10 EXTENSION SCIENCE 2015

BIOLOGY TEST ONE: DNA

Name: ANSWER KEY **Teacher:** _____ **Mark:** /50

Percentage: %

SECTION A: **MULTIPLE CHOICE** **(5 marks)**

Select the most correct answer for each question below.

1. DNA is made up of molecules called:

(a) proteins.
(b) genes.
(c) chromosomes.
(d) nucleotides.

2. Choose the incorrect statement about proteins.

(a) Proteins control many characteristics and functions in the body.
(b) Proteins include the structural materials that build up your cells and tissues.
(c) Proteins are long threadlike structures found in the nucleus of cells.
(d) Proteins make up most of the hormones in the human body.

3. The function of DNA is to:

(a) allow the cells of a living thing to reproduce.
(b) allow complementary nitrogen-rich bases to pair up.
(c) store information on how a living thing's cells and body will work and look.
(d) store nucleotides in the nucleus of a cell.

4. The diploid number of chromosomes is:

(a) 23 chromosomes.
(b) 42 chromosomes.
(c) 46 chromosomes.
(d) 24 chromosomes.

5. Choose the correct statement.

(a) DNA strands have a special shape called a twisted ladder.
(b) The nucleus is part of the cell that produces energy.
(c) DNA is short for Designer Nucleic Acid.
(d) Chromosomes are tightly coiled DNA threads.

SECTION B: **SHORT ANSWER** **(45 marks)**

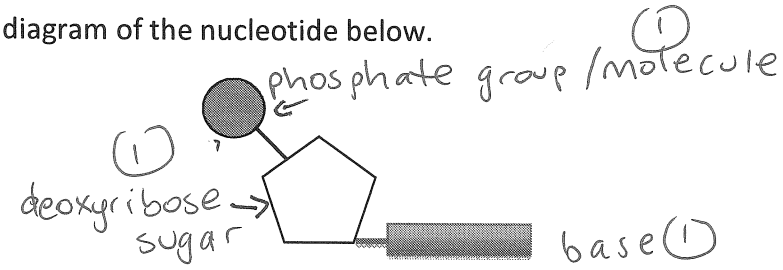
1. **Explain** one main difference between a gene and a chromosome. (2 marks)

A gene is a section of DNA (1) whereas a chromosome is a twisted up strand of DNA (1).

2. **State** what the acronym 'DNA' represents. (1 mark)

Deoxyribonucleic acid

3. **Label** the diagram of the nucleotide below. (3 marks)

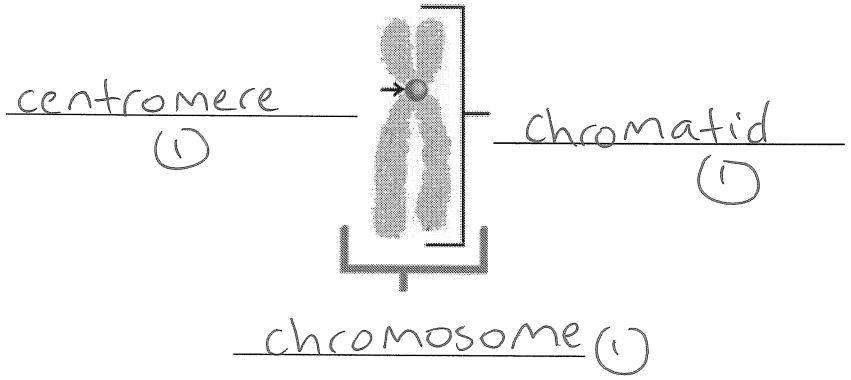


4. The chemical structure of the nitrogen-rich bases means that they can only form chemical bonds with one of the other bases. (2 marks)

Adenine only pairs with thymine

Cytosine only pairs with guanine

5. **Label** the diagram below. (3 marks)



6. Fill in the missing words. (3 marks)

The general cells in the human body each contain 46 chromosomes or 23 pairs.

The only exceptions are the sperm and egg cells which only contain 23 chromosomes and red blood cells which have no nucleus.

-1 mark for each incorrect/missing

7. Write the complimentary DNA strand underneath each given strand of DNA. (2 marks)

a. C G T A A G C G C T A A T T A (1)

G C A T T C G C G A T T A A T

b. T C T T A A A T G A T C G A T C (1)

A G A A T T T A C T A G C T A G

8. Write **definitions** for the terms below. (3 marks)

Somatic cell: every cell in the body except the sex cells. (1)

Replication: The process of making copies of DNA (1)

Zygote: a fertilised egg. (1)

9. **Contrast** (state 3 differences between) sexual and asexual reproduction. (3 marks)

Sexual reproduction requires two parents whereas sexual reproduction only requires one parent (1)

In sexual reproduction the daughter cells are not identical to the parent cells, in asexual reproduction the daughter cells are identical to the parent cell. (1)

In sexual reproduction the daughter cells are not identical to each other, in asexual reproduction the daughter cells are identical to each other. (1)

10. One type of asexual reproduction is vegetative. **State** the three ways an organism can reproduce vegetatively. (3 marks)

Bulbs (1) tubers (1) rhizomes (1)

11. **State** what 1n and 2n refers to in genetics. (2 marks)

1n refers to there being 23 (1 set) chromosomes in a cell and 2n refers to there being 46 (2 sets) chromosomes in a cell.

