Answer key

BB2950 Molecular Biology, Quiz 1: 10-30-17, 25 points total
PLEASE WRITE YOUR NAME ON THE BACK OF EACH PAGE

4. *(3 points)* Fill in the name of each process:

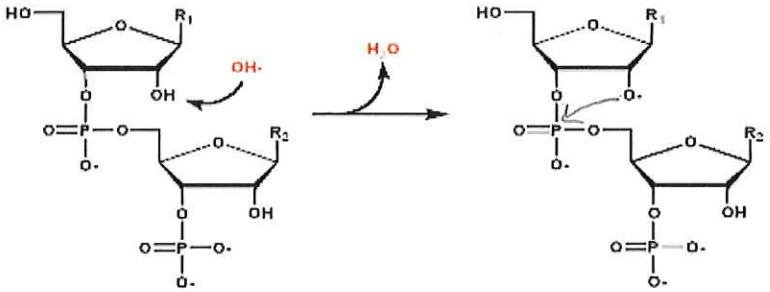
Process	Name
The genome of a cell is duplicated prior to cell division	DNA replication
RNA is synthesized using a DNA template	Transcription
Protein is synthesized using the information in an mRNA	Translation

5. *(4 points)* The schematic below shows deprotonation of the 2' hydroxyl group on the ribose in a strand of RNA (R_1 and R_2 are the nucleobases). The oxygen from the 2' hydroxyl will now "attack" an atom in the sugar-phosphate backbone to form a new covalent bond.

2 pts A. On the molecule on the right, draw an arrow from the deprotonated 2' hydroxyl to the atom that it will attack.

2 pts B. What will happen to the phosphodiester linkage as a result?

It will be broken (hydrolyzed)



6. *(5 points)*

A. Using the codon table, indicate the first three amino acids encoded by the following RNA:

2-5 pts AUGAGUCCGUGU
Met | Ser | Pro

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

Figure 17-4
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2.5 pts B. Suppose the underlined nt was deleted. Would this affect the function of the encoded protein? Why or why not?

It likely would affect the function because it would cause a frameshift (because different amino acids would be encoded from this point onward) and because it would likely lead to truncation (early termination)

7. *(2 points)* Why are A:T base-pairs weaker than G:C base-pairs?

A:T base-pairs are held together with only 2 hydrogen bonds, while G:C base-pairs are held together by 3 hydrogen bonds.

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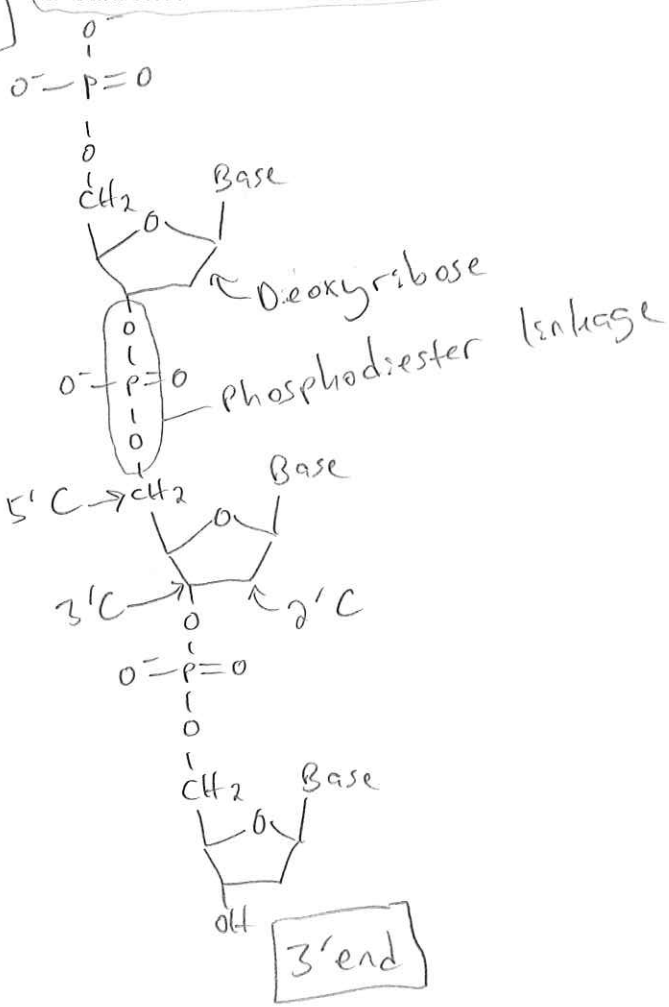
1. *(6 points)* Draw a single strand of DNA that contains three nucleotides. Indicate the bases with a letter or the word "base," and draw the complete molecular structure of the rest of the molecule. Label the 3' and 5' ends of the molecule, the ribose, the phosphodiester linkage, and the 2', 3', and 5' carbons.

0.5 points each

Structure: 2.5 pts



2. *(2 points)* A molecule composed of guanine, deoxyribose, and two phosphates is:

A) dGTP
B) dGDP
C) dGMP
D) GTP
E) GDP
F) GMP

3. *(3 points)* For the following DNA sequence, add the complementary strand and label all of the 5' and 3' ends.

2 pts

1 pt

5' GTTCAGG 3'
3' CAAGTCC 5'