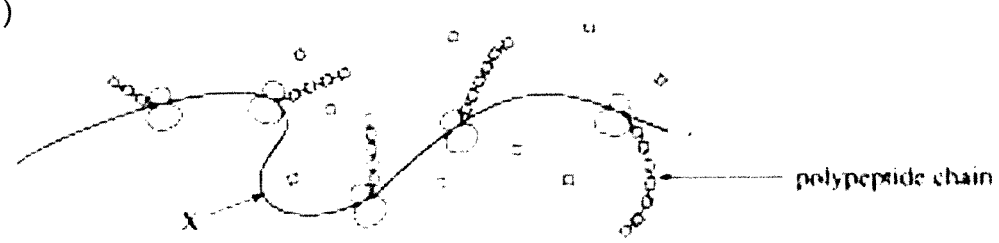
Biology 12
Protein Synthesis Worksheet

Name: KEY
Date:
Block:

1)



The molecule represented by the line labeled **X** is
A. DNA. B. tRNA. C. rRNA. D. mRNA.

2) A section of DNA has the following sequence of nitrogenous bases:
CGAT T ACAG
Which of the following sequences would be produced as a result of transcription?
A. CGTUUTCTG B. GCTAATGTC C. CGAUUACAG D. GCUAAUGUC

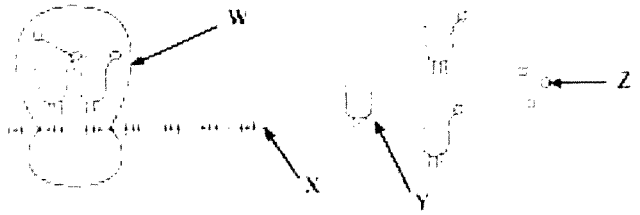
3) 1. Uracil bonds with adenine.
2. Complementary bonding between codon and anticodon.
3. DNA unzips.
4. mRNA joins with ribosome.

The correct order of the above during protein synthesis is
A. 1, 2, 4, 3 B. 1, 3, 2, 4 C. 3, 1, 4, 2 D. 3, 2, 1, 4

4) Give the location of the following processes in the cell:
i) transcription: nucleus
ii) translation:) cytoplasm ribosome

5) . Due to a mutation, one base pair is lost from a DNA molecule. Describe the effect this mutation has on the protein being synthesized.

frameshift



The diagram above shows a part of the process of protein synthesis.
a) Identify the following labeled structures.
W: ribosome **X:** mRNA
Y: tRNA **Z:** amino acid
b) Name the stage of protein synthesis represented by the diagram above.
translation - elongation
c) Where in the cell is **X** synthesized?
nucleus

6)

Three-letter codons of messenger RNA and the amino acids specified by the codons			
AAU, AAC — Asparagine	CAU, CAC — Histidine	GAU, GAC — Aspartic 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

a) Given the DNA sequence **CACGTATGCAAAATT**, use the table above to describe the primary structure of the protein it would transcribe. (Assume initiation has occurred.)

GUGCAUA CGUUUUAA

b) A strand of DNA has the following bases: **CACGGCC**

CCG GCC
GGC CGG

If the adenine base was deleted, which amino acids would be coded for?

D A. valine, proline B. glycine, alanine C. proline, arginine D. glycine, arginine

c) Determine the sequence of amino acids produced by this DNA sequence:
GGAGTTTTC

CCUCAAAAG
Pro glut Lys

C A. Proline, Valine, Lysine. B. Glycine, Valine, Leucine.
C. Proline, Glutamine, Lysine. D. Glycine, Glutamic acid, Leucine.

d) A tRNA molecule with the anticodon GCU would be carrying the amino acid

D A. valine. B. alanine. C. tyrosine. D. arginine.

CGA mRNA
GCU anti

e) If the code for an amino acid is AGC on the DNA molecule, the anticodon on the tRNA would be:

UCG AGC

A A. AGC B. TGC C. UCG D. UGC

f) If the triplet code on a DNA molecule changes from ACT to AGC, the result is called

A A. mutation. B. metastasis. C. translation. D. transcription.

ACT to AGC