Name _____ Date _____

Protein Synthesis: Putting Transcription and Translation in Order

Directions: Answer the questions on protein synthesis, which include two order sets and a group that uses part of the standard genetic code.

1. In a eukaryotic cell, which molecule carries a gene's instructions from the nucleus to the ribosomes in the cytoplasm?

A. The DNA of the gene itself
B. Ribosomal RNA (rRNA)
C. Messenger RNA (mRNA)
D. Transfer RNA (tRNA)

2. Choose words from the bank to finish these sentences comparing RNA with DNA.

Word bank

uracil • ribose • single-stranded • glucose • double-stranded • adenine

RNA uses the base _____ in place of thymine, and its sugar is _____ instead of deoxyribose. Most RNA molecules are _____, while the DNA in cells is usually double-stranded.

3. Put these events of transcription in order, from the start of a gene to the release of its RNA copy. Label each event First, Second, Third or Fourth.

Write the letter of the matching answer on each line.

1. _____ RNA polymerase reaches a signal that marks the end of the gene.
2. _____ RNA polymerase binds to the DNA at the start of the gene.
3. _____ The new RNA strand comes away from the DNA.
4. _____ RNA polymerase moves along the template strand, adding RNA nucleotides that pair with its bases.

Choices for question 3

A. Fourth
B. Second
C. First
D. Third

4. Put these events of translation in order, from the start codon to the stop codon. Label each event First, Second, Third or Fourth.

Write the letter of the matching answer on each line.

1. _____ The first peptide bond forms, linking the first two amino acids.
2. _____ The ribosome reaches a stop codon, and the finished chain is released.
3. _____ A tRNA carrying the first amino acid pairs with the start codon, usually AUG.
4. _____ A tRNA carrying the second amino acid pairs with the second codon.

A. First
B. Second
C. Third
D. Fourth

5. An mRNA has 30 bases from the first base of its start codon through the last base of its stop codon. How many amino acids will the chain contain when the ribosome releases it?

A. 30 B. 9 C. 10 D. 8

6. An mRNA codon reads UGG. Which tRNA anticodon would pair with it, matching each base to its partner in order?

A. UGG B. AGG C. TGG D. ACC

7. Some genes are transcribed into tRNA or rRNA molecules, which do their jobs without ever being translated. What does this show?

A. tRNA and rRNA are proteins made of amino acids.

B. Not every gene's final product is a protein.

C. These genes are translated later, once the cell needs more protein.

D. These genes are broken, since every gene must make a protein.

Reading the Genetic Code

The table shows five codons from the standard genetic code, the codon table that most living things use for most of their genes.

Part of the standard genetic code: five mRNA codons and what each one codes for

mRNA codon	Amino acid or signal
AUG	Methionine (also the usual start codon)
UUU	Phenylalanine
GGC	Glycine
GGA	Glycine
UAA	Stop

8. Using the table, which amino acids does the mRNA sequence AUG UUU GGC UAA code for, in order?

A. Methionine, phenylalanine, glycine

B. Glycine, phenylalanine, methionine

C. Phenylalanine, glycine

D. Methionine, phenylalanine, glycine and a stop amino acid

9. In the table, GGC and GGA both code for glycine. What does this tell you about the genetic code?

A. Some amino acids are coded for by more than one codon.

B. Glycine is built from two codons joined together.

C. The table must contain an error, since each amino acid has one codon.

D. Each codon codes for more than one amino acid.

10. At one spot, a DNA template strand has the bases TAC. Matching each base to its partner in order, which mRNA codon is copied from it, and what does that codon code for?

A. ATG, which codes for methionine B. AUG, which codes for methionine

C. UAC, which codes for methionine D. AUG, which is a stop codon