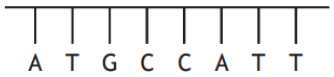
DNA & Proteins

1. The diagram shows the sequence of bases in a strand of DNA.



Which of the following shows the complementary base sequence for this strand of DNA?

A GCATTGCC
B CGTAACGG
C TACGGTAA
D TAGCCTAA

2. Which of the following statements is true for a DNA molecule?

A It is double-stranded and found in the nucleus
B It is single-stranded and found in the nucleus
C It is double-stranded and codes for making sugars
D It is single-stranded and codes for making proteins

3. A section of DNA contains a total of 6400 bases of which 32% are guanine.
The number of adenine bases in this section of DNA is

A 1152
B 2048
C 2304
D 4352

4. A single strand of DNA contains 830 adenine, 929 cytosine, 774 guanine and 615 thymine bases.

How many guanine bases would be in the complementary strand?

A 615
B 774
C 830
D 929

5. A molecule of DNA has 4450 bases of which 890 are cytosine.
The number of adenine bases in this DNA molecule is

A 890
B 1335
C 1780
D 2670.

6. Which of the following shows the correct DNA base pairing?

A
A – C
C – G
G – C
T – A

B
A – T
C – G
G – T
T – A

C
A – G
C – G
G – A
T – A

D
A – T
C – G
G – C
T – A

DNA & Proteins

1. The diagram represents part of a DNA molecule.

(a) (i) Give the term which describes the shape of a DNA molecule as shown in the diagram.

_____

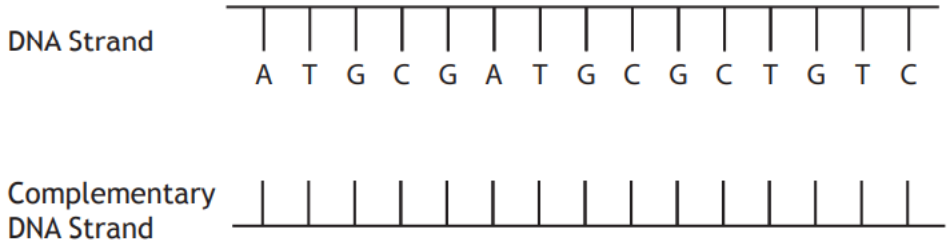
(ii) Describe the way in which the DNA strands are linked together.

_____

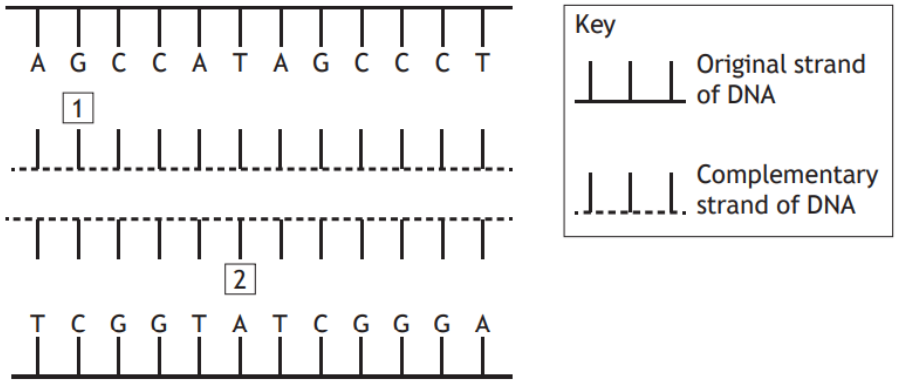
(b) Name the organelle in animal cells which stores the DNA.

_____

2. DNA is a double stranded molecule. The following diagram shows part of one strand. Complete the diagram to show the complementary strand.



3. Forensic scientists can take small quantities of DNA and use a process to make large quantities. Each DNA molecule is separated and used to make two complementary strands as shown below.



Give the full names of bases labelled 1 and 2 in the diagram above. **2**

1 _____

2 _____

4. The four DNA bases represented by A, C, G and T make up the genetic code.

Part of the base sequence that codes for a protein is shown.

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

Name base A and base C. **2**

Base A _____

Base C _____

DNA & Proteins

5 The diagram represents a section of DNA.

(a) Give the term used to describe the structure of a DNA molecule. **1**

_____

(b) The following results show an analysis of the DNA bases contained in a cell.

