

**SECTION 12-1 REVIEW**

**DNA**

**VOCABULARY REVIEW** Define the following terms and provide one example for each.

- 1. **bacteriophage** \_\_\_\_\_  
\_\_\_\_\_
- 2. **transformation** \_\_\_\_\_  
\_\_\_\_\_
- 3. **Chargaff's rules (base pairing)** \_\_\_\_\_  
\_\_\_\_\_
- 4. **nucleotide** \_\_\_\_\_  
\_\_\_\_\_

**MULTIPLE CHOICE** Write the correct letter in the blank.

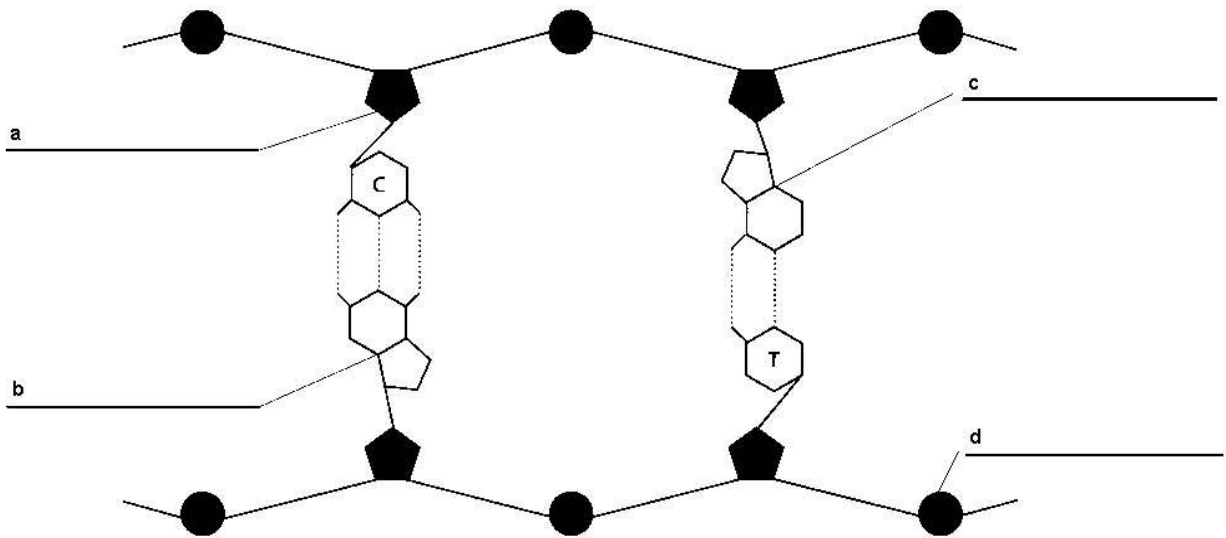
- \_\_\_\_\_ 1. The primary function of DNA in cells is to
  - a. serve as a storage form for unused nucleotides.
  - b. occupy space in the nucleus to keep the nucleus from collapsing.
  - c. store information that tells the cells which proteins to make.
  - d. serve as a template for making long, spiral carbohydrates.
  
- \_\_\_\_\_ 2. The two strands of a DNA molecule are held together in the middle by weak \_\_\_\_\_ bonds.
  - a. ionic
  - b. covalent
  - c. peptide
  - d. hydrogen
  
- \_\_\_\_\_ 3. According to the base-pairing rules, guanine pairs with
  - a. cytosine
  - b. adenine
  - c. thymine
  - d. guanine
  
- \_\_\_\_\_ 4. What did Griffith observe when he injected into mice a mixture of heat-killed disease-causing bacteria and live harmless bacteria?
  - a. The disease-causing bacteria changed into harmless bacteria.
  - b. The mice developed a disease called pneumonia.
  - c. The harmless bacteria died.
  - d. The mice were unaffected.
  
