Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_\_\_\_

**sciencemusicvideos: DNA Structure and Replication**

**Getting to the tutorials.**

* Go to [www.sciencemusicvideos.com](http://www.sciencemusicvideos.com); Use the College Bio, AP Bio, or Learning Guide Menus to find “DNA Structure and Replication”
* Start with “1. DNA, An Overview”

**Tutorial 1: “DNA, an Overview”**

1. Read the introduction. Check the box below when you’re finished. ☐

SUMMARIZE

* DNA stands for
* DNA’s functions are

2. Read “Three Key DNA-Related Processes…,”

3. Read “Where DNA is Found…” ☐

4. Take the “DNA Concepts” quiz. ☐

**CHECKING UNDERSTANDING:**

a. Make a key to the diagram below.

|  |  |  |
| --- | --- | --- |
| 0_simple transcription, translation, numbered | | 1 |
| 2. |
| 3. |
| 4 |  | |
| 5 |  | |
| 6 |  | |
| 7 |  | |
| 8 |  | |

b. Describe these three processes

* REPLICATION
* TRANSCRIPTION
* TRANSLATION

Click the link to the next tutorial, “DNA Structure.“

**Tutorial 2: “DNA Structure”**

1 - 2. Read the Introduction and “Nucleotides are the Monomers of DNA.” ☐

3. Take the Quiz “Checking Understanding: Nucleotides” ☐

|  |  |
| --- | --- |
| glennSSD:private:var:folders:sk:r8ckrgnj4p7d0qc02_gz5m1h0000gn:T:TemporaryItems:01_nucleotide-numbered.png | Create a key to this diagram (without worrying about the specific name of # 3)  1.  2.  3. |

4. Read “Sugar-phosphate bonds form the backbone..” ☐

5. Read “The two strands of DNA are held…” ☐

6. Complete the “Base Pair/Hydrogen Bond Practice.” ☐

7. Read “The Double Helix: Final Points.” ☐

8. Take the “DNA Structure” Quiz ☐

**CHECKING UNDERSTANDING: DNA Structure**

Create a key to this diagram. Note that “9” is guanine (and knowing that, you can figure out the other three bases).

|  |  |
| --- | --- |
| glennSSD:private:var:folders:sk:r8ckrgnj4p7d0qc02_gz5m1h0000gn:T:TemporaryItems:14_DNA_chemical_structure.png | 1.  2.  3.  4.  5.  6.  7.  8.  9. Guanine |

**REFLECT**: What are the three most important things to remember about DNA’s structure. Write small.

**CHECKING UNDERSTANDING: DNA’s dimensions**

|  |  |
| --- | --- |
| 1_dna-structure-campbell_2dimensions-version-2 | m. \_\_\_\_ nm (distance between 10 base pairs (one “wavelength”)  n. \_\_\_\_\_nm (distance between each base pair  o. \_\_\_\_\_ nm (DNA’s diameter)  Image source: *Study guide for Campbell, Biology*. |

Click the link to “DNA Replication,“ the next tutorial.

**Tutorial 3: “DNA Replication”**

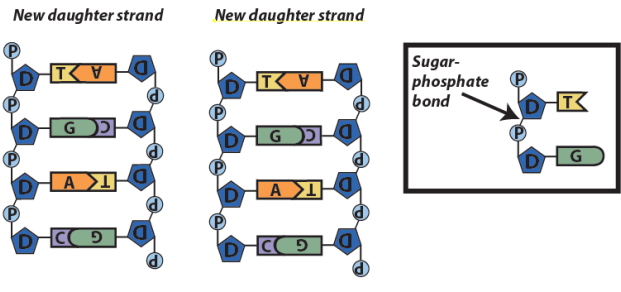
1 - 2. Read the Introduction and “*Replication* Means Copying DNA” ☐

3. Read “During DNA Replication, Each Strand Serves…” ☐

4. Take the quiz “Checking Understanding: DNA Replication (the big picture)” ☐

**SUMMARIZE**

Explain, on a big picture level, how the DNA molecule below could be replicated into two identical daughter strands. Use terms like *template*, *complementary*, *base-pairing*, *hydrogen bonds*, and *sugar-phosphate bonds* in your answer (and add other terms as needed).



