2.6 Transcription & Translation

Question Paper

Course	DP IB Biology
Section	2. Molecular Biology
Topic	2.6 Transcription & Translation
Difficulty	Easy

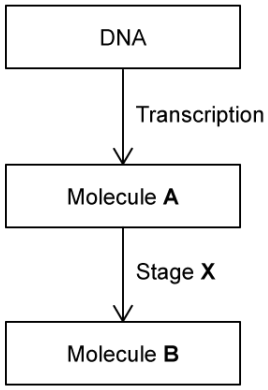
Time allowed: 50

Score: /41

Percentage: /100

Question 1a

a)
The following diagram shows the process of protein synthesis.



i)
Identify stage **X**.

[1 mark]

ii)
State where in the cell stage **X** occurs.

[1 mark]

[2 marks]

Question 1b

b)
Label molecule **A** and **B** in the diagram.

[2 marks]

[2 marks]

Question 1c

c)
State **one** difference in structure between DNA and molecule **A** identified at part b).

[1 mark]

[1 mark]

Question 1d

d)
Molecule **B** is synthesised from monomers.

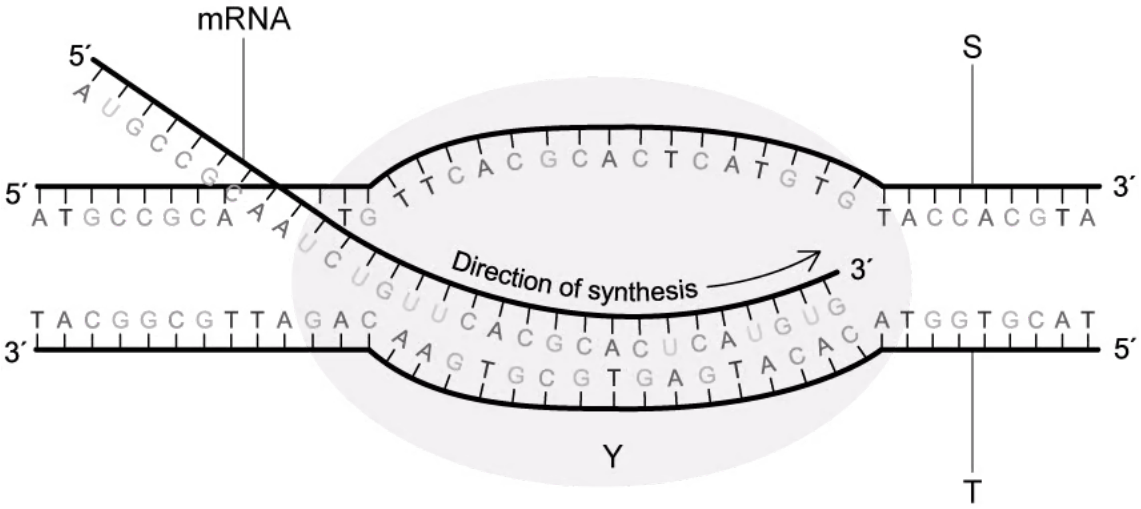
Identify the monomers of molecule **B**.

[1 mark]

[1 mark]

Question 2a

a)
The diagram below shows one of the stages in protein synthesis.



i)
Identify the stage of protein synthesis represented by the diagram.

[1 mark]

ii)
State **one** reason for your answer in part i).

[1 mark]

[2 marks]

Question 2b

b)
Enzyme **Y** plays an important role during the stage of protein synthesis identified at part a) i).

i)
Identify enzyme **Y**.

[1 mark]

ii)
State the role of this enzyme during protein synthesis.

[1 mark]

[2 marks]

Question 2c

c)
Label strands **S** and **T** of the DNA molecule.

[2 marks]

[2 marks]

Question 2d

d)
Explain the purpose of creating an mRNA copy of the genetic code on the DNA molecule.

[2 marks]

[2 marks]

Question 3a

a)
The following DNA base triplets form part of a gene coding for a polypeptide.

CCC ATA CTT GGA

State the mRNA codons that would be transcribed from this section of the gene.

[2 marks]

[2 marks]

Question 3b

b)
The gene mentioned in part a) formed an mRNA molecule that consisted of 180 nucleotides.

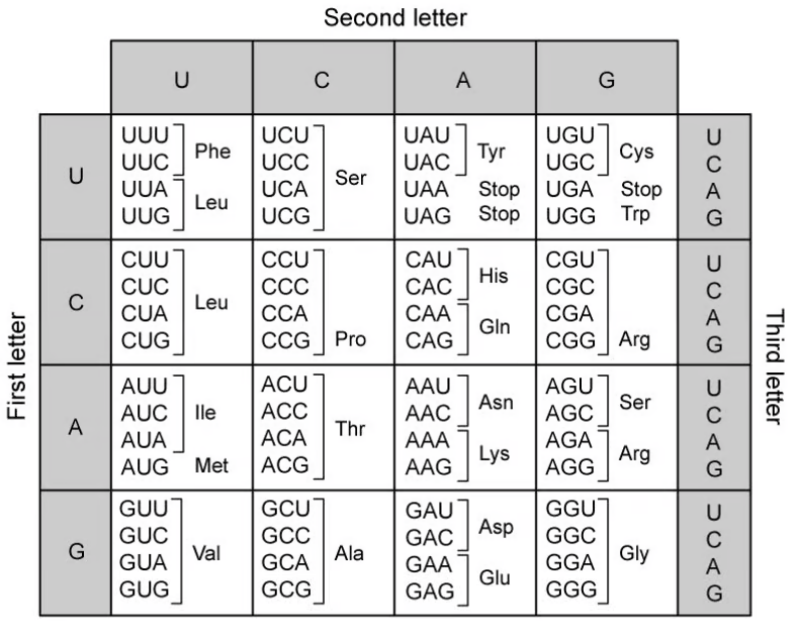
Calculate the number of amino acids that will be coded for by this gene. Show your working.