- \_\_\_\_\_ 5. Which of the following is a nucleotide found in DNA?
  - a. ribose + phosphate + adenine
  - b. deoxyribose + ribose + phosphate
  - c. ribose + phosphate + thymine
  - d. deoxyribose + phosphate + cytosine

**SHORT ANSWER** Answer the questions in the space provided.

1. What are the three parts that make up a nucleotide? (p.291) \_\_\_\_\_  
\_\_\_\_\_
2. If 15% of the nucleotides in a DNA molecule contain the nitrogen base guanine, what would be the percentages of the three remaining nucleotides bases? Explain your reasoning. (p.294) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. Describe the shape of a DNA molecule according to Watson and Crick. (p.293) \_\_\_\_\_  
\_\_\_\_\_
4. Briefly describe how Avery and his group determined which molecule caused the transformation of the harmless bacteria to become the pneumonia-causing bacteria. (p.289) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**STRUCTURES AND FUNCTIONS** Label each part of the figure in the spaces provided. The diagram below shows two nucleotide base pairs in a segment of a DNA molecule. Use the following terms to label the diagram: adenine, guanine, deoxyribose, and phosphate group. (p.291 and p.294) What type of bond is represented by the dotted lines?

\_\_\_\_\_



**SECTION 12-2 REVIEW**

**CHROMOSOMES AND DNA REPLICATION**

**VOCABULARY REVIEW Define the following terms.**

- 1. **chromatin** \_\_\_\_\_  
\_\_\_\_\_
- 2. **histone** \_\_\_\_\_  
\_\_\_\_\_
- 3. **replication** \_\_\_\_\_  
\_\_\_\_\_
- 4. **DNA polymerase** \_\_\_\_\_  
\_\_\_\_\_

**MULTIPLE CHOICE Write the correct letter in the blank.**

- \_\_\_\_\_ 1. The location of the DNA in a prokaryotic cell is in the  
a. nucleus.                      b. mitochondrion.                      c. cytoplasm.                      d. vacuole.
- \_\_\_\_\_ 2. DNA replication results in two DNA molecules,  
a. each with two new stands.  
b. one with two new strands and the other with two original strands.  
c. each with one new strand and one original strand.  
d. each with two original strands.
- \_\_\_\_\_ 3. During mitosis, the  
a. DNA molecules unwind.                      c. histones and DNA molecules separate.  
b. DNA molecules become more tightly coiled.                      d. nucleosomes become less tightly packed.
- \_\_\_\_\_ 4. A eukaryotic chromosome is composed of all of the following except  
a. ribosomes.                      b. histones.                      c. DNA.                      d. nucleosomes.
- \_\_\_\_\_ 5. In eukaryotes, chromosomes  
a. are located in the nucleus.                      c. float freely in the cytoplasm.  
b. are located in the Golgi apparatus.                      d. Both b and c are correct.

**SHORT ANSWER Answer the questions in the space provided.**

1. On the lines provided, choose the words that correctly complete the following sentences. (pp.298-299)

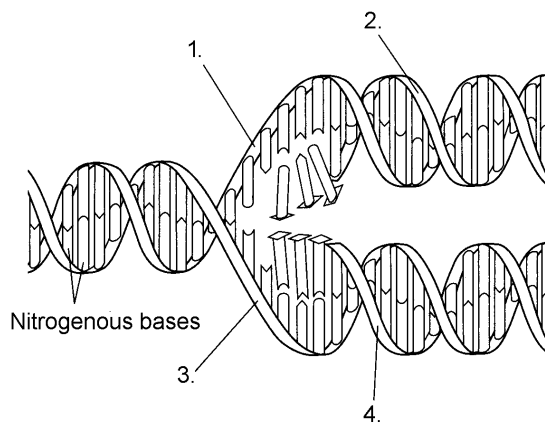
- a. During DNA replication, the DNA molecule \_\_\_\_\_ (separates / combines) into two strands.
- b. At the end of DNA replication, \_\_\_\_\_ (four / two) new strands of DNA have been produced, giving a total of \_\_\_\_\_ (four / six) strands of DNA.
- c. New DNA is replicated in strands complementary to old DNA because production of new DNA follows the rules of \_\_\_\_\_ (base pairing / the double helix).