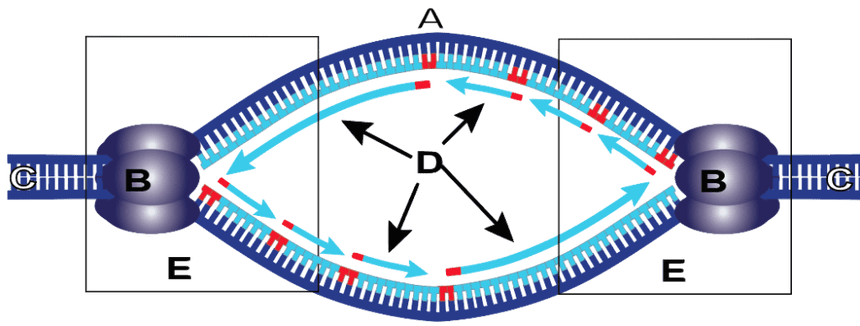
5. Read “How DNA Replication Occurs in Cells.” ☐

6. Watch the amazing HHMI video “And Here’s What it Really Looks Like” ☐

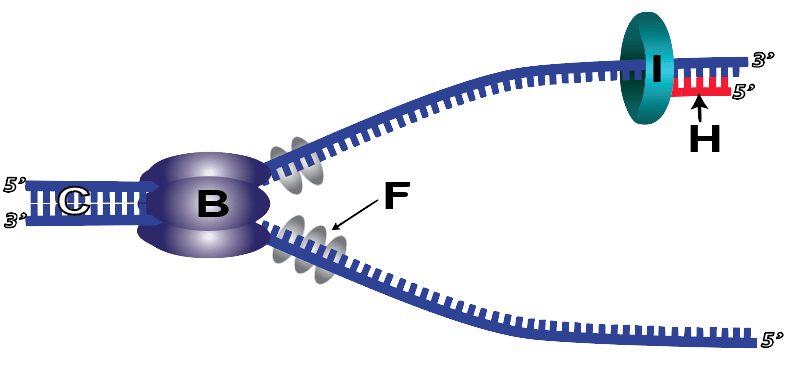
7. Take the very long quiz “DNA Replication (with some DNA structure review” ☐

