DNA Web Quest

Name _____Per ___

Part 1 – Introduction, History, DNA Structure, DNA Replication

Introduction

Go to http://science.howstuffworks.com/cell4.htm

Read the text. As you read fill in the blanks below.

As long as a [ ] membrane is intact and [ ] is making all of [ ] enzymes it needs to [ ] properly, the cell is [ ] The enzymes it needs [ ] function properly allow the [ ] to create energy from [ ] construct the pieces that [ ] up its cell wall, [ ] and, of course, produce [ ] enzymes.So where do [ ] of theses enzymes come [ ] And how does the [ ] produce them when it [ ] them? if a cell [ ] just a collection of [ ] causing chemical reactions that [ ] the cell do what [ ] does, then how can [ ] set of chemical reactions [ ] the enzymes it needs, [ ] how can the cell [ ] Where does the miracle [ ] life come from?The [ ] to these questions lies [ ] the DNA or deoxyribonucleic [ ] You have certainly heard [ ] DNA, chromosomes and genes. [ ] guides the cell in [ ] production of new enzymes.[ ] DNA in a cell [ ] really just a patern [ ] up of four different [ ] called nucleotides or bases. [ ] a set of blocks [ ] has only four different [ ] or an alphabet that [ ] only four different letters. [ ] is a long string [ ] blocks or letters. In [ ] E. coli cell, the [ ] pattern is about 4 [ ] blocks long. If you [ ] to stretch out this [ ] stand of DNA, it [ ] be 1.36 mm long [ ] pretty long considering the [ ] itself is 1,000 times [ ] In bacteria, the DNA [ ] is like a wadded-up [ ] of string. Imagine taking [ ] feet (300 meters) of [ ] thin thread and wadding [ ] up -- you could [ ] hold it in you [ ] a human's DNA is about 3 billion blocks long, or almost 1,000 times longer than an E. coli's. Human DNA is so long that the wadded-up aproach does not work. Instead, human DNA is tightly wrapped into 23 structures called chromosomes to pack it more tightly and fit it inside a cell.The amazing thing about [ ] is this: DNA is [ ] more than a pattern [ ] tells the cell how [ ] make proteins! That is [ ] that DNA does. The [ ] million bases in an [ ] coli cell's DNA tell [ ] cell how to make [ ] 1,000 or so enzymes [ ] an E. coli cell [ ] to live its life. [ ] gene is simply a [ ] of DNA that acts [ ] a template to form [ ] enzyme.Let's look at [ ] entire process of how [ ] is turned into an [ ] so you can understand [ ] it worksYou have [ ] heard of the DNA [ ] referred to as the [ ] DNA is like two [ ] twisted together in a [ ] spiralDNA is found [ ] all cells as base [ ] made of four different [ ] Each base pair is [ ] from two complementary nucleotides [ ] together. The four bases [ ] DNA's alpabet are▪ [ ]▪Cytosine▪Guanine▪ThymineAdenin[ ] and thymine always bond [ ] as a pair, and [ ] and guanine bond together [ ] a pair. The pairs [ ] together like rungs in [ ] ladder.In an E. [ ] bacterium, this ladder is [ ] 4 million base pairs [ ] The two ends link [ ] to form a ring, [ ] then the ring gets [ ] up to fit inside [ ] cell. The entire ring [ ] known as the genome, [ ] scientists have completely decoded [ ] That is, scientists know [ ] 4 million of the [ ] pairs needed to form [ ] E. coli bacerium's DNA [ ] The human genome project [ ] in the process of [ ] all 3 billion or [ ] of the base pairs [ ] a typical human's DNA.

Stop!

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DNA History

Go to http://www.dnaft.org/dnaftb/1/concept/index.html
Read the text and answer the following questions.

1. What have people wondered since the beginning of human history?

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2. Who discovered that individual traits are passed on from one generation to the next? In what year?_____

On the menu at the right click on number 15 *"DNA & proteins are key ...."*

3. When was DNA discovered as a major chemical of the nucleus of cells? _____
4. In the early 1900s what molecule was considered to be a better candidate to transmit hereditary information from one generation to the next? _____.
5. Why was protein considered to be a better candidate as the hereditary molecule than DNA?

_____
_____

On the menu at the right click on number 16 *"one gene makes one protein"*

6. What was the conclusion make by Beadle & Tatum? What year was this?

_____

On the menu at the right click on number 17 *"a gene is made of DNA"*

7. What did Oswald Avery's team of scientists conclude from their experiments? In what years?

_____

On the menu at the right click on number 19 *"The DNA is shaped like a twisted ladder"*

8. What did earlier work on DNA show?_____
_____
9. Who won the race to show the 3-dimensional structure of DNA? _____
10. What year was this? _____

Click on animation at the bottom of your screen (step through the animation and answer the following questions

11. What makes up a nucleotide? _____
12. How could DNA be an "intelligent molecule" (carry hereditary information)?

_____
13. What was Erwin Chargaff's contribution to the DNA puzzle?

_____
14. What important tool did Linus Pauling use to determine the structure (shape) of proteins?

_____
15 How was this tool used to help discover the shape of DNA?

---

16. Name the two scientists that made the x-ray diffraction patterns that Watson & Crick used?

_____
17. The distinctive "X" meant the DNA had what pattern? _____
18. Scroll through the rest of the animation and **summarize** the rest of the story.

