

Unit 4 study guide: Central Dogma and the Cell Cycle

Name Answer Key

What is the structure of DNA called? Double Helix

1) Define genes, chromatin, and chromosomes.

Genes	Chromatin	Chromosomes
<u>Segment of DNA</u>	<u>Loose DNA & protein</u>	<u>Condensed DNA & protein</u>

2) What are the complementary base pairs in DNA? Write the 1 letter symbol & spell them out.

Note which bases pair together. Adenine (A)-Thymine (T) & Cytosine (C)-Guanine (G)

3) What are the complementary base pairs in RNA? Write the 1 letter symbol & spell them out.

Note which bases pair together. Adenine (A)-Uracil (U) & Cytosine (C)-Guanine (G)

4) What type of bond holds the nitrogenous bases together? hydrogen bonds

5) There are three subunits that make up nucleotides. The backbone of the DNA is made up of the sugar and the phosphate while the 'rungs' or 'steps' of the DNA 'ladder' are made up of the base pairs.

6) Use a chart to compare and contrast RNA and DNA in terms of structure, sugars, and bases.

	DNA	RNA
Structure	<u>double helix</u>	<u>single stranded</u>
Sugar	<u>deoxyribose</u>	<u>ribose</u>
Bases	<u>A T C & G</u>	<u>A U C G</u>

7) If the template strand of a DNA molecule reads ATGCCGT, what would the complementary strand read? TACGGCA

8) HONORS: What is the name of the enzymes which 'unzips' the DNA? Helicase

9) HONORS: What is the name of the enzyme which adds nitrogen bases to create a strand of DNA? DNA Polymerase

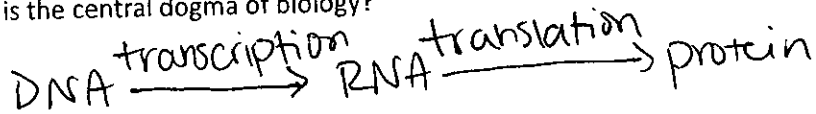
10) Complete the processes of transcription and translation for the following DNA strand:

DNA template	AAC TAG GGT
mRNA	<u>UUG AUC CCA</u>
Amino acids	<u>leucine Isoleucine Proline</u>

11) Complete the table on the three types of RNA.

RNA types	Function
mRNA	<u>carries the message from DNA to the ribosome</u>
rRNA	<u>the "machine" that builds the protein</u>
tRNA	<u>Contains the anticodon & carries over the amino acids</u>

- 12) What is the process by which a DNA molecule is copied? DNA replication
 13) What is the central dogma of biology?



- 14) A sequence of three nucleotides that together form a unit of genetic code in a DNA or RNA molecule is called a what? codon
 15) What are the building blocks (subunits) of proteins? amino acids
 16) Amino acids are linked together to form polypeptides. Polypeptide chains form proteins. Amino acids are linked together by what type of bond? peptide bond
 17) A DNA segment is changed from AATTAG- to- AAATAG. What kind of point mutation is this? substitution
 18) A DNA segment is changed from AATTAG to ATATAG. What kind of point mutation is this? inversion
 19) If a mutation in DNA does **not** change the amino acid that is being made, what kind of mutation is it? ~~missense~~ silent
 20) What are two examples of frameshift mutations and why are they so detrimental?

Deletions and insertions. They change the entire codon reading frame.

- 21) Can a mutation be beneficial and if so, how?
Yes. Good mutations can help an organism be better adapted to its environment
 22) Give three examples of things that can cause a mutation.

UV rays (sunlight), chemicals, mistakes during DNA replication, transcription

- 23) What would happen if a cell's DNA contains a mutation which leads to the inhibition of the production of proteins that assist in the checkpoints of the cell cycle? uncontrolled cell division (cancer)
 24) Complete the set for the following:

DNA template	TAG TAG AAA.GTT TGA ATT
DNA complementary strand	ATG ATC TTT CAA ACT TAA
mRNA	AUG AUC UUU CAA ACU UAA
tRNA	UAC UAG AAA GUU UGA AUU
Amino acid	Met - Iso - Phe - Gln - Thr - stop

- 25) What does the cell do during interphase? Grow and Replicate DNA
- 26) In which phase of the cell cycle does DNA replication occur? S phase
- 27) During mitosis, what types of cells are being replicated? Somatic diploid cells
- 28) How many daughter cells are produced during mitosis? 2
- 29) Fill in the table with the appropriate information about each phase of mitosis

Phase of mitosis	Picture of cell	What happens
Prophase		<ul style="list-style-type: none"> - Nuclear envelope breaks down - Spindle fibers emerge - Chromosomes become visible
Metaphase		Chromosomes line up along the metaphase plate
Anaphase		Sister chromatids are pulled apart by the spindle fibers to opposite poles of the cell
Telophase		<ul style="list-style-type: none"> - Spindle fibers release chromosomes - Nuclear envelopes form around 2 clusters of chromosomes

30) HONORS: How is cytokinesis different in plant and animal cells?

in a plant, a cell plate forms to separate 2 cells

in an animal cell, the cytoplasm is "pinched" apart