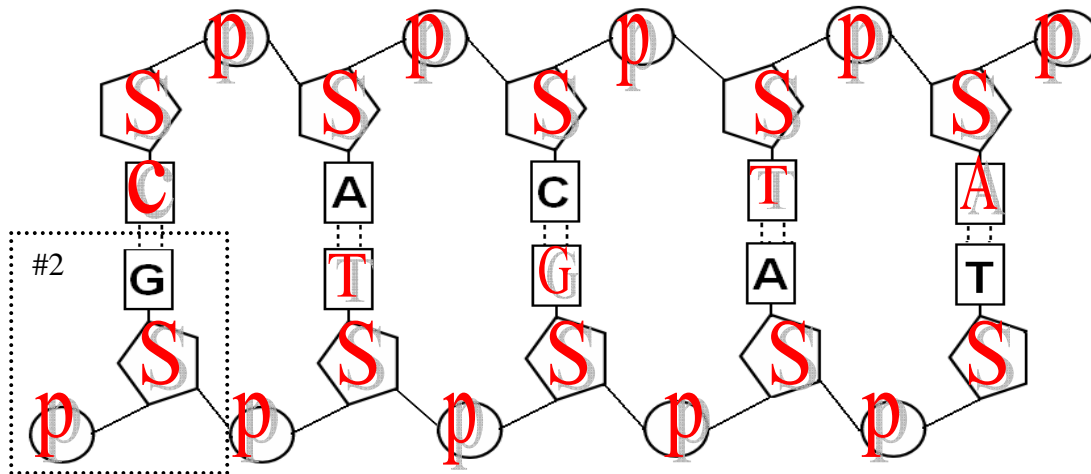


DNA Unit Review Worksheet | **KEY**

Directions: Correct your worksheet using a non blue or black pen so your corrections can be clearly seen.

DNA Basics

1. Label EVERY sugar (S), phosphate (P), and nitrogen base (A, T, C, G) in the diagram below.



2. Examine the objects inside the box labeled #2. What is this called? **Nucleotide**

3. What is the special shape of DNA called? **Double Helix**

4. Which type of chemical bonds will join the two DNA bases? **Hydrogen bond**

5. Which nucleotide part(s) make up the outside of the DNA ladder?

Sugar **Phosphate** Base

6. Which nucleotide part(s) make up the rungs of the DNA ladder?

Sugar Phosphate **Base**

DNA Replication

7. Put the pictures of DNA replication in order by placing a 1, 2, or 3 on the line **above** the picture.

8. Describe what is happening on the lines **below** the picture. Be sure to include the names of any enzyme involved.

3



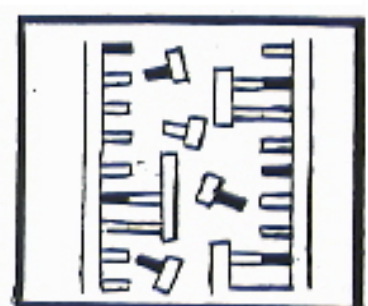
**DNA polymerase
reconnects the 2 DNA
strands**

1



**DNA Helicase breaks
apart the hydrogen
bonds between
nitrogen bases.**

2



**Free floating DNA
nucleotides match to
their complementary
base pair: A=T, C=G**

DNA and RNA Comparison

9. Complete the following chart by comparing DNA, mRNA, and tRNA. Sample answers have been provided.

	DNA	mRNA	tRNA
Molecule full name	Deoxyribonucleic acid	Messenger ribonucleic acid	Omit tRNA
Name of sugar	deoxyribose	Ribose	Omit
Nitrogen Bases Present	Adenine, thymine, cytosine, guanine	Adenine, Uracil, Guanine, Cytosine	OMIT
Function	Stores genetic information	Transcribes a section of DNA (gene) and carries the code to a ribosome	Omit