_____
_____

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DNA Structure

Go to http://www.pwc.k12.nf.ca/wadey/biotech/dna1.swf

Draw a DNA molecule 12 base pairs long in the box below (remember to match the nitrogen bases correctly!).

DNA Replication

Go to http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/dna-rna2.swf

Answer the following questions as you move through the animation of DNA replication.

Before clicking

1. What class of proteins are the molecules with –ase endings? _____
2. Draw a portion of the DNA molecule on the screen.

Click on the large arrow once. ***(total of one click)***

3. Draw the portion of DNA that has "unzipped"

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More DNA Replication

Click on the large arrow again (total of 2 clicks).

4. What begins to happen on one of the "unzipped" strands?

Click several more times slowly and study what happens.

5. What do you think the molecules are with the –ase endings on them?

   _____

6. Can you hypothesize what function they could have in this process?

   _____

7. Explain in your own words & draw a diagram of the process of DNA replication (include what you start and end with & what happens in between)

Explanation

_____
_____
_____
_____
_____
_____
_____

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Part 2 – RNA, Transcription, Translation

RNA

Go to http://www.dnaftb.org/dnaftb/21/concept/index.html

Read the text and answer the following questions

1. Where is RNA commonly found? _____
2. Describe what is meant by the "central dogma" in biology.

_____

_____

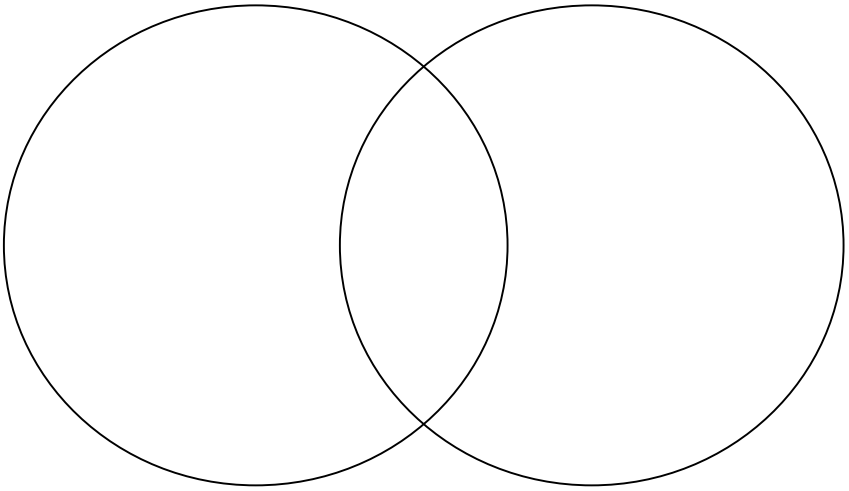
3. Name the 3 types of RNA and the general roles they play in the making of protein.

_____

_____

Click on the animation button below. Step through the animation and compare and contrast the structure of RNA to DNA. Use the Venn diagram to compare and contrast. Then do a sketch of an RNA molecule (at least 10 nucleotides long using the all the appropriate nitrogen bases at least twice).

DNA



RNA

RNA Sketch (at least 10 nucleotides long with appropriate nitrogen bases)

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Transcription (DNA → RNA)

Go to http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/transcription.swf

Answer the following questions as you move through the animation of Transcription

Before clicking

1. The diagram represents what type of molecule? _____

Click once

2. What type of molecule is the RNA polymerase? _____

Click again

3. What function does the RNA polymerase have? _____
4. Where in the cell do you think this is taking place? _____
5. Explain how the mRNA molecule forms.

_____

_____

_____

_____

6. What nitrogen base replaces thymine on the RNA molecule? _____

Translation (mRNA → protein)

Go to http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/translation.swf

Answer the following questions as you move through the animation of Translation

Before clicking

1. The diagram represents what type of molecule? _____

Click once

2. Where in cell in this taking place? _____

Click again

3. What type of molecule is the tRNA (transfer RNA) bringing to the mRNA? _____
4. Explain (in terms of nitrogen bases) how the tRNA docks on the mRNA ?

_____

Click until the end watching the process of translation

5. As the tRNAs dock on the mRNA bringing amino acids with them what type of molecule is created

_____

Start the animation over

6. What are the 3 nitrogen bases on the tRNA carrying the amino acid "Met"? _____
7. What are the 3 nitrogen bases on the mRNA that the "Met"-tRNA docks upon? _____
8. Check out the next tRNA with its 3 nitrogen bases and see where it docks on the mRNA. Can you detect a pattern. If there are 20 amino acids then what is the minimum number of tRNAs that must exist. _____
9. Write a summary of translation using words and a sketch