2. The length of the bacterium's DNA may be 1000 times the length of its cell. Suggest an explanation for how this can occur. (P.295) \_\_\_\_\_  
\_\_\_\_\_

3. How does the structure of a eukaryotic chromosome during mitosis differ from its structure during the rest of the cell cycle? (P.296) \_\_\_\_\_  
\_\_\_\_\_

4. Why do cells need to copy their chromosomes before they divide into two daughter cells? (P.299) \_\_\_\_\_  
\_\_\_\_\_

**STRUCTURES AND FUNCTIONS** On the lines corresponding to the numbers on the diagram, write whether the strand pointed to is an **original strand** or a **new strand**. (P.298)



- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

1. What is the name of the enzyme that is used to replicate the DNA strands? (P.299) \_\_\_\_\_

**SECTION 12-3 REVIEW**

## RNA AND PROTEIN SYNTHESIS

**VOCABULARY REVIEW** Distinguish between the terms in each of the following groups of terms.

1. **codon, anticodon** \_\_\_\_\_  
\_\_\_\_\_
2. **translation, transcription** \_\_\_\_\_  
\_\_\_\_\_
3. **exon, intron** \_\_\_\_\_  
\_\_\_\_\_
4. **mRNA, tRNA, rRNA** \_\_\_\_\_  
\_\_\_\_\_

**MULTIPLE CHOICE** Write the correct letter in the blank.

- \_\_\_\_\_ 1. Ribose is a type of
 

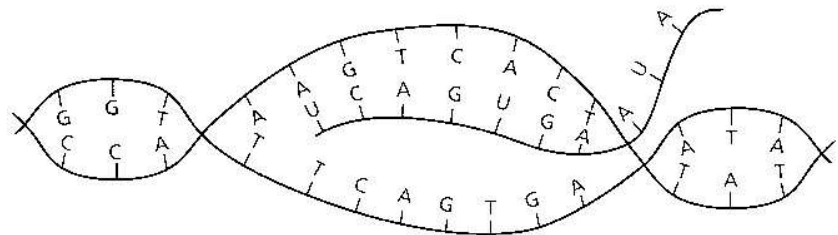
a. nitrogen-containing base.	c. sugar.
b. amino acid.	d. enzyme.
- \_\_\_\_\_ 2. In RNA, the nitrogen base thymine is replaced by
 

a. adenine.	b. guanine.	c. cytosine.	d. uracil.
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- \_\_\_\_\_ 3. The type of RNA that carries the instructions for making a protein is called
 

a. mRNA.	b. pRNA.	c. rRNA.	d. tRNA.
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- \_\_\_\_\_ 4. In eukaryotic cells, RNA is copied from DNA in the
 

a. ribosomes.	b. nucleus.	c. nuclear membrane.	d. cytoplasm.
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- \_\_\_\_\_ 5. What process is shown in the diagram below?
 

a. proofreading	b. protein synthesis
c. replication	d. transcription



**SHORT ANSWER Answer the questions in the space provided.**

1. List, in order, the tRNA anticodons that are complementary to the following mRNA codons: (p.301)

AUG      CAU      GCA      AGU      UAG

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List the amino acids, in order, that the above mRNA codons would code for. Use the chart on p.303.

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2. Why is methionine the first amino acid in every growing protein. (p.303)\_\_\_\_\_

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3. Describe three ways that RNA differs from DNA. (p.300)\_\_\_\_\_

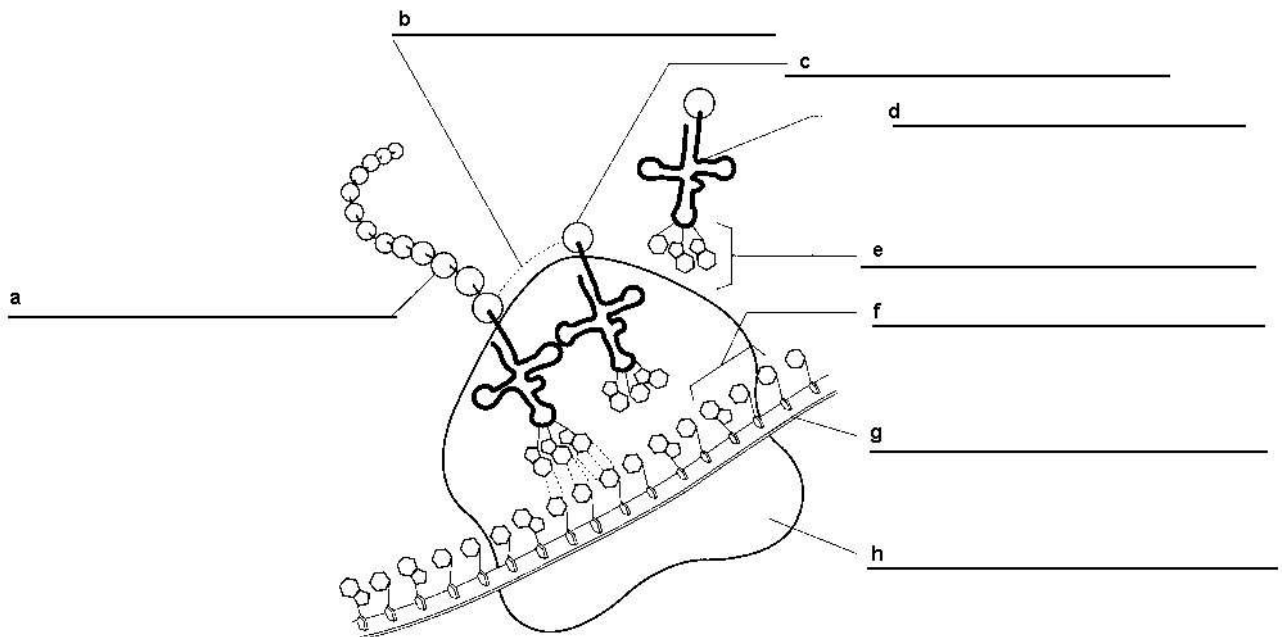
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4. Suppose the DNA sequence GCT ATA TCG was changed to GCT ATT TCG. How would the products of translation, the amino acids, be affected? (p.303)\_\_\_\_\_

