TRIAL TEST 11: DNA

Time allowed:	**60 minutes**	**Section 1** – Multiple Choice	10 marks
Total marks:	**80**	**Section 2** – Short Answer	50 marks
		Section 3 – Short Answer	20 marks

SECTION 1 – MULTIPLE CHOICE (10 MARKS)

1. Which of the following nitrogen bases pairs with adenine in a DNA molecule?
   (a) cytosine
   (b) guanine
   (c) uracil
   (d) thymine.

2. Which of the following statements is correct? DNA has:
   (a) a molecular shape that creates an 'active site'
   (b) nitrogen bases bonded to phosphate molecules
   (c) equal amounts of cytosine and guanine
   (d) paired bases of guanine and thymine.

3. The basic building blocks which make up a DNA molecule are called:
   (a) nucleotides
   (b) amino acids
   (c) nitrogenous bases
   (d) monosaccharides.

4. The importance of mitochondrial DNA is that it codes for enzymes which are directly involved in the process of:
   (a) protein synthesis
   (b) endocytosis
   (c) nuclear division
   (d) respiration.

5. DNA in the cell nucleus is important because it carries codes for:
   (a) chromosomes replication
   (b) new mitochondria
   (c) protein synthesis
   (d) carbohydrate synthesis.

6. The molecule which transfers information to the ribosomes where protein synthesis occurs is called:
   (a) Messenger RNA (mRNA)
   (b) Transfer RNA (tRNA)
   (c) Carrier RNA (cRNA)
   (d) Messenger DNA (mDNA).

7. Which of the following nucleotides is found in DNA but not in RNA molecules?
   (a) adenine
   (b) cytosine
   (c) guanine
   (d) thymine.

8. When protein synthesis occurs, the type of protein produced is determined by:
   (a) the order of nucleotides that is copied by mRNA
   (b) the temperature of the cell
   (c) the tRNA available to carry amino acids
   (d) enzymes present in the nucleoplasm and cytoplasm.

9. Proteins that are closely associated with gene expression and together with DNA form chromosomes are called:
   (a) centrioles
   (b) nucleosomes
   (c) histones
   (d) lysines.

10. Small differences in the appearance of "identical twins" are likely to be due to
    (a) mistakes made during meiosis resulting in slightly different genotypes
    (b) differences in their phenotypes
    (c) slight mutations in their DNA since birth
    (d) different methylation of their chromosomes.

SECTION 2 – SHORT ANSWER (50 MARKS)

Answer each question in the space provided.

1. (i) A nucleic acid which transfers free amino acids in the cytoplasm to the ribosomes where amino acids are linked to form proteins

   _____

   (ii) The copying of DNA which occurs in cells during the interphase

   _____

   (iii) Mitochondria and mitochondrial DNA are inherited from this parent

   _____

   (iv) The order of these determines the message carried from the nucleus to the ribosomes

   _____

   (v) The fluid in which free nucleotides are available for DNA copying

   _____

   (vi) The word for D in DNA

   _____

   (vii) The formation of a complimentary strand of mRNA from a section of DNA in the nucleus

   _____

(viii) Weak bonds involved in base pairing between the complementary strands of a DNA molecule

_____

(ix) The phenotypic expression of genes due to something other than the sequence of bases on the DNA

_____

(x) The process in which methyl groups are transferred to histone proteins of chromosomes

_____

[10 marks]

2. (i) A human cell normally has 46 chromosomes (diploid number). When a human cell undergoes mitosis, each of the two cells formed has 46 chromosomes. Explain how the number of chromosomes in each cell is maintained.

_____

_____

_____

[3 marks]

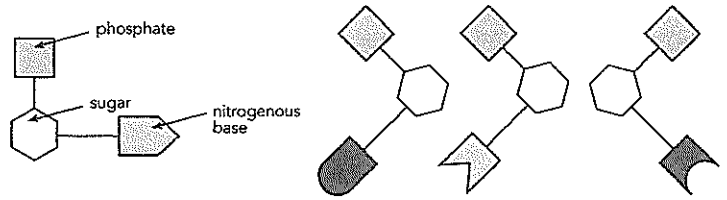
(ii) Where do the extra nucleotides come from to create the extra 46 DNA molecules?

_____

_____

[1 mark]

3. The diagrams below show four different nucleotides.



(i) In what way is each nucleotide shown different?

_____

[1 mark]

(ii) Draw a diagram below to show how these four nucleotides could be linked to form part of a DNA molecule.

[2 marks]

(iii) A molecule of DNA normally contains thousands of nucleotides, not just four. In which part of the DNA molecule is the cell's genetic information stored?

_____

[1 mark]

(iv) Explain briefly how this information is stored and how it is translated.

_____

_____

_____

_____

_____

_____

_____

_____

[8 marks]

4. A freshwater amoeba may have as many as 600 chromosomes whereas a cat cell has only 38. Does this imply that the amoeba is a more complex animal than the cat?

_____

Explain:

_____

_____

_____

[2 marks]

SECTION 3 – EXTENDED ANSWER (20 MARKS)

(i) Describe how DNA molecules replicate before cell division occurs. Use diagrams to illustrate your answer. [10 marks]

(ii) Transcription and translation are the two main stages in protein synthesis. Describe the steps in each stage in their correct order. [10 marks]