

**REVISION: DNA, RNA & MEIOSIS**

**19 MARCH 2014**



**Lesson Description**

In this lesson we revise:

- The structure, function and process involving DNA and RNA
- The process of meiosis

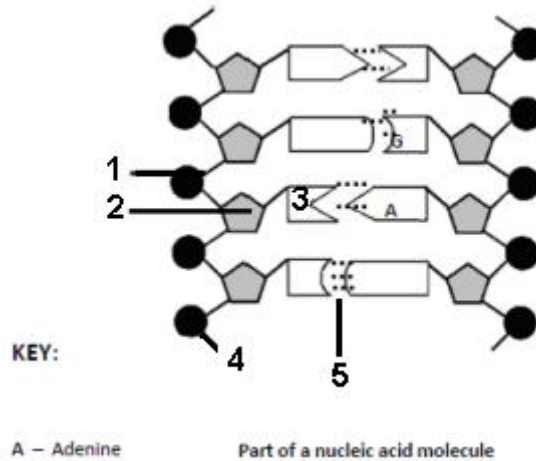


**Improve your Skills**

**DNA – The Code of Life**

**Question 1**

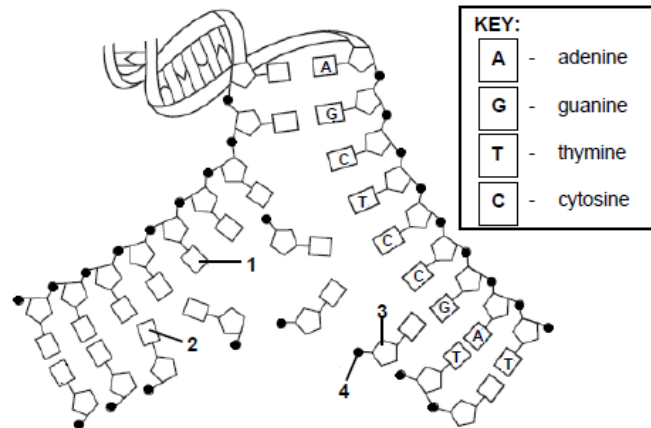
Study the diagram below which represents a part of a nucleic acid molecule and answer the questions that follow.



- a.) Identify the nucleic acid shown in the diagram above. (1)
- b.) Label the following: (3)
- Part 1
  - Part 2
  - The nitrogenous base 3
- c.) What is the collective name for the parts numbered 1, 2 and 3? (1)
- d.) Comment on the significance of the nature of the bond labelled 4. (2)

**Question 2**

The diagram below shows part of a DNA molecule in a nucleus just before cell division.



2.1. Identify the parts labelled:

- a.) 3
- b.) 4

2.2. Identify the nitrogenous bases labelled:

- a.) 1
- b.) 2

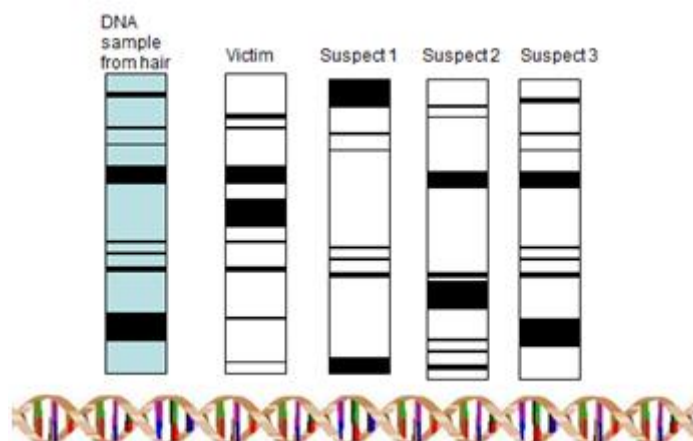
2.3 Explain why the diagram above represents replication and not transcription.

**Question 3**

Read the following case study and answer the questions that follow:

Inspector Ndlovu was investigating the scene of a violent crime. The victim was a 70 –year old woman. She was stabbed and left to die. They found a few pieces of hair in one of her hands. There was also skin under her nails.

They arrested three possible suspects. DNA samples were taken from all three and the victim. DNA fingerprint samples of the four samples were compared with the DNA fingerprints taken from the crime scene. The following diagram illustrates the DNA fingerprints.



- a.) Identify the suspect responsible for the crime out of the above evidence.
- b.) Provide a reason for your answer above.
- c.) Suggest a reason for comparing the victim’s DNA with the other samples.
- d.) Do you think that the DNA evidence on its own is enough to convict a suspect? Explain your answer.