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**STRUCTURES AND FUNCTIONS** Label each part of the figure in the spaces provided. The diagram below summarizes the events that occur during translation. Use the following terms: ribosome, polypeptide (protein), mRNA, tRNA, amino acid, codon, and anticodon. (pp.304-305)



**SECTION 12-4 REVIEW**

**MUTATIONS**

**VOCABULARY REVIEW** Define the following terms.

- 1. **mutation** \_\_\_\_\_  
\_\_\_\_\_
- 2. **point mutation** \_\_\_\_\_  
\_\_\_\_\_
- 3. **frameshift mutation** \_\_\_\_\_  
\_\_\_\_\_
- 4. **polyploidy** \_\_\_\_\_  
\_\_\_\_\_





**MULTIPLE CHOICE** Write the correct letter in the blank.

- \_\_\_\_\_ 1. Which of the following is not a gene mutation?  
a. polyploidy.                      b. insertion.                      c. deletion                      d. substitution
- \_\_\_\_\_ 2. Mutations that can be inherited arise in  
a. skin cells.                      b. body cells.                      c. bone cells.                      d. reproductive cells.
- \_\_\_\_\_ 3. Which of the following sequences could result from a deletion of part of this sequence GAGACATT?  
a. GAGCATT                      b. GTGACATTA                      c. CTCTGATT                      d. GATACAGT
- \_\_\_\_\_ 4. Which of the following is a point mutation that does not produce a frame shift?  
a. substitution                      b. insertion                      c. deletion                      d. inversion
- \_\_\_\_\_ 5. A mutation that involves one or two nucleotides is called a(n)  
a. chromosomal mutation.                      c. inversion.  
b. translocation.                      d. point mutation.
- \_\_\_\_\_ 6. Which organisms are most likely to benefit by inheriting a condition called polyploidy?  
a. bacteria                      b. animals                      c. plants                      d. humans

**SHORT ANSWER Answer the questions in the space provided.**

1. Would a frame shift mutation have a more serious effect if it occurred near the beginning of a gene or the end of a gene? Explain your answer. (p.307) \_\_\_\_\_  
 \_\_\_\_\_
2. Most organisms inherit two sets of chromosomes, one set from each parent. They are said to be diploid or 2n. How can some organisms become triploid (3n) or tetraploid (4n) (p.308) \_\_\_\_\_  
 \_\_\_\_\_
3. Mutations can have any of three possible effects on an organism. Name the three different effects that may occur if one inherits a mutation. (p.308) \_\_\_\_\_  
 \_\_\_\_\_

**STRUCTURES AND FUNCTIONS** Use the diagram below to answer the following questions about mutations. (p.308)

Example of a Mutation	Type of Mutation
<p>A </p>	<p>A. _____</p>
<p>B </p>	<p>B. _____</p>
<p>C </p>	<p>C. _____</p>
<p>D </p>	<p>D. _____</p>

