

Practice Quiz

Ch. 17 From Gene to Protein

1. What is the relationship among DNA, a gene, and a chromosome?
 - a. A chromosome contains hundreds of genes which are composed of protein.
 - b. A chromosome is composed of DNA and contains hundreds of genes.
 - c. A gene contains hundreds of chromosomes which are composed of protein.
 - d. A gene is composed of DNA, but there is no relationship to a chromosome.
 - e. A gene contains hundreds of chromosomes which are composed of DNA.

Check your answer by viewing Fig. 17.4

2. What is one function of a **signal sequence**?
 - a. to direct an mRNA molecule into the cisternal space of ER
 - b. to bind RNA polymerase to DNA and initiate transcription
 - c. to terminate translation of the messenger RNA
 - d. to attach ribosomes synthesizing secretory proteins to pores in the ER
 - e. to signal the initiation of transcription

3. All organisms, from bacteria to mammals, use the same genetic code or *dictionary*. From this, one can logically assume all of the following EXCEPT:
 - a. A gene from an organism could theoretically be expressed by any other organism.
 - b. All organisms almost certainly have a common ancestor.
 - c. DNA was the first genetic material, not RNA or some form of protein.
 - d. Amid the incredible diversity we see in all the varied forms of living creatures, at the biochemical level there is incredible similarity.

4. What is the region of DNA called where RNA polymerase attaches to a gene?
 - a. structural gene region
 - b. initiation region
 - c. promoter region
 - d. operator region
 - e. regulator region

5. What is an anticodon part of?
 - a. DNA
 - b. tRNA
 - c. mRNA
 - d. ribosome
 - e. activating enzyme

6. A particular prokaryotic protein is 300 amino acids long. Which of the following could be the number of nucleotide pairs in the DNA that codes for this protein? Remember, bacteria lack introns and exons.
 - a. 3
 - b. 100
 - c. 300
 - d. 900
 - e. 1800

7. A particular triplet of bases in the coding sequence of DNA is AGT. What is the corresponding triplet in the complementary strand of DNA?
 - a. AGT

- b. UCA
 - c. TCA
 - d. GAC
 - e. TCA in eukaryotes, but UCA in prokaryotes
8. A particular triplet of bases in the coding sequence of DNA is AGT.
The corresponding codon for the mRNA transcribed from the gene is
- a. AGT.
 - b. UCA.
 - c. TCA.
 - d. AGU.
 - e. Either UCA or TCA, depending on wobble in the first base.
9. A particular triplet of bases in the coding sequence of DNA is AGT.
The anticodon on the tRNA that binds the mRNA codon transcribed from the gene is
- a. AGT.
 - b. UCA.
 - c. TCA.
 - d. AGU.
 - e. Either UCA or TCA, depending on wobble in the first base.
10. What are the coding segments of a stretch of eukaryotic DNA called?
- a. introns
 - b. exons
 - c. codons
 - d. replicons
 - e. transposons
11. All of the following are directly involved in translation EXCEPT
- a. mRNA.
 - b. tRNA.
 - c. ribosomes.
 - d. DNA.
 - e. amino acid-activating enzymes.
12. RNA differs from DNA in that RNA
- 1. contains ribose as its sugar.
 - 2. is found only in cytoplasm.
 - 3. contains uracil instead of thymine.
- a. 1
 - b. 2
 - c. 3
 - d. 1 and 3 are correct.
 - e. 1, 2, and 3 are correct.
13. A **frameshift** mutation could result from
- a. a base insertion only.
 - b. a base deletion only.
 - c. a base substitution only.
 - d. deletion of three consecutive bases.
 - e. either an insertion or a deletion of a base.

14. If the triplet UUU codes for the amino acid phenylalanine in bacteria, then in plants UUU should code for
- leucine.
 - valine.
 - cystine.
 - phenylalanine.
 - proline.
15. Which **point mutation** would be most likely to have a catastrophic effect on the functioning of a protein?
- a base substitution
 - a base deletion near the start of the coding sequence
 - a base deletion near the end of the coding sequence, but not in the terminator codon
 - deletion of three bases near the start of the coding sequence, but not in the initiator codon
 - a base insertion near the end of the coding sequence, but not in the terminator codon
16. Choose the answer that has these events of protein synthesis in the proper sequence.
1. An aminoacyl-tRNA binds to the A site of the ribosome.
 2. A peptide bond forms.
 3. tRNA leaves the P site and the P site remains vacant.
 4. A small ribosomal subunit associates with mRNA.
 5. tRNA translocates to the P site of the ribosome.
- 1, 3, 2, 4, 5
 - 4, 1, 2, 5, 3
 - 5, 4, 3, 2, 1
 - 4, 1, 3, 2, 5
 - 2, 4, 5, 1, 3

Check your answer by viewing [Fig. 17.16](#) Anatomy of functioning ribosome

Refer to Figure 17.4 "The dictionary of the genetic code" in your text to answer the following question(s).