12. **State** two ways in which genes are different from each other. (2 marks)

Ordering of bases (1)

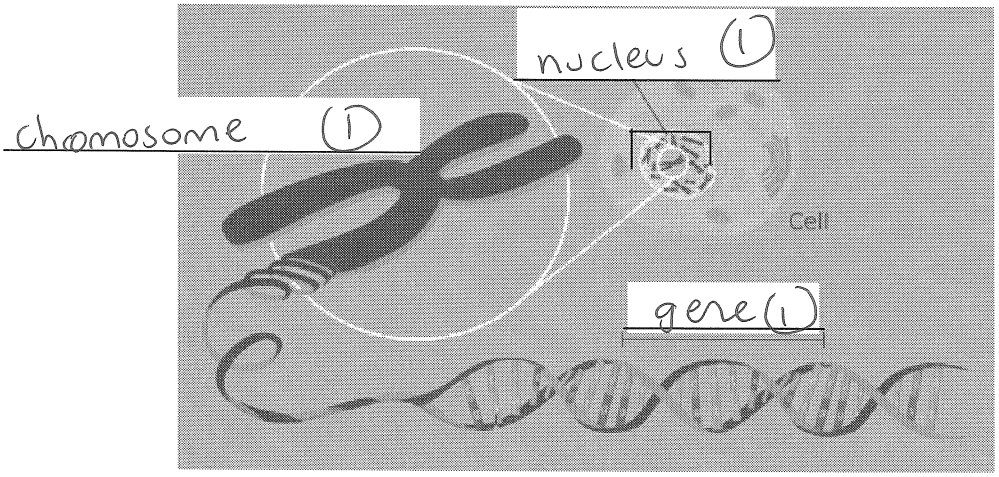
Length of DNA strand (1)

13. Complete the table below. (5 marks)

Comparison of mitosis and meiosis

	Mitosis	Meiosis
The type of cells this occurs in	General body cells /somatic cells	sex cells / gametes (1)
The number of daughter cells that are produced	2	4 (1)
The number of divisions	1	2 (1)
Are the daughter cells genetically identical to the parent cells? (Yes/no)	Yes	No (1)
The number of chromosomes in each produced cell	46	23 (1)

14. Complete the diagram below. (3 marks)



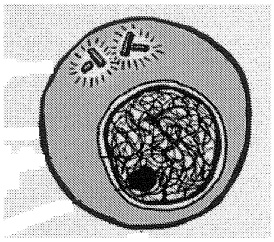
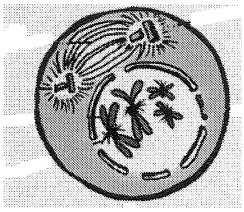
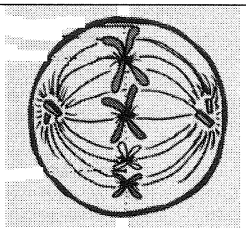
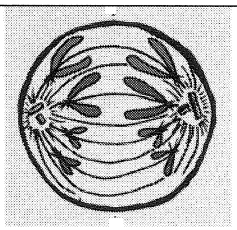
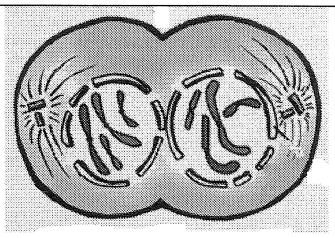
15. **State** what makes up the 'steps' of the ladder in a DNA strand. (1 mark)

Nitrogen bases

16. **State** what makes up the 'sides' of the ladder in a DNA strand. (1 mark)

phosphate molecules/groups & deoxyribose sugar molecules

17. Complete the table below. (6 marks)

Phase of mitosis	What is happening	Diagram
Interphase (1)	• DNA replicates (DNA replication occurs) • Organelles duplicate	
prophase (1)	• Nuclear membrane breaks down. • Chromosomes appear. • spindle apparatus forms.	
Metaphase (1)	• Chromosomes line up at equator of cell. • Centromeres attach to spindle fibres.	
Anaphase (1)	• Chromosomes split & chromatids move to opposite poles of cell.	
Telophase (1)	• Spindle apparatus breaks down. • Nuclear membranes form.	
(1) cytokinesis	• Cytoplasm splits between two cells. • Two daughter cells are formed. • Chromosomes unravel