1. What general type of mutation is being represented by all of the drawings above? \_\_\_\_\_  
 \_\_\_\_\_
2. Contrast mutation A and mutation B. \_\_\_\_\_  
 \_\_\_\_\_
3. Which process would be an example of a translocation? \_\_\_\_\_
4. During which process does a segment of DNA become oriented in an opposite direction? \_\_\_\_\_



**SECTION 12-5 REVIEW**

**GENE REGULATION**

**VOCABULARY REVIEW** Define the following terms.

- 1. **operon** \_\_\_\_\_  
\_\_\_\_\_
- 2. **operator** \_\_\_\_\_  
\_\_\_\_\_
- 3. **differentiation** \_\_\_\_\_  
\_\_\_\_\_
- 4. **hox gene** \_\_\_\_\_  
\_\_\_\_\_

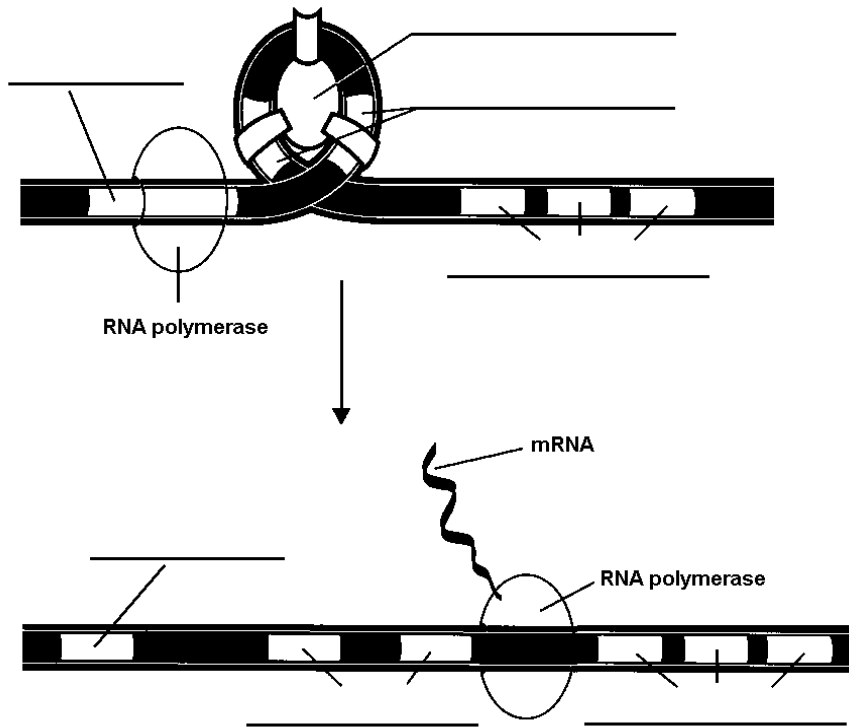
**MULTIPLE CHOICE** Write the correct letter in the blank.

- \_\_\_\_\_ 1. An expressed gene
  - a. functions as a promoter.
  - b. codes for only one amino acid.
  - c. is transcribed into DNA.
  - d. is transcribed into messenger RNA.
- \_\_\_\_\_ 2. A promoter is a
  - a. replication site for copying DNA.
  - b. start signal for protein synthesis.
  - c. binding site for RNA polymerase.
  - d. end signal for translation.
- \_\_\_\_\_ 3. In *E. coli*, the lac operon controls the
  - a. production of fats and nucleotides.
  - b. production of DNA from RNA.
  - c. uptake and breakdown of a sugar called lactose.
  - d. uptake and breakdown of a sugar called glucose.
- \_\_\_\_\_ 4. Which of the following is not generally part of a eukaryotic gene?
  - a. operon
  - b. TATA box
  - c. exons
  - d. promoter sequences
- \_\_\_\_\_ 5. Hox genes determine a developing embryo's
  - a. skin color.
  - b. size.
  - c. hair color.
  - d. basic body plan.
- \_\_\_\_\_ 6. A lac repressor turns off the lac genes by binding to
  - a. the promoter.
  - b. the operator.
  - c. tRNA.
  - d. the lac genes.

