***Web Quest: DNA Genetics*** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Transcription & Translation***  Period: \_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_

This web quest takes you through various websites to better understand genetics. Use the following questions and directions to navigate through the sites. Record the information to the questions as you find it.

Find the links for this assignment on our science class website (no need to type in web addresses)

**To start please go to this site:**

<http://learn.genetics.utah.edu/content/begin/dna/builddna/>

Simply build a DNA molecule with interactive animation. Stop when it says how long it will take you to make a DNA molecule of a human being at the rate you are progressing.

Read the text below and answer the following questions:

1. In order to speed up the copying process (replication), DNA replication begins at

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ locations along each chromosome.

2. The two DNA strands are pulled apart and copied in both directions at the rate of

 about \_\_\_\_\_\_\_\_\_ nucleotides per second.

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ base-pairing ensures that DNA strands are copied accurately, with just a few errors for each round of replication.



**Now go to this page of the same site:**

<http://learn.genetics.utah.edu/content/begin/tour/>

This is a basic tour of genetics. **Click on the top tab of the menu “What is DNA**?” and then answer these questions as you click along either “next” or “previous” on the bottom of display panel of the presentation as you need to answer questions #1-7.

#1 What part of a cell are the instructions for a living

 organism found? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#2 What is the name of molecule where these instructions are encoded on?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#3 What is the shape of DNA called?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#4 What two molecules make up the sides or “backbone” of the DNA

 molecule? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

#5 What matches with T: \_\_\_\_\_\_ , and matches with G:

 \_\_\_\_\_\_ ?

#6 Write the names of the nucleotides below:

**T: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**A: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**C: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**G: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

#7 What do genes tell/instruct the cell to make? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Now go to this site:**

<http://www.pbs.org/wgbh/aso/tryit/dna/>

Click on “[DNA Workshop Activity](http://www.pbs.org/wgbh/aso/tryit/dna/index.html##)” and a window pops up. Click on “DNA Replication” button and just follow the instructions of dragging the bases over to match into pairs to **replicate (copy)** a portion of the DNA molecule into two identical copies.

**What is the matching sequence you created?**

 **C A T G G G C T C C**

**\_\_ \_\_ \_\_ \_\_ \_\_ \_\_ \_\_ \_\_ \_\_ \_\_**

Now on the same interactive window where you put together the DNA **click on: “Protein Synthesis”** (upper right button). This is where you transcribe DNA to RNA and then have a ribosome read each ‘Codon” (which is triplet of nucleotides/bases), in order to put the amino acids together to form a protein! This process is called translation.

When you transcribe DNA into an RNA molecule did you notice there is no Thymine in RNA? There is a different nitrogen base called Uracil which is symbolized by the letter “U.” RNA is single stranded instead of double like DNA and is active outside of the nucleus.

When you complete the messenger RNA copy from DNA it will show you leaving the nucleus and thread itself through a ribosome (which itself is mostly made of RNA). Follow directions and match up the codons of messenger RNA “mRNA” with anti-codons of transfer RNA “tRNA”. They are complementary A with U and G with C. Read the text that pops up to understand it better.

**What are the three amino acids you strung together for the protein (“polypeptide chain”)?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Now go to this site:**

<http://learn.genetics.utah.edu/content/begin/dna/firefly/>

[What Makes a Firefly Glow?](http://gslc.genetics.utah.edu/units/basics/firefly/) An animated example of transcription and translation.

Read the information in animation to answer the following questions. Watch the animation and click on the “play” and “more” buttons to continue through it.

1. What is the name of the enzyme (protein) that makes fireflies glow (generate light)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What protein copies the luc gene into messenger RNA? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What is the process of making RNA copies of DNA (genes) called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. After the mRNA copy of luc gene moves into the cytoplasm; what organelle is going to read it to make it into the glowing protein? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. What is the process of making proteins called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. State two reasons why fireflies glow (stated the text below the animation panel):

#1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Now please go to this site:**

<http://learn.genetics.utah.edu/content/begin/dna/transcribe/>

For fun you can attempt to transcribe DNA into RNA and then translate the RNA into an amino acid chain (a protein).

Follow the directions of the interactive program.

Cells use the two-step process of transcription and translation to read each gene and produce the string of amino acids that makes up a protein. The basic rules for translating a gene into a protein are laid out in the Universal Genetic Code.

**What is the amino acid sequence you created?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ &

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & STOP CODON.



**Now *if you are interested* below is a link** to an interactive program that challenges you to make the different type of **mutations** that will change the shape of a protein by changing the sequence of bases of DNA and thus RNA.

<http://molo.concord.org/database/activities/102.html>

Click on “Go to Activity.”

Again this is not required to complete this assignment and it is a bit advanced, but it is well done so I am sharing it with you.