10. For each statement write DNA, mRNA, or tRNA.

Holds the original coded information for making proteins = **DNA**

Can replicate itself = **DNA**

Copies DNA's coded message = **mRNA**

Carries amino acids to the ribosome for assembly : **omit**

Found in the nucleus only = **DNA**

Found in the cytoplasm primarily **omit**

Found in both the nucleus and cytoplasm = **mRNA**

Carries the coded message to the ribosome = **mRNA**

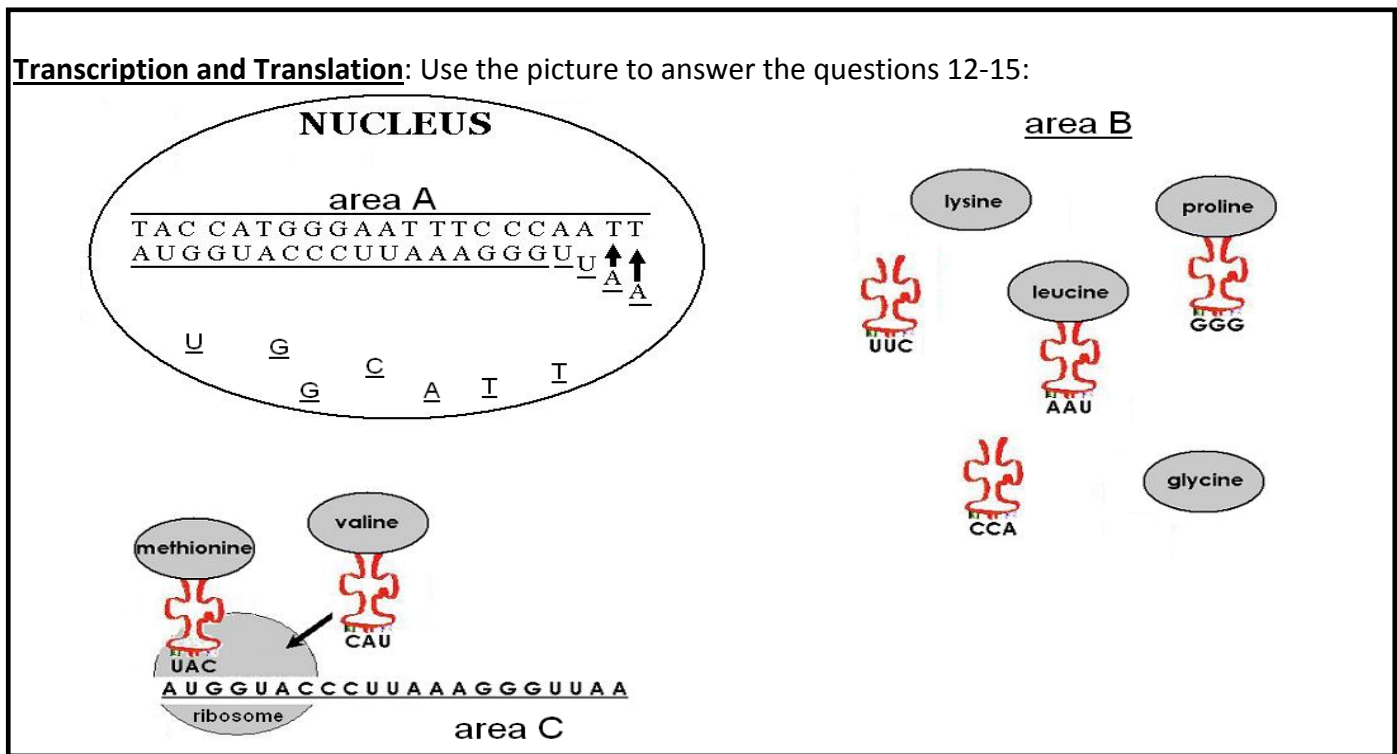
11. For each statement write either DNA helicase, DNA polymerase, RNA Polymerase

DNA polymerase = Reconnects DNA during replication

RNA polymerase = **Omit**

DNA Helicase = Separates DNA during replication

Transcription and Translation: Use the picture to answer the questions 12-15:



12. **Describe** what is forming and happening in **AREA A** of the diagram. (best writing skills)

Transcription is taking place inside area A. mRNA is being created from the strand of DNA.

Specifically, a gene is being transcribed.

13. **Describe** what is being gathered and happening in **AREA B** of the diagram. (best writing skills)

omit

14. **Describe** what is being assembled and happening in **AREA C** of the diagram. (best writing skills)

In area C, the ribosome is performing the process of translation. The ribosome reads one mRNA codon at a time. Then an amino acid is being delivered to the ribosome by the transfer RNA.