**CHECKING UNDERSTANDING**

**Exercise 1:** Make a key to this diagram

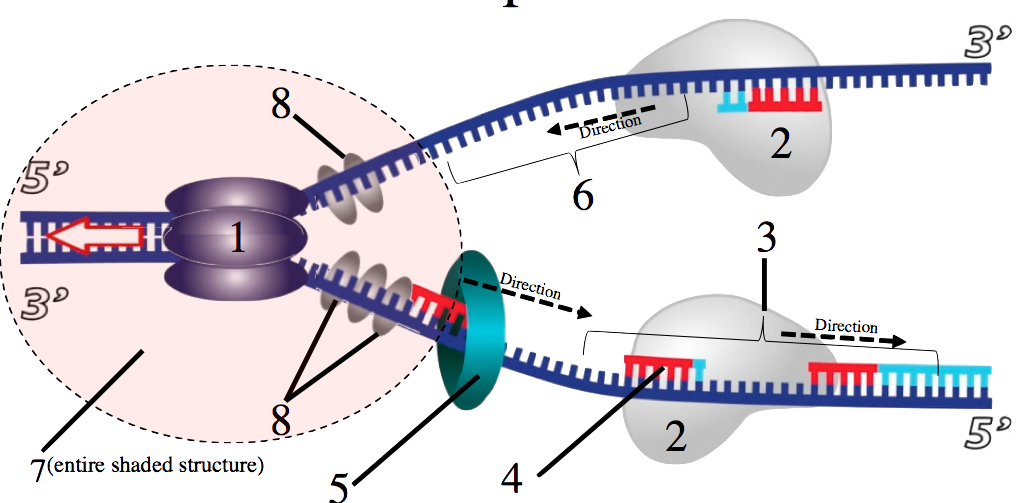


|  |  |
| --- | --- |
| A |  |
| B |  |
| C |  |
| D |  |
| E |  |

**Exercise 2:** Complete the sentence below this diagram:

What’s happening above is

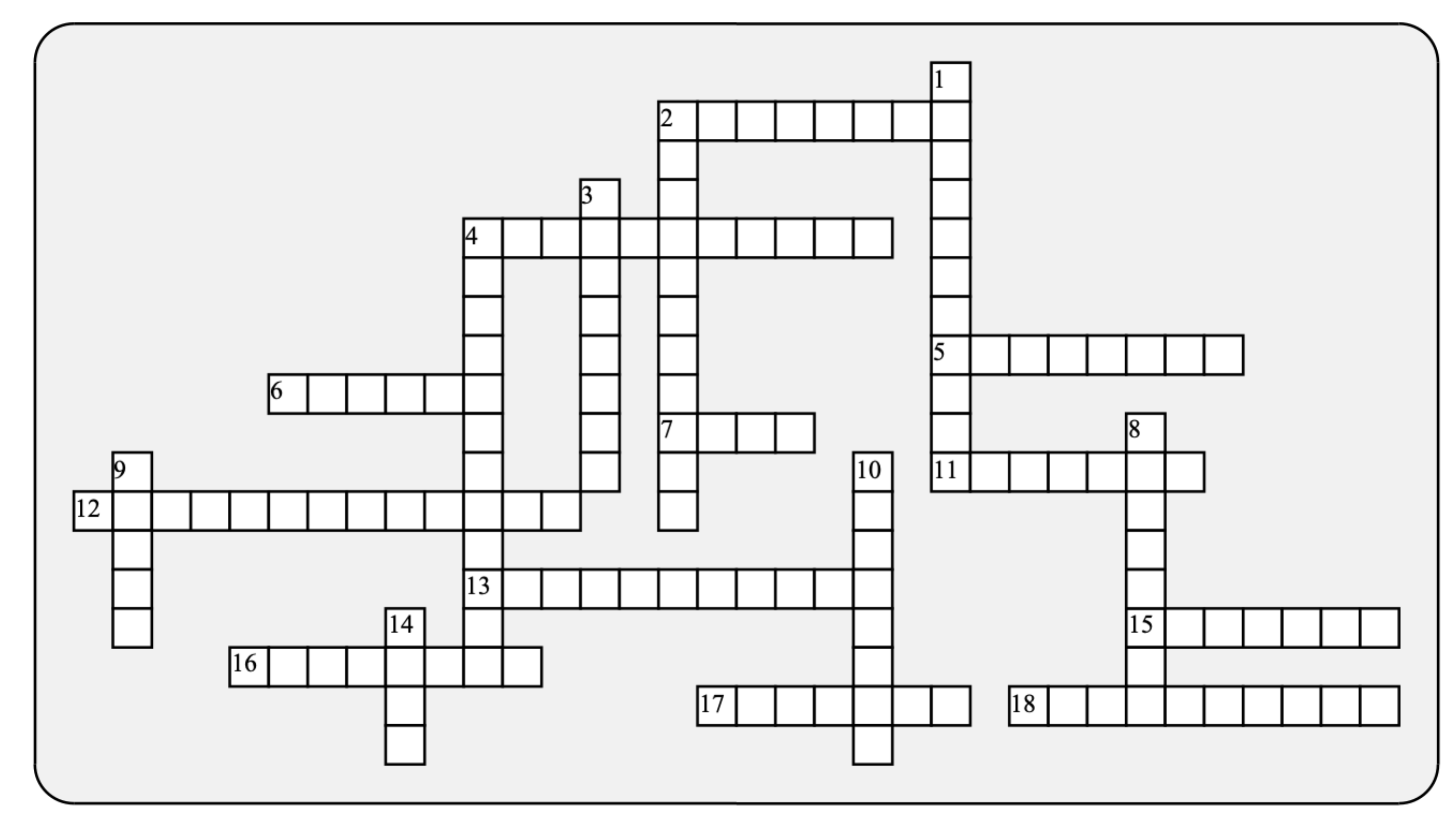
**Exercise 3:** Using the diagram below, explain how DNA Replication works. *Feel free to use the top of the next page.* In your explanation, describe any new items you haven’t already referenced above.