[2 marks]

[2 marks]

Question 3c

c)
The table below shows mRNA codons and their corresponding amino acids.



First letter \ Second letter	U	C	A	G	Third letter
U	UUU, UUC: Phe; UUA, UUG: Leu	UCU, UCC, UCA, UCG: Ser	UAU, UAC: Tyr; UAA: Stop; UAG: Stop	UGU, UGC: Cys; UGA: Stop; UGG: Trp	U C A G
C	CUU, CUC, CUA, CUG: Leu	CCU, CCC, CCA, CCG: Pro	CAU, CAC: His; CAA, CAG: Gln	CGU, CGC, CGA, CGG: Arg	U C A G
A	AUU, AUC, AUA: Ile; AUG: Met	ACU, ACC, ACA, ACG: Thr	AAU, AAC: Asn; AAA, AAG: Lys	AGU, AGC: Ser; AGA, AGG: Arg	U C A G
G	GUU, GUC, GUA, GUG: Val	GCU, GCC, GCA, GCG: Ala	GAU, GAC: Asp; GAA, GAG: Glu	GGU, GGC, GGA, GGG: Gly	U C A G

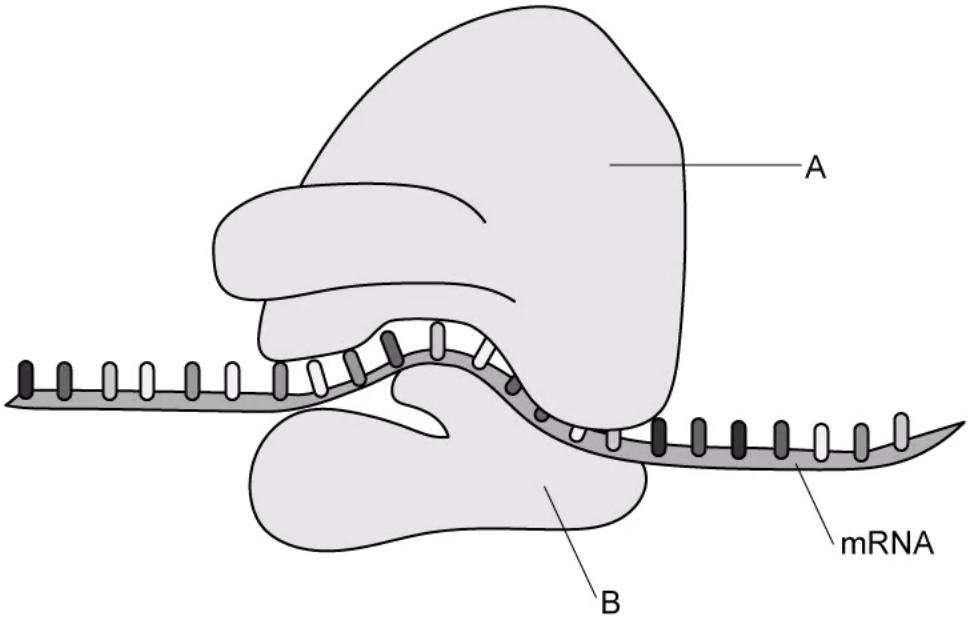
Use this table to state the amino acid sequence of the section of the gene given in part a).

[2 marks]

[2 marks]

Question 4a

a)
The diagram below shows the structure of a ribosome.



Identify parts **A** and **B** of the ribosome.

[2 marks]

[2 marks]

Question 4b

b)
State **one** substance that a ribosome is composed of.

[1 mark]

[1 mark]

Question 4c

c)
Describe the role of a ribosome in the process of protein synthesis.

[2 marks]

[2 marks]

Question 4d

d)
The mRNA molecule that is shown in the diagram at part a) carries the genetic code in the form of codons.

Define the term 'codon'.

[1 mark]

[1 mark]

Question 5a

One mark is available for clarity of communication throughout this question.

a)
Describe how the structure of a tRNA molecule contributes to the accuracy of the translation.

[3 marks]

[3 marks]

Question 5b

b)
Draw a labelled diagram of two nucleotides bonded together within the same DNA strand.

[5 marks]

[5 marks]

Question 5c

c)
Outline the three stages of polymerase chain reaction (PCR).

[7 marks]

[7 marks]