**SHORT ANSWER** Answer the questions in the space provided.

1. What is an operon? (p.309) \_\_\_\_\_  
\_\_\_\_\_
2. What is the function of the TATA box? (p.311) \_\_\_\_\_  
\_\_\_\_\_
3. What role do the Hox genes play in the development of an organism? (p.312) \_\_\_\_\_  
\_\_\_\_\_
4. Given that 600 million years after they shared a common ancestor, mice and fruit flies possess HOX genes that are very similar, what can be inferred about the effect of mutations upon these genes? (p.312)  
\_\_\_\_\_

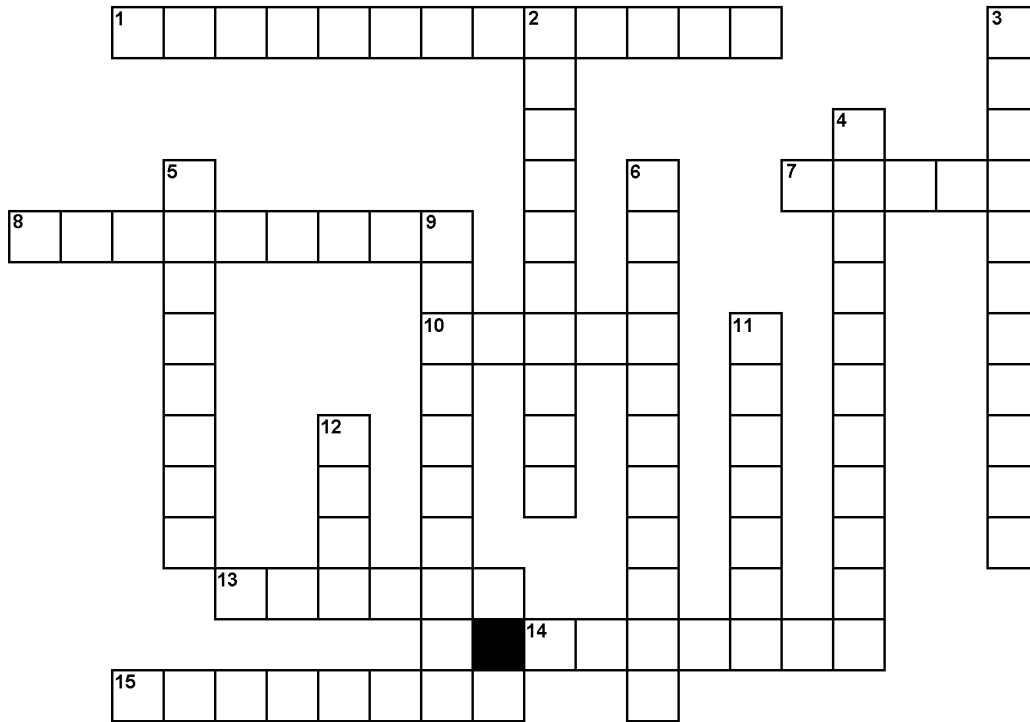
**STRUCTURES AND FUNCTIONS** Use the diagrams below to label the components of the lac operon of the *E. coli* bacteria. Gene regulation in prokaryotes is not as complicated as it is in eukaryotes. Use the following terms: lac genes, repressor, promoter, and operators. (p.310)



1. In which strand is a repressor present? (top or bottom). \_\_\_\_\_
2. In which strand is transcription occurring? (top or bottom) \_\_\_\_\_
3. What molecule binds to the repressor and causes it to release the DNA and allow RNA polymerase to begin transcription of the lac genes? (p.310) \_\_\_\_\_

## VOCABULARY - CHAPTER 12

The crossword puzzle is a simple way to master some of the more important vocabulary terms in this chapter.



**Across**

1. process of creating a mRNA molecule
7. the shape of a DNA molecule is called a double  
\_\_\_\_\_
8. group of three sequential bases for tRNA
10. group of three sequential bases of mRNA
13. substitutes for thymine in RNA
14. a polymer consisting of a specific sequence of amino acids
15. site where RNA polymerase binds to the beginning of a gene

**Down**

2. thymine and cytosine
3. sugar found in DNA
4. process that makes an identical copy of a DNA molecule
5. organelle where protein synthesis takes place
6. process that produces a protein by using complimentary base pairing with mRNA and tRNA
9. building block for DNA and RNA molecules
11. \_\_\_\_\_ bonds link amino acids together to form a protein
12. transports one specific type of amino acid to a ribosome

The following term is **not** used in this chapter but is found in this puzzle. Use a reference source and look up its meaning so you can complete this vocabulary puzzle. **peptide.**