(My explanation of DNA replication, continued)

|  |  |
| --- | --- |
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**DNA Structure and Replication Crossword, part 1**

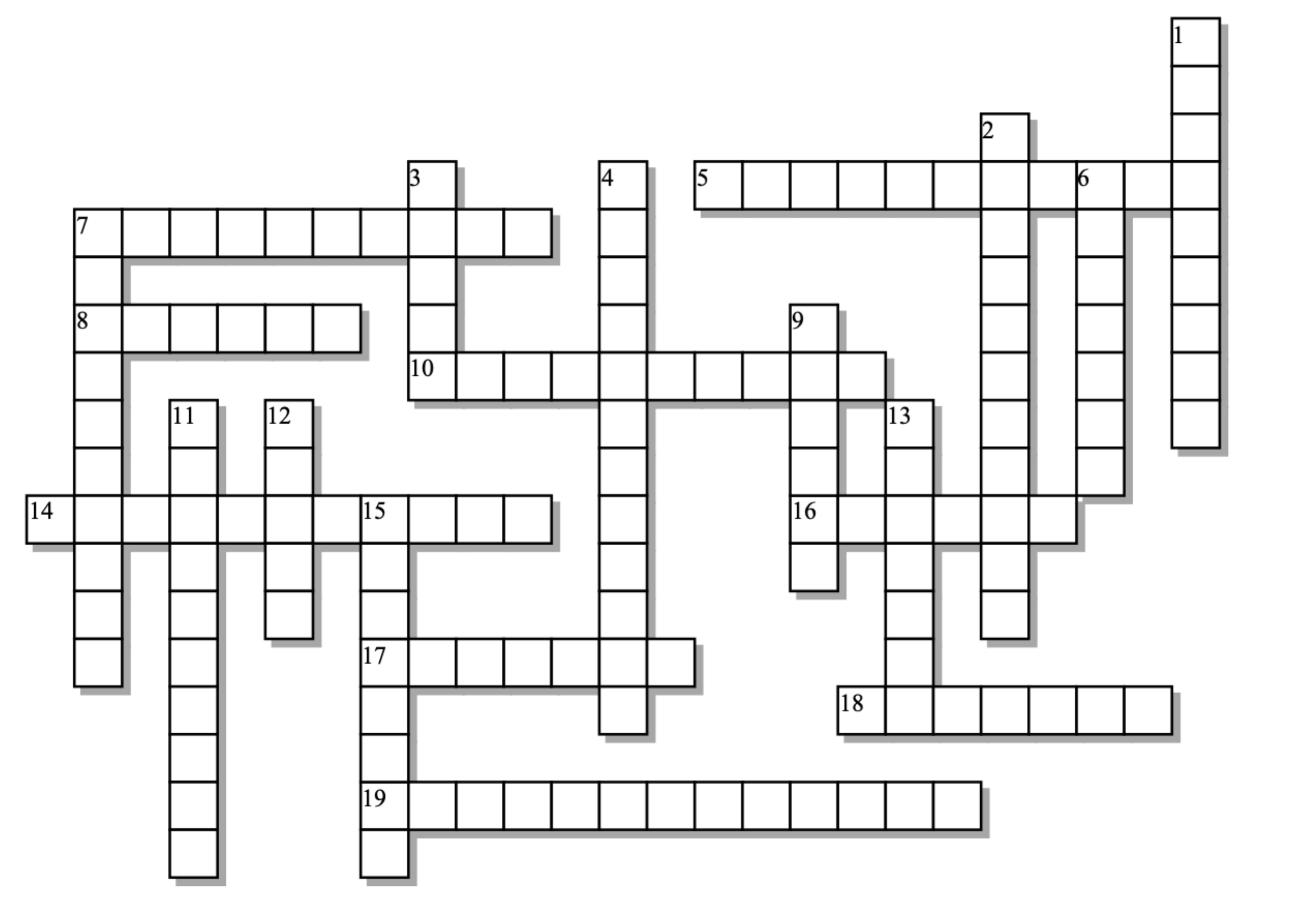
****

|  |  |
| --- | --- |
| **Across:** | **Down:** |
| 2 - The one-ring base that complements guanine.  4 - DNA, in eukaryotes, is mostly found in long, linear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  5 - This part of DNA is made of alternating sugars and phosphates.  6 - A pair or replication forks creates a replication \_\_\_\_\_\_\_\_\_\_\_.  7 - DNA's complementary bases fit together only when in an \_\_\_\_\_\_-parallel orientation.  11 - All the DNA building proteins that end in -*ase* are \_\_\_\_\_\_\_\_\_\_\_\_\_.  12 - The paired bases in DNA are \_\_\_\_\_\_\_\_\_\_\_\_\_ to one another.  13 - This biological theme, more than any other, is connected to DNA.  15 - The two-ring base that complements thymine.  16 - Bonds that are individually weak, but collectively strong enough to hold the two strands together.  17 - The strand where the direction of synthesis moves away from the opening fork.  18 - The kind of information that DNA transmits. | 1 - The sugar in DNA.  2 - A photosynthesizing organelle with its own DNA.  3 - The strong, electron-sharing bonds within a single strand of DNA.  4 - Since each new double helix has one old and one new strand, DNA replication is said to be semi-\_\_\_\_\_\_\_\_\_\_\_.  8 - The enzyme that breaks apart the double helix  9 - "DNA makes RNA makes protein" is molecular biology's central \_\_\_\_\_\_\_\_\_\_\_.  10 - Cheated by death of a Nobel Prize, her analysis of crystallized DNA was an essential clue to DNA's structure.  14 - A utensil: also the site of the action during replication. |

