**Chapter 17 Reading Questions**

Concept 17.1: Genes Specify proteins via transcription and translation.

1. What is the **CENTRAL DOGMA** of biology?
2. Does gene expression always result in the formation of a protein? Explain.
3. What is **transcription**? Where does it occur?
4. How is transcription different in prokaryotes and eukaryotes?
5. What is **translation** and where does it occur?
6. The timing of transcription and translation is different for prokaryotes and eukaryotes. Explain how they are different.
7. Why do we say the genetic code has **redundancy**? What is the benefit of this?

Concept 17.2: Transcription is the DNA-directed synthesis of RNA: a closer look

1. What is the role of **RNA** **polymerase**? How does it work?
2. Explain the function of the **promoter**.
3. What is the **terminator**?
4. What does a **transcription** **unit** code for?
5. Initiation of transcription differs in prokaryotes and eukaryotes. Explain or compare/contrast how this process differs between the cells. Use the following terms: promoter, transcription factors, transcription initiation complex, RNA polymerase, RNA polymerase II.

Concept 17.3: Eukaryotic cells modify RNA after transcription.

1. There are 2 main post**-transcription modifications** made to RNA.
   1. Describe the **poly-A tail**.
   2. Describe the **5’ cap**.
   3. What is the purpose of the poly-A tail and 5’cap on eukaryotic mRNA?
2. After transcription, RNA splicing takes place. Explain what happens during **RNA splicing**. Use the terms **introns**, **exons**, **spliceosome**, **snRNA** (small nuclear RNA), and **ribozyme**.
3. How does RNA splicing help the 20,000 DNA genes to code for 100,000 polypeptides?

Concept 17.4: Translation is the RNA-directed synthesis of a polypeptide: a closer look

1. List 3 types of RNA involved in translation and briefly describe the function of each.
2. Draw and label the parts of a **tRNA** molecule.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the triplet codes on mRNA that code for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the triplet complementary bases on tRNA that correspond to mRNA codons.
5. The ribosome is made up of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ subunit, which are composed of proteins and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. Explain what happens at each of the 3 binding sites on a ribosome:
   1. **P site**:
   2. **A site**:
   3. **E site**:
7. What is always the start codon for reading frame of mRNA? \_\_\_\_\_\_\_\_\_\_\_\_\_.
8. What is always the first amino acid in a polypeptide? \_\_\_\_\_\_\_\_\_\_\_ Why?
9. What energy molecule powers the initiation phase of translation? \_\_\_\_\_\_\_\_\_\_\_
10. What type of bond holds the amino acids together in the polypeptide? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. When does translation end?
12. How do cells know where to send a finished protein?

Concept 17.5: Mutations of one or few nucleotides can affect protein structure and function.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ alter one base pair of a gene. These can be:
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: where one nucleotide pair is replaced with another \_\_\_\_\_\_\_\_\_ of nucleotides. These come in 2 forms:
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutations: substituted nucleotides still code for an amino acid, but it may not be the correct one
         1. If the base pair substitution does not result in a change in the amino acid, then it is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutation
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutations: these substitutions change the normal amino acid to a stop codon, ending translation and truncating the polypeptide
   2. **Insertions** and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: adding or deleting nucleotide pairs
      1. Can cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mutations which alter the reading frame of Mrna.
2. What are some examples of **mutagens**?
3. TRUE or FALSE: A single mRNA can be read by multiple ribosomes simultaneously.
4. TRUE or FALSE: Polyribosomes can be found in both prokaryotes and eukaryotes.
5. RECALL: What determines the primary structure of a protein?
6. What are **chaperonins** and what do they do?

Concept 17.6: While gene expression differs among the domains of life, the concept of a gene is universal.

1. Transcription and translation are coupled in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but in eukaryotes, transcription is compartmentalized in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Read p. 347. What is the final consensus on the definition of a **gene**?

**TEST YOUR UNDERSTANDING**: Answer questions 1-7 on p. 350 and record your answers here.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

**Pearson Test Prep Questions:**