DNA Base	Composition (%)
X	28
Guanine	22
Y	22
Z	28

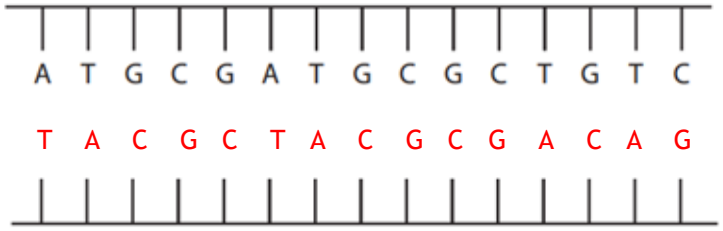
Which letter in the table represents the base cytosine? **1**

_____

DNA Answers

1. C
2. A
3. A
4. D
5. B
6. D

1 a (i) double helix (ii) complementary bases b) nucleus

2. 

3. 1. cytosine 2. Thymine

4. A=adenine C=cytosine

5 a) double helix b) Y

Proteins

1. Cells in the stomach produce enzymes to help digest food.
Identify the structure where these enzymes are produced.

A Mitochondrion
B Nucleus
C Ribosome
D Cell membrane

2. Which of the following statements is true for proteins?

1. They are made in the nucleus.
2. They are affected by temperature.
3. They can be found in the cell membrane.
4. They all function as enzymes.

A 2 and 3 only
B 2 and 4 only
C 1, 3 and 4 only
D 2, 3 and 4 only

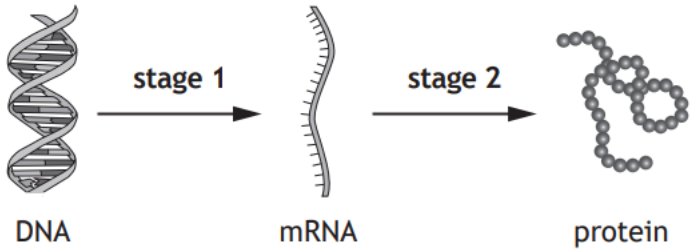
3 Where in a cell would mRNA **not** be found?

A Cell membrane
B Cytoplasm
C Nucleus
D Ribosome

4 Which of the following statements matches a type of protein to its function?

A Receptors target specific enzymes
B Enzymes carry chemical messages in the blood
C Antibodies destroy specific pathogens
D Hormones carry electrical impulses

5. The diagram shows stages in the production of a protein in a cell.



Which row in the table identifies the exact location of each stage?

	Stage 1	Stage 2
A	nucleus	cytoplasm
B	nucleus	ribosome
C	cytoplasm	ribosome
D	cytoplasm	nucleus

DNA & Proteins

6. Which of the following represents the sequence of events in the production of a protein from the genetic code?

A DNA → amino acids → mRNA → protein

B DNA → mRNA → amino acids → protein

C mRNA → DNA → amino acids → protein

D amino acids → DNA → mRNA → protein

7. Which of the following are all types of proteins?

A Hormones, enzymes and nitrates

B Antibodies, enzymes and plasmids

C Hormones, receptors and antibodies

D Receptors, antibodies and nitrates

8. Proteins have different functions. Which of the following statements identifies a **protein** and its function?

A Hormones carry oxygen around the body.

B Enzymes carry chemical messages around the body.

C Antibodies defend the body against disease.

D Cellulose provides strength and structure to a plant cell wall.

9. Hormones are composed of

A glycerol

B glucose

C protein

D starch.

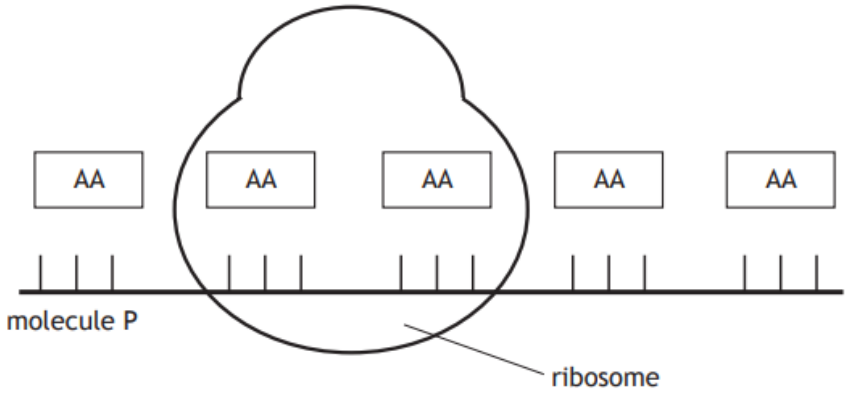
DNA & Proteins

1. (i) DNA contains genetic material which controls the synthesis of chemicals made from amino acids.

