

# Transcription and Translation Worksheet

Name \_\_\_\_\_

Hour \_\_\_\_\_ Date \_\_\_\_\_

For each of the following sequences, fill in either the DNA, the mRNA sequence, the tRNA anticodons, or the amino acid sequences that have been left blank.

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

mRNA A U G A C U A G C U G G G G G U A U U A C U U U U A G

tRNA \_\_\_\_\_

AA \_\_\_\_\_

2. DNA T A C C G C T C C G C C G T C G A C A A T A C C A C T

mRNA \_\_\_\_\_

tRNA \_\_\_\_\_

AA \_\_\_\_\_

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

mRNA \_\_\_\_\_

tRNA U A C C A C C C C C G U A U G G C U G G G A A U A U C

AA \_\_\_\_\_

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

mRNA \_\_\_\_\_

tRNA \_\_\_\_\_

AA MET ARG GLY PHE PHE MET VAL GLY (STOP)

5. DNA T A C \_\_\_\_\_ A T G \_\_\_\_\_

mRNA \_\_\_\_\_ U G U G A U \_\_\_\_\_

tRNA \_\_\_\_\_ C U C \_\_\_\_\_ U U G \_\_\_\_\_ A U U

AA \_\_\_\_\_ ALA \_\_\_\_\_ PRO \_\_\_\_\_

6. What are the four differences between RNA and DNA?



7. Where is DNA found in the cell? \_\_\_\_\_ Where is RNA found in the cell? \_\_\_\_\_

8. Name the three types of RNA and what they do.

9. Draw an mRNA strand that is complementary to the DNA strand AATTGC. Circle a nucleotide.



10. What are the steps of transcription?



# CODON TABLE

<b>1 s t  B a s e</b>	<b>U</b>	Phenylalanine Phenylalanine Leucine Leucine	Serine Serine Serine Serine	Tyrosine Tyrosine Stop Stop	Cysteine Cysteine Stop Tryptophan	<b>U C A G</b>	<b>3 r d  B a s e</b>
	<b>C</b>	Leucine Leucine Leucine Leucine	Proline Proline Proline Proline	Histidine Histidine Glutamine Glutamine	Arginine Arginine Arginine Arginine	<b>U C A G</b>	
	<b>A</b>	Isoleucine Isoleucine Isoleucine Methionine	Threonine Threonine Threonine Threonine	Asparagine Asparagine Lysine Lysine	Serine Serine Arginine Arginine	<b>U C A G</b>	
	<b>G</b>	Valine Valine Valine Valine	Alanine Alanine Alanine Alanine	Aspartic acid Aspartic acid Glutamic acid Glutamic acid	Glycine Glycine Glycine Glycine	<b>U C A G</b>	
		<b>U</b>	<b>C</b>	<b>A</b>	<b>G</b>		
<b>2nd Base</b>							

Skills Worksheet

# Directed Reading

## Section: From Genes to Proteins

In the space provided, write the letter of the description that best matches the term or phrase.

- |                                 |  |
|---------------------------------|--|
| _____ 1. ribonucleic acid (RNA) | a. the entire process by which proteins are made   |
| _____ 2. uracil                 | b. a molecule made of linked nucleotides   |
| _____ 3. transcription          | c. the process of reading instructions on an RNA molecule to put together the amino acids that make up a protein |
| _____ 4. translation            | d. the process of transferring a gene's instructions for making a protein to an RNA molecule                     |
| _____ 5. gene expression        | e. a nitrogen base used in RNA instead of the base thymine found in DNA  |

Complete each statement by underlining the correct term or phrase in the brackets.

6. Transcription begins when [RNA / RNA polymerase] binds to the gene's promoter.
7. RNA polymerase adds complementary [DNA / RNA] nucleotides as it "reads" the gene.
8. In eukaryotes, transcription takes place in the [nucleus / cytoplasm].

Read each question, and write your answer in the space provided.

9. What are two differences between transcription and DNA replication?

---

---

---

---

---

10. What determines where on the DNA molecule transcription begins and where it ends?

---

---

---

**Directed Reading** *continued*

**In the space provided, explain how the terms in each pair are related to each other.**

**11.** RNA, messenger RNA

---

---

---

---

**12.** codons, genetic code

---

---

---

---

**Study the following six steps in the synthesis of proteins. Determine the order in which the steps take place. Write the number of each step in the space provided.**

- \_\_\_\_\_ **13.** The codon in the vacant A site receives the tRNA molecule with the complementary anticodon. The tRNA carries the amino acid specified by the codon.
- \_\_\_\_\_ **14.** Steps 2–5 are repeated until a stop codon is reached. The newly made protein is released into the cell.
- \_\_\_\_\_ **15.** The tRNA at the P site detaches, leaves behind its amino acid, and moves away from the ribosome.
- \_\_\_\_\_ **16.** Enzymes help form a peptide bond between the amino acids of adjacent tRNA molecules.
- \_\_\_\_\_ **17.** The tRNA (with its protein chain) in the A site moves over to fill the empty P site. A new codon is present in the A site, ready to receive the next tRNA and its amino acid.
- \_\_\_\_\_ **18.** An mRNA, two ribosomal subunits, and a tRNA carrying a modified form of the amino acid methionine bind together. The tRNA bonds to the “start” codon AUG.

## Skills Worksheet

**Active Reading****Section: From Genes to Proteins**

Read the passage below. Then answer the questions that follow.

Like DNA, **ribonucleic acid (RNA)** is a nucleic acid—a molecule made of nucleotides linked together. RNA differs from DNA in three ways. First, RNA consists of a single strand of nucleotides instead of the two strands found in DNA. Second, RNA nucleotides contain the five-carbon sugar ribose rather than the sugar deoxyribose found in DNA nucleotides. And third, RNA has a nitrogen base called **uracil**—abbreviated as *U*—instead of the base thymine (T) found in DNA. No thymine (T) bases are found in RNA. Like thymine, uracil is complementary to adenine whenever RNA base-pairs with another nucleic acid.

**SKILL: RECOGNIZING SIMILARITIES AND DIFFERENCES**

Read each question, and write your answer in the space provided.

1. In the spaces provided, write *D* if the statement is true of DNA. Write *R* if the statement is true of RNA. Write *B* if the statement is true of both DNA and RNA.

- \_\_\_\_\_ a. consists of a single strand of nucleotides
- \_\_\_\_\_ b. made of nucleotides linked together
- \_\_\_\_\_ c. contains deoxyribose
- \_\_\_\_\_ d. has the nitrogen base uracil
- \_\_\_\_\_ e. contains ribose
- \_\_\_\_\_ f. is a nucleic acid
- \_\_\_\_\_ g. consists of a double strand of nucleotides
- \_\_\_\_\_ h. contains a base that pairs with adenine

An analogy is a comparison. In the space provided, write the letter of the term or phrase that best completes the analogy.

- \_\_\_\_\_ 2. RNA is to *U* as DNA is to
- a. *C*
- b. *G*
- c. *T*
- d. *A*