Name_____Class Period_____

Comparing DNA

You are part of an ***Astrobiological*** team tasked with decoding the DNA of six specimens found living on a newly discovered planet. Similar to life on Earth, each specimen's DNA contains the bases; adenine, cytosine, guanine, and thymine and share the same pairing. Each specimen's genome is between 2.5 to 3 billion base pairs long. Your team wants to know how many different species they have and which species are the most related to each other. Your team will analyze the samples of 16 bases from each specimen's DNA. Follow the steps to determine how each specimen is related.

1. Each sample is 16 bases long and part of an incomplete strand, Fill in the complementary base for each specimens' DNA to complete each strand. Specimen A is done for you.

Specimen A : Original Strand: ATAC TCGA CCAG GATC
Complimentary Strand: TATG AGCT GGTC CTAG

Specimen B : Original Strand: ATAC TCGA CCAG GTCG
Complimentary Strand:

Specimen C : Original Strand: ATAC TCGA CCAG ACTA
Complimentary Strand:

Specimen D : Original Strand: ATAC TCGA CCAG ACCT
Complimentary Strand:

Specimen E : Original Strand: ATAC TCGA CCAG GATC
Complimentary Strand:

Specimen F : Original Strand: ATAC TCGA CCAG GATA
Complimentary Strand:

2. Based on their DNA,which two specimens are the same species? How do you know?

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3. Which specimen is a different species from Specimen A but genetically similar? What percentage are they genetically similar? Show your work.

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4. How genetically similar are specimen A and specimen B? Show your work.

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5. Which two specimens are different species and are genetically similar but not genetically similar to Specimen A?

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6. What Percentage are these two specimens genetically similar? Show your work.

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7. What percentage are each of these two specimens genetically similar to specimen A? Show your work.

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8. Given the size of the organisms' genomes, would it be beneficial to use these DNA samples to determine species and their relationships? Why or why not?

9. Human's and Chimpanzee's DNA sequence is 98.8 % similar. The human genome is 3 billion (3,000,000,000) base pairs long, how many of these pairs follow the same sequence as a chimpanzee? How many pairs do not follow same sequence? Show your work.

10. Between you and one of teammates you are 99.9% genetically similar. How many of your base pairs follow the same sequence as a teammate? How many pairs do not follow the same follow the same sequence? Show your work.