**DNA Replication questions**

Name and date submitted (3 pts):

Using this handout as a TEMPLATE, create space in between questions below and write or type your answers. KEEP THE SAME NUMBERING! Turn in your completed work by the due date.

Most of the questions below are answered in your textbook, but some will require Internet research.

Note: These 3 terms are equivalent: “Replication = Duplication = Copying”

(20 questions, 100 points possible)

1. What is DNA and what is its function?
2. What is messenger RNA (mRNA) and what is its function?
3. How does the chemical structure of DNA differ from RNA?
   1. ‘D’ stands for ‘different’, while ‘R’ stands for ‘regular’, so DNA has different bases.
   2. DNA has a 6-carbon sugar backbone, while RNA has a 5-carbon sugar backbone.
   3. DNA has Thymine, while RNA has Uracil
   4. DNA is in eukaryotes, while RNA is in prokaryotes
4. How do eukaryotic cells differ from prokaryotic cells?
5. In which stage of the cell cycle is the DNA replicated (copied)? (if you don’t remember, review the chapter on cellular reproduction and the cell cycle)
6. Why does DNA need to be replicated (copied)?
   1. The cell uses DNA for fuel when glucose-supplies are low, and it must be replaced
   2. The telomeres wear out and the old DNA must be replenished
   3. When a cell replicates, a new copy of all the DNA must be made
   4. When a mutation occurs, new DNA is cranked out to replace the damaged DNA
7. If DNA of a particular species was analyzed and it was found that it contains 27 percent Adenine, what would be the percentage of Cytosine?
   1. 27 percent
   2. Can’t tell
   3. 23 percent
   4. 54 percent
8. In eukaryotes, what is the DNA wrapped around?
   1. Single-stranded binding proteins
   2. Sliding clamp
   3. Polymerase
   4. Histones
9. The DNA double helix does NOT have which of the following?
   1. Antiparallel configuration
   2. Complementary base pairing
   3. Major and minor grooves
   4. Uracil
10. What is meant by the term ‘double helix’?
11. Meselson and Stahl’s experiments proved that DNA replicates by a semi-conservative mode. What exactly is meant by this?
12. What is meant by ‘antiparallel configuration’?
13. If the sequence of a 5’-3’ strand of DNA is AATGCTAC, then the complementary strand has the following sequence:
    1. 3’-AATGCTAC-5’
    2. 3’-CATCGTAA-5’
    3. 3’-TTACGATG-5’
    4. 3’-GTAGCATT-5’
14. Nitrogenous bases:
    1. Name the four nitrogenous bases found in DNA.
    2. Which bases pair with each other?
15. Where does DNA reside and do its work in a eukaryotic cell?
16. These will require Internet research:
    1. How big is the DNA molecule in your body’s chromosome #1 (your largest chromosome)? In other words, how many base-pairs are on your chromosome 1?
    2. How many base pairs are on chromosome 22 (one of your smallest chromosomes)?
    3. How many base pairs do you have in your entire genome (in all your 46 chromosomes)?
    4. Compare: how many base pairs are in the entire *E. coli bacterium’s* genome?
    5. Compare: how many base pairs are in the entire Baker’s yeast (*S. cerevisiae*) genome? Baker’s yeast is a *single-celled eukaryote*, and is very important in Biotech research.
17. What is meant by the term ‘gene’?
    1. A French pastry chef
    2. A compartment of the cell which contains the genetic information
    3. A single nucleotide
    4. A section of DNA which codes for a given protein
18. These will require Internet research:
    1. How many genes are located on the human chromosome 1?
    2. How many genes are located on the human chromosome 22?
    3. How many total genes do you have in your entire genome? They keep finding new ones; try to find the most up-to-date figure.
    4. How many genes does a single *E. coli* have?
    5. How many genes does a single Baker’s yeast cell have?

California Standards Test questions:

1. Semi-conservative replication of DNA refers to the idea that (be careful, think about it…)
   1. DNA molecules need to unwind before duplication begins
   2. Each new DNA molecule contains two new single RNA strands
   3. The two strands of DNA molecules run in opposite directions
   4. Each half of the original DNA molecule is joined with a new complementary DNA strand
2. This segment of DNA has undergone a mutation in which three nucleotides have been deleted.

5’ GTA\_ \_ \_AA 3’

3’ CATGCATT 5’

A repair enzyme would replace them with

* 1. CGT
  2. GCA
  3. CTG
  4. GTA