10 SCIENCE 2016

BIOLOGY TEST ONE: DNA

Name: MARKING KEY **Teacher:** _____ **Mark:** /53

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.

MARKING KEY

SECTION B: **SHORT ANSWER** **(48 marks)**

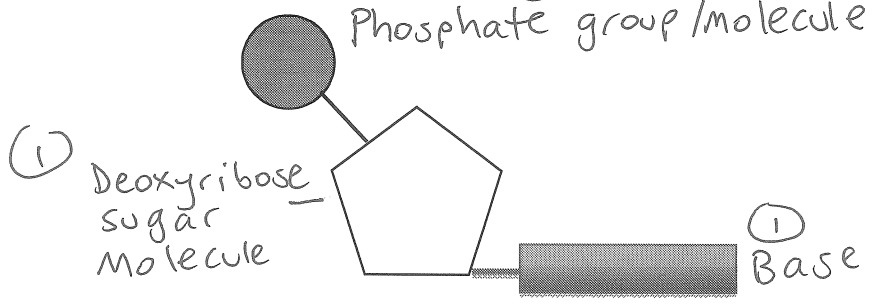
1. Explain the difference between a gene and a chromosome. (2 marks)

A gene is a section of DNA (1) whereas a chromosome is a tightly coiled up DNA strand (1)

2. State what the initials DNA represent. (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 mark)

Adenine only pairs with Thymine (1)

Guanine only pairs with cytosine (1)

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

The general cells in the human body each contain (1) 46 chromosomes or (1) 23 pairs.

The only exceptions are the Sperm (1) and egg (1) cells which only contain 23 (1) chromosomes and red blood cells which have no nucleus / chromosomes (1).

6. 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

G C A T T C G C G A T T A A T (1)

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

7. Write definitions for the terms below. (2 marks)

Meiosis: Cell division that produces two daughter cells identical to the parent cell. (1)

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

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

Sexual reproduction requires two (1) parents, the daughter cells are not identical (1) to the parent and the daughter cells are different to each (1) other, whereas asexual reproduction only requires one parent, the daughter cells are identical to the parent cell and the daughter cells are identical to each other.

9. State one advantage of sexual reproduction. (1 marks)

Gives genetic variation

10. State one disadvantage of sexual reproduction. (1 mark)

Two parents are required

11. Circle either true or false for the statements below. (6 marks)

a. Meiosis occurs in gametes. (True) / false (1)

b. Mitosis produces four daughter cells. True / (false) (1)

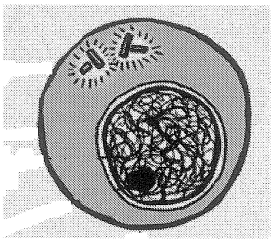
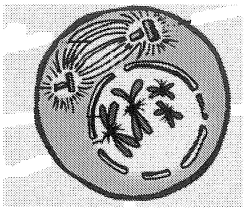
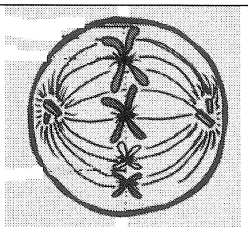
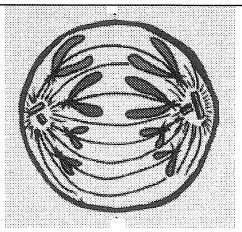
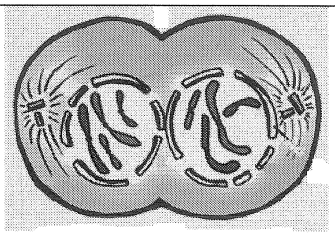
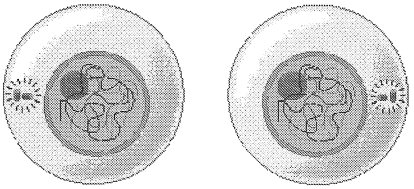
c. Each chromosome is a gene strand tightly coiled up. True / (false) (1)

d. A fertilised egg is known as a zygote. (True) / false (1)

e. Meiosis produces general body cells. True / (false) (1)

f. Sex chromosomes determine the sex of an individual. (True) / false (1)

12. Complete the table below. (6 marks)

Phase of mitosis	What is happening	Diagram
Interphase	• DNA duplicates. / go through replication • Organelles duplicate	 (1)
Prophase	• Nuclear membrane breaks down. • Chromosomes appear. • Spindle apparatus forms	 (1)
Metaphase	• Chromosomes line up at equator of cell. • Centromeres attach to spindle fibres	 (1)
Anaphase	• Chromosomes split and move to opposite poles of the cell.	 (1)
Telophase	• Spindle apparatus breaks down. • Nuclear membranes form	 (1)
Cytokinesis	• Cytoplasm splits between two cells • Two daughter cells are formed. OR Chromosomes unravel	 (1)

13. Complete the table below. (10 marks)

Comparison of mitosis and meiosis

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

14. Complete the diagram below. (3 marks)