



Learner instructions

1. The following assessments may be typed or handwritten unless stated otherwise in the assessment instructions.
2. If handwritten, write neatly and legibly in blue ink and use the TDA Answer Book.
3. Write your name and surname on each page.
4. Number each page.
5. Submit as a SINGLE PDF document unless stated otherwise in the assessment instructions.
6. Make sure it is submitted in the correct page order and all pages are upright.
7. It is the responsibility of the learner to make sure the upload was correct and successful.

Leerder instruksies

1. Die volgende assessering mag getik of handgeskrewe wees tensy daar anders aangedui word in die assesseringinstruksies.
2. Indien jy skryf, skryf asseblief netjies en leesbaar in blou ink en gebruik die TDA Antwoordboek.
3. Skryf jou naam en van op elke bladsy.
4. Nommer elke bladsy.
5. Handig in as 'n ENKELE PDF dokument tensy daar anders aangedui word in die assesseringsinstruksies.
6. Maak seker dat die bladsye in die korrekte volgorde en regop opgelaai word.
7. Dit is die verantwoordelikheid van die leerder om seker te maak dat die inhandiging reg en suksesvol is.

Do not rely on artificial intelligence (AI) to do your work for you. Doing so will contravene Think Digital's Academic Assessment Policy and penalties will apply.

LIFE SCIENCES

GRADE 12

TERM 1

TASK 1 – PRACTICAL

Total : 30

Time allocation : 60 Minutes

Submission date : February 2025

Examiner : R du Toit

Moderator : J Joubert

Practical

Instructions and information

1. Make use of a study guide, textbook or any other relevant resource materials with information on DNA and protein synthesis to complete this task.
2. This task must be completed under supervision within the given time allocation.
3. Make use of the given answer sheets.
4. Write your name and surname in the given space.
5. Write neatly and legible.

Practical

DNA to Protein synthesis

Objective: To learn how DNA is used to make proteins through the processes of transcription and translation.

Materials needed: DNA sequence cards (normal and mutated)
mRNA codon chart (showing how codons match to amino acids)

Above-mentioned information will be provided on the worksheet.

Practical

Name and Surname	
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SECTION A: QUESTION 1**TRANSCRIPTION (DNA TO MRNA)**

1.1 Transcribe the following DNA sequence to mRNA.

Write the mRNA sequence in the space below each triplet of DNA nucleotides: (6)

TAC	ACC	TTG	GCG	ACG	ACT

Make use of the following rules when answering the above question:

A (Adenine) pairs with U (Uracil) and T (Thymine) pairs with A (Adenine).

C (Cytosine) pairs with G (Guanine) and G (Guanine) pairs with C (Cytosine).

A – U**T – A****C – G****G – C****[6]**

Practical

SECTION B: QUESTION 2**TRANSLATION (MRNA TO PROTEIN)**

- 2.1 Identify the mRNA codons from Question 1 on the following codon chart and break them into groups of three bases (codons). Determine which amino acid each of the mRNA represent.

Standard genetic code												
		Second mRNA base										
		U		C		A		G				
First mRNA base (5' end)	U	UUU	Phenylalanine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U		
		UUC		UCC			UAC		UGC		C	
		UUA	Leucine	UCA			UAA	STOP	UGA	STOP	A	
		UUG		UCG			UAG		UGG	Tryptophan	G	
	C	CUU	Leucine	CCU	Proline	CAU	Histidine	CGU	Arginine	U		
		CUC				CAC		CGC			C	
		CUA				CCA		CAA		Glutamine	CGA	A
		CUG				CCG		CAG			CGG	G
	A	AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	AGU	Serine	U		
		AUC				AAC		AGC		C		
		AUA				ACA		AAA	Lysine	AGA	Arginine	A
		AUG		START Methionine		ACG		AAG		AGG		G
	G	GUU	Valine	GCU	Alanine	GAU	Aspartic acid	GGU	Glycine	U		
		GUC				GCC		GAC			GGC	C
		GUA				GCA		GAA		Glutamic acid	GGA	A
		GUG				GCG		GAG			GGG	G
		Third mRNA base (3' end)										

Record the amino acids in the space provided in the following table:

mRNA						
Amino acid						

[6]

Practical

SECTION C: QUESTION 3**MUTATIONS AND THEIR EFFECTS:****What is a mutation?**

A Change in the DNA sequence by means of substitution, insertion or deletion.

The following example is a **mutated DNA** sequence:

TAC	ATC	TTG	GCG	ACG	ACT

3.1 One base is changed. Transcribe the mutated DNA to mRNA. Fill in the above table by writing the mRNA in the space provided with each triplet of mutated DNA and indicate the mutated letter. (2)

3.2 Translate the mutated mRNA by finding the new codons on the chart and briefly explain the change in the amino acid sequence. (3)

Compare the new amino acid sequence with the original one and study the difference.

Think about how it might possibly affect the protein that is formed.

[5]

Practical

SECTION D: QUESTION 4

Complete the worksheet:

4.1 What is transcription? (5)

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.....

.....

4.2 What is translation? (2)

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4.3 What was the amino acid sequence for the normal DNA? (2)

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.....

4.4 What was the amino acid sequence after mutation? (2)

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Practical

4.5 Which gene mutation took place and briefly describe how the change in the amino acid sequence might affect the protein formed. (2)

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[13]

MARK ALLOCATION

Description	Maximum mark	Learner mark
Transcription from DNA to mRNA	6	
Translation from mRNA to protein	6	
Transcription from mutated DNA to mRNA Correct change indicated	2	
Translation of mutated mRNA to amino acids	3	
Meaning of Transcription	5	
Meaning of Translation	2	
Normal DNA sequence	2	
Mutated amino acid sequence	2	
Gene mutation and how it affects protein	2	
GRAND TOTAL	30	