		SECOND BASE				
		U	C	A	G	
U	FIRST BASE (5' end)	UUU } Phe	UCU } Ser	UAU } Tyr	UGU } Cys	U
		UUC } Phe	UCC } Ser	UAC } Tyr	UGC } Cys	C
		UUA } Leu	UCA } Ser	UAA Stop	UGA Stop	A
		UUG } Leu	UCG } Ser	UAG Stop	UGG Trp	G
C	CUU } Leu	CCU } Pro	CAU } His	CGU } Arg	U	
	CUC } Leu	CCC } Pro	CAC } His	CGC } Arg	C	
	CUA } Leu	CCA } Pro	CAA } Gln	CGA } Arg	A	
	CUG } Leu	CCG } Pro	CAG } Gln	CGG } Arg	G	
A	AUU } Ile	ACU } Thr	AAU } Asn	AGU } Ser	U	
	AUC } Ile	ACC } Thr	AAC } Asn	AGC } Ser	C	
	AUA } Ile	ACA } Thr	AAA } Lys	AGA } Arg	A	
	AUG } Met or start	ACG } Thr	AAG } Lys	AGG } Arg	G	
G	GUU } Val	GCU } Ala	GAU } Asp	GGU } Gly	U	
	GUC } Val	GCC } Ala	GAC } Asp	GGC } Gly	C	
	GUA } Val	GCA } Ala	GAA } Glu	GGA } Gly	A	
	GUG } Val	GCG } Ala	GAG } Glu	GGG } Gly	G	

©1999 Addison Wesley Longman, Inc.

17. What amino acid sequence will be generated, based on the following mRNA codon sequence? 5' AUG-UCU-UCG-UUA-UCC-UUG
- met-arg-glu-arg-glu-arg
 - met-glu-arg-arg-gln-leu
 - met-ser-leu-ser-leu-ser
 - met-ser-ser-leu-ser-leu
 - met-leu-phe-arg-glu-glu
18. All of the following can be found in prokaryotic messenger RNA EXCEPT
- the AUG codon.
 - the UGA codon.
 - introns.
 - uracil.
 - cytosine.
19. During translation, chain elongation continues until what happens?
- No further amino acids are needed by the cell.
 - All tRNAs are used up.
 - The polypeptide is long enough.
 - Chain terminator codons occur.
 - The ribosomes run off the end of mRNA.

20. Which of the following represents a similarity between RNA and DNA?
- the presence of a double-stranded helix
 - the presence of uracil
 - their occurrence on chromosomes
 - nucleotides consisting of a phosphate, sugar, and nitrogen base
 - repair systems that correct genetic code errors
21. What are ribosomes composed of?
- RNA
 - DNA
 - rRNA
 - single stranded DNA
 - double stranded RNA
22. Sickle-cell anemia is probably the result of which kind of mutation?
- point only
 - frameshift only
 - nonsense only
 - nondisjunction only
- 1
 - 2
 - 3
 - 4
 - both 2 and 4

Check your answer with Fig. 17.23

23. According to the signal hypothesis, ribosomes are directed to the ER membrane
- by a specific characteristic of the ribosome itself, which distinguishes free ribosomes from bound ribosomes.
 - by a certain amino acid sequence at the beginning of the polypeptide chain being synthesized by the ribosome.
 - by moving through a channel from the nucleus.
 - by a chemical signal given off the ER.
 - by a signal sequence of RNA that precedes the start codon of the message.
24. We recently read about an outbreak of Ebola virus in Zaire. Originally, it was thought that the outbreak was caused by a new virus that resulted from a mutation in the original virus. Closer examination showed that the viruses were the same. How would you tell if a virus had mutated?
- All of these are correct.
 - Look for differences in its physical characteristics (with an electron microscope).
 - Look for differences in the amino acid sequence of the proteins the virus produces.
 - Look for differences in the nucleotide sequence of its DNA (or RNA).
 - Look for differences in its pattern of infection.

25. Your friend Forrest wants to create a new "green" shrimp. He plans on growing normal shrimp in green light because, he says, the green light will cause mutations that make the shrimp green. You must tell him this is not a good idea because
- a. if the green light is capable of causing such mutations, it will also turn him green.
 - b. mutations are random, and no agent (chemical, or light radiation) can be expected to cause a specific mutation, like turning shrimp green.
 - c. it cannot work because everyone knows that water absorbs green light (that's why lakes and ponds are green).
 - d. the green shrimp would be mutagenic and anyone eating them would be in danger of turning green.
 - e. the color of a shrimp has nothing to do with its genes.