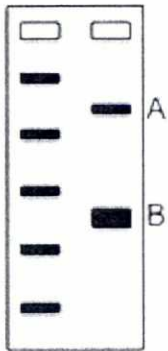
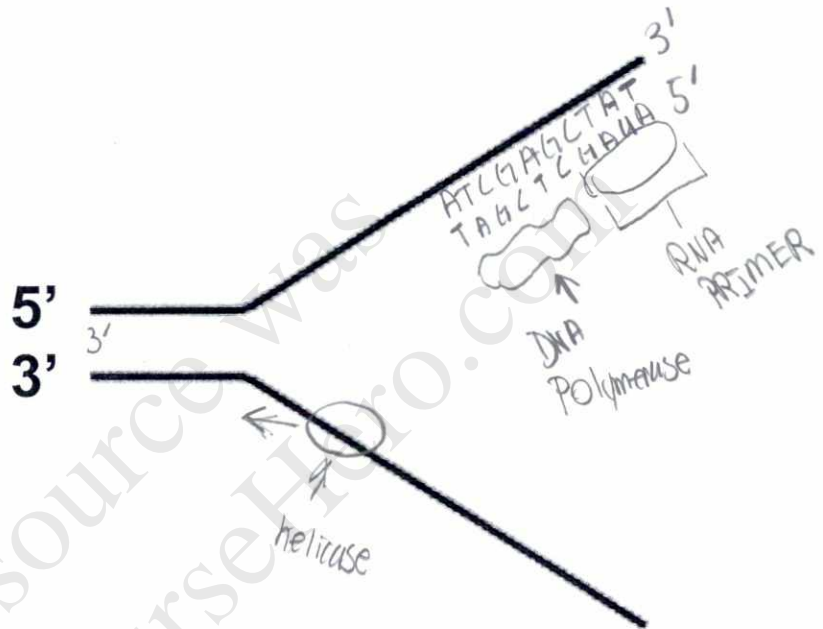
GG | CC  
CC | GG

Use arrows to clearly indicate where this restriction enzyme would cut the DNA shown below. (3 pts)

5' CGATCGGGCCTATGTCAATTGGCCTCGAGATATGACGATCCGGCCCCTCG 3'  
3' GCTAGCCCGGATACAGTTAACCGGAGCTCTATACTGCTAGGCCGGGGAGC 5'

25. On the replication fork shown at the right, for the **LEADING STRAND ONLY**, clearly draw each of the following in the appropriate location: (8 pts)

- newly replicated DNA
- RNA primer
- DNA polymerase
- helicase



26. The figure at the left shows an agarose gel with the sample wells at the top.

- a) **BRIEFLY** explain why the DNA fragments in bands A and B are in different locations. (3 pts)

Electrophoresis sorts DNA fragments according to size. Therefore Band A is larger than Band B.

- b) **BRIEFLY** explain why band B appears brighter (indicated by band thickness in this image) than band A. (3 pts)

Although Band B is smaller than Band A, Band B contains more copies of DNA fragment and is therefore brighter.