DNA Webquest: A self guided introduction to basic genetics

Type in the following address in the URL box: http://learn.genetics.utah.edu

Look in the upper left hand corner of the homepage under the heading "GENETICS". Click on the area that says “TOUR OF BASIC GENETICS”. Now go through each of the sections of this tutorial and answer the questions below.

**Click on “What is DNA?”**

1. Every living thing needs a set of instructions that are necessary to live and grow. Where are these instructions found? ___________________________________

2. What does DNA encode?

3. DNA is an abbreviation for: ____________________________________________

4. The twisted ladder shape of DNA is called ____________________________________________________________________________

5. We have 26 letters in our alphabet. How many letters does DNA have? _________

6. What do the letters of the DNA alphabet stand for?

   ___= ___________      ___= ____________     ___=___________       ____= ___________

   CLICK ON THE ← IN THE TOOL BAR AND CONTINUE TO THE NEXT SECTION

**Click on “What is a Gene?”**

7. A special protein in your blood captures and carries oxygen. This protein is called_____________________

8. What happens if the instructions to make this protein are mutated (changed)? Be specific.

9. What protein makes up your hair and nails?___________________________________

   CLICK ON THE ← IN THE TOOL BAR AND CONTINUE TO THE NEXT SECTION.
Click on “What is a Chromosome?”

10. How long would the DNA from a human cell be if you stretched it out? _______________

11. DNA is packaged and coiled up into structures called ____________________________

12. Draw what a chromosome looks like here:

13. How many chromosomes does a human have? ______. We get ______ chromosomes from each parent.

14. Do all living things have as many chromosomes as people? Explain your answer.

Click on the ← IN THE TOOL BAR AND CONTINUE TO THE NEXT SECTION

Click on “What is a Protein?”

15. _____________________________ are responsible for picking up a pain signal and delivering it to the next cell, all the way to the brain.

16. Which type of protein is like bricks that can be stacked up like columns, giving the nerve cell its shape? _____________________________

17. The blueprint (or set of instructions) to make a protein is called a __________________. Genes are long strands of _________________.

18. When a cell needs to make a protein, special parts within the nucleus read the DNA and use that information to produce messages in the form of _____________________________.

19. RNA moves from the ____________________________ to the __________________________ of the cell. Once there, the cell’s protein makers called ____________________________, read the message and produces a protein that matches the instructions laid out by the gene.

20. Now click on the Home tab in the upper left of the screen. Click on the tab that says MOLECULES OF INHERITENCE. Then, click on the phrase that says “BUILD A DNA MOLECULE”. Scroll down and read the text that is on this page. Label the diagram of the DNA molecule below.
21. To see how the double helix structure of DNA is made, scroll back up to the top of the page and click on the tab that says "START BUILDING". After doing the click and drag activity, summarize what you learned by filling in the diagram below by placing the correct letter in the white space on each shape.

22. By looking at the above diagram, what can you conclude about the relationship between A, C, T and G?

Now go to the top of the screen and click on the tab that says "Molecules of Inheritance". Click on the phrase that says "TRANSCRIBE & TRANSLATE A GENE" (right side of screen). Read the information on that page and complete the activity as it is explained to you. After you do the typing activity, copy your work from the screen to area below (where it says mRNA strand). Then complete the click and drag activity and copy your answers from the screen into the circles below.

**Original DNA sense strand:**

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ATTACGATCTGTGCAACAAGATCCT
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**mRNA strand (Transcription):**

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**Sequence of amino acids (Translation):**
25. Use the word bank below to complete the blanks in the paragraphs.

DNA molecules contain information for building specific
________________________. In a 3-D view, a DNA molecule looks like a spiral
staircase; correctly called a _______________________. The
constant parts of the helix are the ________________ and
_____________________, forming the backbone of the ladder. It is
said that the bases of DNA, which form the rungs of the ladder are
______________________, which means they can be joined
together, following specific rules. The rules say that adenine will form
a cross bridge bond with ________________________ and cytosine
will bond with ______________________. It is estimated that there
are approximately six billion letter pairings in the DNA of a human cell!

When a cell is preparing to divide, a double dose of DNA is
prepared so that the "daughter cells" have all the necessary
information to function. The process of making another copy of DNA is
called __________________. This process starts when the helix
"unzips" itself, exposing each strand. Each strand acts a
______________________ to make the other half. In this way, two
identical strands of DNA are made. The fact that DNA replicates
before cell division ensures that each new cell has a complete set of
_______________________. The information of DNA is actually in the
form of a code, where the sequence of __________________
ultimately tells the cell what protein to make. When the four bases are
combined in different three letter sequences, different
_______________________________ of the protein are called for.

The production of proteins involves the cooperation of DNA and
RNA. RNA is a compound similar to DNA, but different in that it can
travel outside of the nucleus. During a process called
__________________________, the message of DNA is copied onto a
different molecule called mRNA. The "m" stands for "messenger".
mRNA is made by using the DNA strand as a template, matching one
base at a time according to specific rules. Transcription is similar to
DNA replication with one important difference. RNA has a base called
__________________________, that behaves like thymine. Like thymine, it
will form ____________________________________ with adenine in DNA.

Once a gene is transcribed, it leaves the nucleus and heads out into the cytoplasm. The ribosome
then reads the message, three letters at a time through a process called _____________.

The three letter words of the message called __________________ are matched with
their counterparts, called anti-codons. In this way the correct amino acid is placed in the correct
position in the growing protein chain. Further changes to the protein are made by the endoplasmic
reticulum and Golgi bodies before being transported throughout the cell.