15. Examine **area C**. List the amino acids that will be delivered to this ribosome from start to finish.

Remember, in order to find the amino acid, you have to read the mRNA strand.

1st = **Methionine**

4th = **Leucine**

2nd = **Valine**

5th = **Lysine**

3rd = **Proline**

6th = **Glycine**

16. Which mRNA **codon** will start the process of translation? **AUG**

17. Which **amino acid** does every protein begin with? **Methionine**

18. Which mRNA **codons** will end the process of translation? **Stop codons: UAA, UAG, or UGA**

19. What are **tRNA** nucleotides called? **omit**

20. From the DNA information given, fill in the missing information.

DNA	mRNA	tRNA	Amino Acid
TTT	AAA	OMIT	LYSINE

21. From the tRNA information given, fill in the missing information.

DNA	mRNA	tRNA	Amino Acid
GTT	CAA	Omit	GLUTAMINE

22. From the amino acid given, fill in the missing information.

DNA	mRNA	tRNA	Amino Acid
TAC	AUG	omit	METHIONINE

23. Follow the rules of transcription and fill in the boxes below? Ask yourself...what does transcription make?

C	T	G	A	A	T
G	A	C	U	U	A

24. Below is a strand of mRNA. Follow the rules of translation and fill in the tRNA strand below?

OMIT

25. Which two amino acids does the following DNA strand code for?

C	C	A	T	T	A
GLYCINE			ASPARAGINE		

Mutations

26. What is a mutagen? Give an example: **A mutagen is a substance that can cause changes (mutations) to your DNA. Examples: UV exposure (sunlight), radiation, BPAs, smoke, etc.**
27. Mutations that take place on somatic cells cannot be passed on to offspring. Explain this statement. **Only mutations that take place on gametes/germ cells (AKA sex cells like sperm/egg) can be passed on to offspring. Somatic cells are body cells: muscle, skin, hair, stomach, eye, etc. If a mutation takes place within the DNA of a somatic cell, only the individual experiences that mutation, not their offspring.**
28. Using the chart below, what type of mutation would take place if the highlighted and underlined 'G' was substituted for an 'A'? **Silent Point Mutation**

a. What would be the affect on the overall protein? Explain.

There would be no change to the structure or function of the protein because TAA → AUU would still code for the amino acid Isoleucine. Because there is no change to the overall protein this is why the point mutation is considered to be silent.

DNA	AAT	TA<u>G</u>	CTA	GAA	GTA
RNA	UUA	AUC	GAU	CUU	CAU
Amino Acid	Leu	Iso	Asp	Leu	His

29. Using the chart below, what type of mutation would take place if the highlighted and underlined 'A' was substituted for an 'G'? **Silent Point Mutation**

a. What would be the affect on the overall protein? Explain.

There would be no change to the structure or function of the protein because GTG → CAC would still code for the amino acid histidine. Because there is no change to the overall protein this is why the point mutation is considered to be silent.

DNA	AAT	TAG	CTA	GAA	GT<u>A</u>
RNA	UUA	AUC	GAU	CUU	CAU
Amino Acid	Leu	Iso	Asp	Leu	His

Consider the following: If the "A" in GTA was replaced with a "C" this would be considered a POINT MUTATION (not a silent point mutation) because GTC → CAG = Glutamine. The original amino acid for GTA → CAC = histidine; this shows that there would be a change to the amino acid sequence and therefore the structure and function of the protein.

30. Using the chart below, what type of mutation would take place if the highlighted and underlined 'A' was deleted? **Frameshift Mutation (deletion)**

a. What would be the affect on the overall protein? Explain.

By deleting a nucleotide this would cause the codon reading frame to shift, causing the overall protein to be changed from the location of the deleted nucleotide forward. This type of mutation is more serious and destructive to the overall structure and function of the protein.

DNA	AAT	TAG	CT<u>A</u>	TAA	GTA
RNA	UUA	AUC	GAU	AUU	CAU
Amino Acid	Leu	Iso	Asp	Iso	His