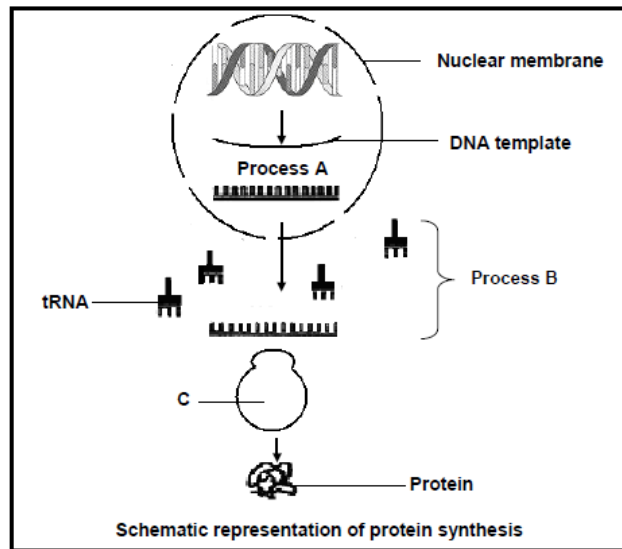
**RNA & Protein Synthesis**

**Question 1**

Tabulate the differences between DNA and RNA

**Question 2**

The diagram below represents protein synthesis. Study the diagram and answer the questions that follow.



2.1 Name the following processes:

(a) A

(b) B

(2)

2.2 Describe how the mRNA is made from the DNA template during process A.

2.3 Write down the numbers 1 to 3 and next to each number the nitrogenous bases that will complete the table.

	Base sequence on DNA	Codon on mRNA	Anticodon on tRNA	Amino acid
(a)	CAA	1	2	Valine
(b)	3	GCA	CGU	Alanine

**Question 3**

The questions below are based on protein synthesis.

3.1 Describe the role of DNA during transcription in protein synthesis.

(4)

3.2 The diagram below shows the sequence of nitrogenous bases of a small part of a strand of DNA which codes for part of a protein molecule.

**CGG    TAT    CCT**

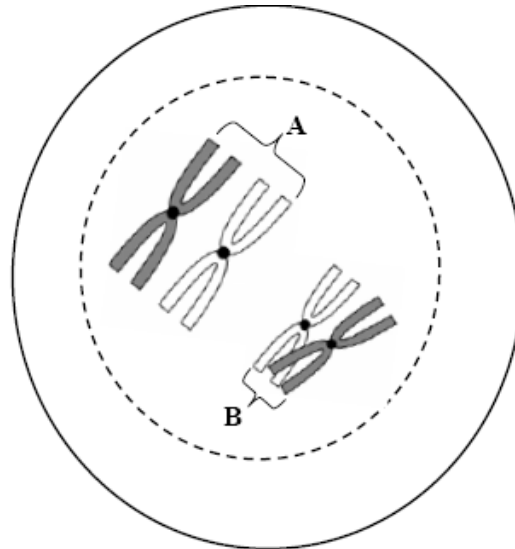
Write down the mRNA codon sequence that reads from left to right from the DNA sequence above.

(3)

## Meiosis

### Question 1

Study the diagram and answer the questions that follow:



- 1.1 What type of cell division is shown here?
- 1.2 Provide ONE OBSEVABLE reason for your answer.
- 1.3 Name the phase shown here.
- 1.4 What important process is shown at B?
- 1.5 What is the significance of the above-mentioned process?
- 1.6 Draw a fully labelled diagram to show the phase occurring immediately after this phase.

### Question 2

Bacteria reproduce asexually by binary fission (ordinary mitotic division). Two sterile Petri dishes were filled with nutrient agar (a jelly). Red bacteria from a single colony of bacteria growing on another Petri dish were smeared onto the agar in both sterile Petri dishes. One Petri dish (A) was placed under an ultraviolet light and the other one (B) was left in the dark. The two Petri dishes were examined after 5 days. In A, all but one of the bacterial colonies were red. One bacterial colony was white. In B, all the bacterial colonies were red

- 2.1 Provide a hypothesis for this experiment.
- 2.2 Name the independent and dependent variables in the experiment.
- 2.3 Which apparatus, A or B, was the control and which was the experiment?
- 2.4 What was the result for the control?
- 2.5 Explain any TWO changes to the method that would improve the reliability of the investigation.

**Question 3**

The table below show the percentage relative risk of a mutation occurring during interphase of meiosis, at different ages.

<b>AGE (years)</b>	<b>Relative chance of a mutation occurring during interphase (%)</b>
< 20	7.5
21 – 40	18
41 – 60	37.5
61 – 80	57
>80	74.5

Use the data in the table to draw a histogram.

(8)