DNA REPLICATION AND PROTEIN SYNTHESIS QUESTIONS

1. What are the units of which DNA is made?
2. When does DNA replication occur?
3. The nitrogen bases, Adenine and Thymine, and Guanine and Cytosine, are complementary. What does this mean?
4. Distinguish between a nitrogen base and a nucleotide.
5. Describe the structure of a DNA molecule.
6. What are the differences between DNA and RNA?
7. A small part of a DNA molecule contains the sequence of nucleotides GAA GTA CCA on one of the strands.

(a) Sketch this part of the DNA molecule showing both strands.

(b) What would be the mRNA nucleotide sequence formed from this strand?

(c) Sketch this part of the mRNA molecule.

(d) What are the amino acids coded for by this small part of DNA?

8. Distinguish between messenger RNA, ribosomal RNA and transfer RNA.
9. What is the difference between a codon and an anticodon?
10. What is the role of each of these in protein synthesis: (a) mRNA (b) rRNA (c) tRNA ?
11. Describe the difference between transcription and translation.
12. Give an example of a Start codon and a Stop codon.
13. Suppose you wished to follow particular nucleic acid molecules in the cell by radioactive tracer methods. Which nucleotide would you “label” so you could be sure the isotope was in : (a) DNA (b) RNA ?
14. What 16 nitrogen base combinations would be possible in a two-base code on the RNA molecule?
15. A strip of DNA has the following sequences of nitrogen bases: GGC CAT TCC GTG . In the formation of protein from this, what would be the corresponding base triplet sequence on the transfer RNA?
16. The enzyme catalase has a molecular weight of about 240 000. The average molecular weight of amino acids is about 140.

(a) How many amino acids would such a protein contain?

16. (b) How many nucleotides would there be in the messenger RNA which coded for this protein?

(c) If the approximate molecular weight of a nucleotide is 186, what would be the approximate molecular weight of messenger RNA?

(d) How many proteins could be made from one DNA molecule? (There are at least 5000 nucleotides per DNA molecule.)