Name the type of chemicals synthesised. **1**

_____

(ii) The diagram below shows an example of one of these chemicals being synthesised.



Name molecule P and describe how it determines the sequence of amino acids, represented by AA, as shown in the diagram. **2**

Molecule P _____

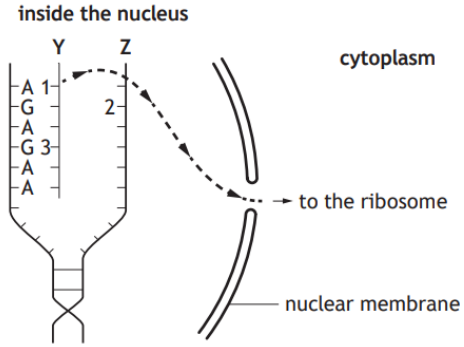
Description _____

_____

(iii) Name the part of the cell where molecule P was made. **1**

_____

2. The diagram shows how genetic information in the nucleus is used in the first stage of making a protein.



(a) (i) Name molecule Y. **1**

_____

(ii) Underline one option in each bracket to complete the following sentences. **2**

The molecules represented by the letter **A** are { bases / amino acids / proteins. }

The complementary strand **Z** would have the letter { A / C / G / T } at position **2** in the diagram.

(b) State the name given to a section of DNA which codes for a protein. **1**

_____

(c) The diagram above shows a section of the code to make a protein such as the enzyme amylase.

Describe how the code to make the protein insulin would differ from this. **1**

_____

_____

DNA & Proteins

3a) The bases in a strand of DNA make up the code for the production of proteins. The DNA for every individual person varies.

Describe the way in which this code differs from person to person. **1**

b) Name the single stranded molecule which carries a complementary copy of the code from the DNA in the nucleus to the ribosome for protein synthesis. **1**

c) Name the type of molecule that proteins are made from.

4 (i) Name the type of molecule coded for by a section of DNA. **1**

(ii) A mutation occurred in a section of DNA as shown.

original code	C A T G T A A A T
mutated code	C A T C T A A A T

Describe the effect of this mutation on the molecule produced. **1**

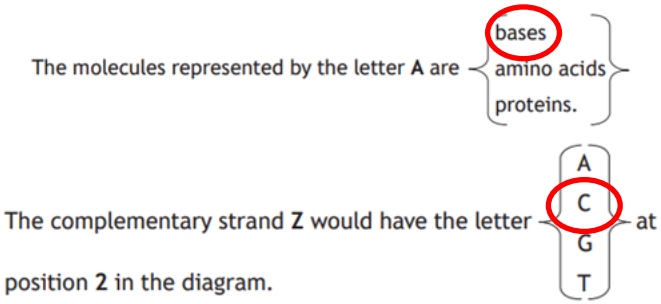
5 Describe the stages of protein production in a cell. **4**

DNA & Proteins

1. C
2. D
3. A
4. C
5. B
6. B
7. C
8. C
9. C

1 (i) Proteins (ii) molecule P = mRNA carries complementary DNA code from nucleus to ribosome (iii) nucleus

2 a (i) mRNA (ii) b) gene c) different base sequence



3 a) different base sequence b) mRNA c) amino acids

4 (i) protein (ii) change in amino acid sequence/protein structure/function

DNA & Proteins Answers

5.

1. A complementary copy of the section of DNA/ gene/genetic code is made **(1)**
2. messenger RNA/mRNA carries the complementary code **(1)**
3. from (the DNA in) the nucleus **(1)**
4. to a ribosome **(1)**
5. (where proteins are formed) from amino acids **(1)**

Any 4 from 5 points