

GCSE Biology (9 – 1)

DNA

Name:

Group:

Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.



For markers use	
Question	Mark
1	/5
2	/8
3	/10
4	/6
5	/9
6	/8
Total	/46
%	
Grade	

Information

- The maximum mark for this paper is 46 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.



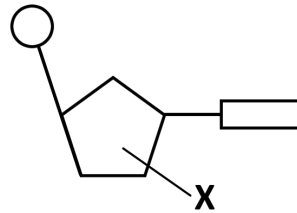
1. DNA is the molecule found in living cells that contains the unique genetic code for an organism.
Circle the letter of the correct answer for each.

a) A human cell contains a length of DNA that carries the code for making which substance?

- | | | | |
|----------|----------|----------|----------|
| A | B | C | D |
| Glycogen | Fat | Starch | Protein |

(1 mark)

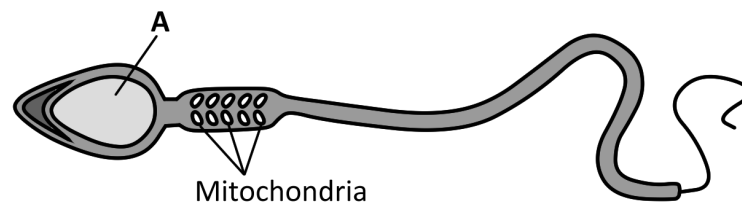
b) The figure below shows a DNA nucleotide. Which answer identifies structure X?



- | | | | |
|-----------|-------------|------------------|----------|
| A | B | C | D |
| Phosphate | Deoxyribose | Nitrogenous base | Thymine |

(1 mark)

c) The diagram shows a human sperm cell. Structure A on the diagram contains DNA.
Identify structure A.



- | | | | |
|-------------|----------|-----------------|-----------------|
| A | B | C | D |
| Deoxyribose | Nucleus | Haploid nucleus | Diploid nucleus |

(1 mark)

d) What is defined as a length of DNA that codes for a protein?

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|----------|------------|------------|----------|
| A | B | C | D |
| Allele | Chromosome | Amino acid | Gene |

(1 mark)

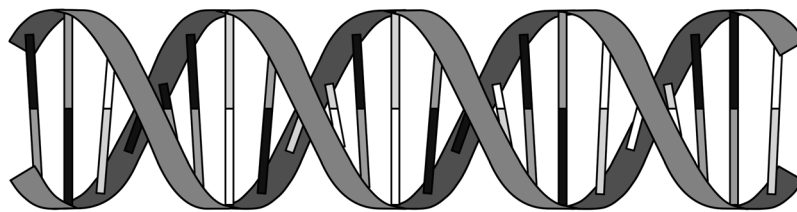
e) The structure of a DNA molecule is best described as a:

- | | | | |
|----------|--------------|----------|---------------|
| A | B | C | D |
| Allele | Double helix | Helix | Single strand |

(1 mark)

(Total for Question 1 is 5 marks)

2. The figure below shows a small section of DNA.



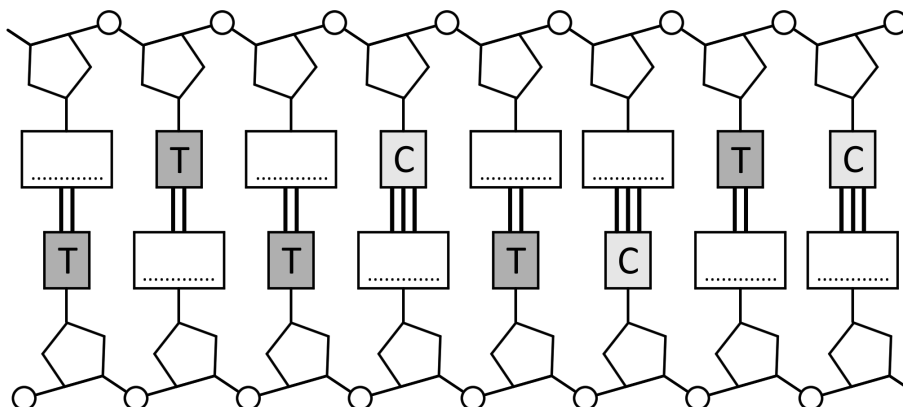
- a) DNA passed from parent to offspring when an organism reproduces.
What is DNA short for?

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(2 marks)

- b) The structure of DNA was determined in 1953 by which **two** scientists?

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.....
(2 marks)

The figure below shows a short section of DNA showing some of the nitrogenous bases.



- c) Complete the figure above for the missing nitrogenous bases.
(2 marks)

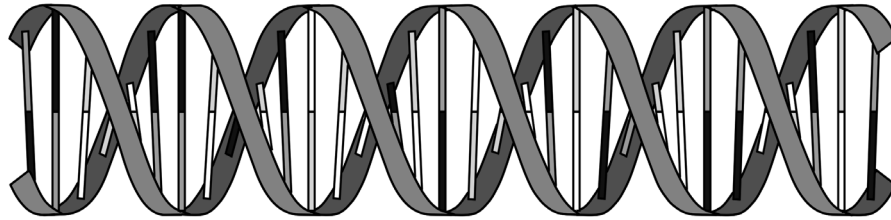
A scientist obtained a mass of 0.0084 nanograms of DNA from a **diploid** human cell.

- d) Calculate the mass of DNA the scientist should expect to obtain from a haploid human cell.
Give your answer in nanograms.

..... nanograms
(2 marks)

(Total for Question 2 is 8 marks)

3. The figure below shows DNA.



a) Describe the structure of DNA, including the roles of the scientists involved in its discovery.

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(6 marks)

b) Describe the structure of a DNA nucleotide and identify which bases pair together and the type of bond that forms between them.

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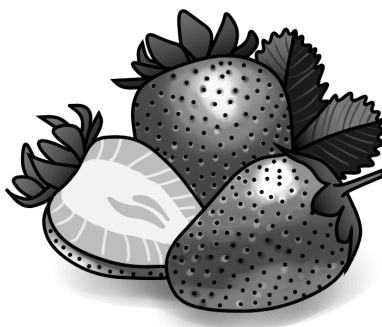
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(4 marks)

(Total for Question 3 is 10 marks)

4. DNA is found within the cell of an organism. The figure below shows some strawberries.



Describe the key practical steps a student would need to follow to extract a sample of DNA from the strawberry, starting with the whole fruit and ending with the visible DNA.

This image shows a full page of white paper with horizontal dotted lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(6 marks)

(Total for Question 4 is 6 marks)

5. In a prokaryotic cell, DNA is often found loose in the cytoplasm.

a) Why is the DNA of a prokaryotic cell not found in the nucleus?

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(2 marks)

b) In the space below draw a **labelled** DNA nucleotide.

(3 marks)

The two strands of a DNA molecule are linked by complementary bases.

c) Describe how the complementary bases are linked in a DNA molecule.

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(2 marks)

d) The figure below shows a small section of a DNA molecule.

Write the sequence of bases that is complementary for the DNA molecule shown below.

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

(2 marks)

(Total for Question 5 is 9 marks)

6. This question is about DNA and RNA.

a) What does RNA stand for?

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(1 mark)

b) Describe **two** similarities between the structure of a DNA molecule and the structure of an RNA molecule.

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(2 marks)

c) Describe **two** differences between the structure of a DNA molecule and the structure of an RNA molecule.

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(2 marks)

d) Explain the main functional role of DNA in a cell and outline **two** different roles of RNA molecules in the process of protein synthesis.

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(3 marks)

(Total for Question 6 is 8 marks)