INDIAN SCHOOL NIZWA - WORKSHEET

BIOLOGY

CH:5 MOLECULAR BASIS OF INHERITANCE

Name: _____ Date:_____ Class: XII Sec: A

1.	If the sequence of one strand of DNA is 5′-ATGCATGC-3′, what will be the complementary strand? A. 3′-TACGTACG-5′ B. 3′-GCATGCAT-5′ C. 5′-GCATGCAT-3′ D. 5′-TACGTACG-3′
2.	Which of the following features of the genetic code proves its evolutionary significance? A. Degeneracy B. Universality C. Non-ambiguity D. Polarity
3.	Why does DNA replication occur only in 5' to 3' direction? A. DNA polymerase can add nucleotides only to the 5′ end B. DNA polymerase needs a free 5′ phosphate C. DNA polymerase adds nucleotides to the free 3′ OH group D. DNA polymerase is unstable at 3′ end
4.	Removal of introns and joining of exons in a defined order during transcription is called: A. Capping B. Tail addition C. Splicing D. Translation
5.	In the Hershey-Chase experiment, which radioactive isotopes were used to label DNA and proteins respectively? A. C-14 and S-35 B. P-32 and S-35 C. N-15 and P-32 D. S-35 and N-14
6.	The enzyme responsible for removing supercoils ahead of the replication fork is: A. Helicase B. Ligase C. DNA polymerase III D. Topoisomerase
7.	If a tRNA has anticodon 3′-UAC-5′, what is the corresponding mRNA codon? A. 5′-ATG-3′ B. 5′-GUA-3′ C. 5′-AUG-3′ D. 5′-CAU-3′

8. DNA replication requires various enzymes, table represent enzyme and function; choose the function of respective enzyme.

		X	Y	Z	W
(I)	Helicase	Breakdown of H bond	Joining DNA fragments	Formation of RNA primer	Joining DNA fragments
(II)	DNA polymerase	Polymerization of nucleotides	Polymerization of nucleotides	Polymerization of nucleotides	Polymerization of nucleotides
(III)	Ligase	Joining DNA fragments	Formation of RNA primer	Joining DNA fragments	Breakdown of H bond
(IV)	Primase	Formation of RNA primer	Breakdown of H bond	Breakdown of H bond	Formation of RNA primer

A. X
B. Y
C. Z
D. W

9. The scientist who developed a chemical method for the synthesis of RNA molecule with defined base combination is

A. George Gamaw

B. Hargovind Khuarana

C. Marshall Nirenberg

D. Severo Ochao

10. Arun thinks that identifying the exact mRNA sequence from the protein sequence is difficult.

Is he correct and why?
A. No, as the genetic code is universal.
B. Yes, as the genetic code is degenerate.
C. No, as the mRNA is translated into a protein sequence.
D. Yes, as the mRNA contains introns which are non-coding sequences.

11. Assertion: DNA is considered to be better genetic material than RNA for most organisms.
Reason: The 2′-OH group present in DNA makes it labile and less reactive.

12. Assertion: UTRs are present at both 5’ end and 3’end in mRNA.
Reason: UTRs are required for efficient translation process.

13. Assertion: mRNA carries the genetic information from DNA to the ribosome.
Reason: Ribosomal RNA forms the core of the ribosome's structure.

14. Assertion: In Bacteria, translation of mRNA begins before it is fully transcribed.
Reason: There is no spatial separation of cytosol and nucleus in bacteria.

15. A researcher studied the process of transcription in eukaryotic cells. During the experiment, she found that the primary RNA transcript contained sequences that were removed before the mature mRNA was formed. She also observed that the mature mRNA had a 5′ cap and a 3′ poly-A tail.
1. What are the sequences that are removed from the primary transcript called? Why are these sequences removed?
2. What is the function of the 5′ cap on the mature mRNA?
3. What role does the 3′ poly-A tail play in mRNA stability?
4. Why is processing of primary RNA transcript important in eukaryotes but not in prokaryotes?

16.	Why are Okazaki fragments formed only on the lagging strand and not the leading strand during DNA replication?
17.	A mutation occurs in the promoter region of a gene, making it non-functional. Predict and explain the effect on gene expression.
18.	Suppose a eukaryotic cell is exposed to a chemical that inhibits the addition of the 5′ cap during mRNA processing. Predict the consequences on gene expression.
19.	Meselson and Stahl used ^{15}N and ^{14}N isotopes in *E. coli* to prove the mode of DNA replication. What observations did they make, and how did it support the semi-conservative model?
20.	How is eukaryotic mRNA processed before translation? Why are these modifications necessary?
21.	Explain how the structure of tRNA is suitable for its function in translation. Also describe how the accuracy of translation is ensured.