**Possible Answers:** Dogma, Franklin, Hydrogen, adenine, anti, backbone, bubble, chloroplast, chromosomes, complementary, conservative, covalent, cytosine, deoxyribose, enzymes, fork, helicase, hereditary, information, lagging

|  |  |
| --- | --- |
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**DNA Structure and Replication 2**



|  |  |
| --- | --- |
| **Across:** | **Down:** |
| 5 - The unique, informational part of a nucleotide.  7 - Sounds like an Egyptian monument; also a base with one ring.  8 - The enzyme that creates sugar-phosphate bonds between adjacent Okazaki fragments.  10 - Unlike the bases, sugar and phosphate play a \_\_\_\_\_\_\_\_\_role in DNA.  14 - Making protein from RNA.  16 - The spot where replication begins.  17 - A little circle of DNA found in bacterial cells.  18 - On this strand, synthesis of DNA is continuous.  19 - Making RNA from DNA. | 1 - The sour part of the nucleotide thatÕs neither sweet nor bitter.  2 - Making DNA from DNA.  3 - These infectious particles inject their DNA into other organisms (including us).  4 - An ATP secreting organelle that has its own DNA.  6 - The fragments formed on the lagging strand.  7 - The key enzyme in DNA synthesis.  9 - Along with Crick, one of the two famous discoverers of DNAÕs structure.  11 - DNA is so skinny: merely two \_\_\_\_\_\_\_\_\_\_ in diameter.  12 - The shape of DNA is a double \_\_\_\_\_\_\_\_.  13 - An enzyme that lays down a short stretch of RNA to give polymerase a place to begin.  15 - During replication, each strand acts as a \_\_\_\_\_ for creation of a new strand. |

**Possible Answers:**

Helix, Ligase, Mitochondria, Nanometers, Nitrogenous, Okazaki, Origin, Phosphate, Plasmid, Polymerase, Primase, Pyrimidine, Replication, Structural, Template, Transcription, Translation, Virus, Watson, leading