Markscheme

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Prokaryotic protein synthesis	Eukaryotic protein synthesis
use of RNA polymerase in transcription	
form complementary mRNA in transcription	
use of ribosomes in translation	
transcription and translation occurs simultaneously	translation occurs after a complete and modified mRNA is made
occurs entirely in cytoplasm	transcription occurs in nucleus, translation in the cytoplasm

2

mRNA
A U G U U A G C G A A A C C A U U U U G A
T A C A A T C G C T T T G G T A A A A C T
antisense strand

A U G U U A G C G A A A C C A U U U U G A
STOP

met - leu - ala - lys - pro - phe

3

a) Sense strand contains the same sequence as the mRNA, except it contains thymine instead of uracil
sense strand is complementary to the antisense strand
the antisense strand is complementary to the mRNA, except it contains thymine instead of uracil

b) it is called the sense strand as it contains the same information that codes for proteins which is why it is also called the coding strand as it contains the coded information

c) it is called the antisense strand as it contains the complementary or 'opposite' information that codes for proteins
Because it is used to form the RNA transcript and it is what is 'read' by RNA polymerase, it is also known as a template strand

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proteins are the most diverse biomolecule as polypeptides are made up of a potential 20 different amino acids, which can be arranged in any order and the chain can be any length. As such, there are many different possible structures and functions

Catalysis: proteins can act as enzymes in order to speed up chemical reactions
→ RNA polymerase, Helicase, RuBisCo, etc.

Muscle contraction: work together to shorten & lengthen muscles for locomotion
→ myosin and actin

Tensile strength: fibrous proteins provide strength needed in skin, tendons, ligaments, blood vessels etc.
→ collagen (skin)

Hormones: chemical messengers that send signals to parts of the body for homeostasis
→ insulin *not all hormones are proteins

Receptors: binding sites for hormones, neurotransmitters, tastes, smells and light
→ rhodopsin (in the retina)

Immunity: also known as antibodies. Used in the specific immune response to target pathogens
→ immunoglobins

Transport: proteins in blood help transport O_2, CO_2, lipids, iron, etc.
→ haemoglobin (in red blood cells)

Membrane transport: proteins act as channels and carriers which help control movement of materials in and out of cells
→ Na^+/K^+ pump

DNA packing: DNA is wrapped around proteins and this association allows for supercoiling and gene expression
→ histones

⑤ Complementary base pairing ensures that the code found in mRNA is the exact complement to template as A··· U and C··· G. Without this pairing, there would be no mechanism to ensure the same code is being used as nucleotides could combine in any order.

Complementary base pairing between codons on mRNA and anticodons on tRNA ensure the the correct tRNA binds at the correct place and thus bringing the correct amino acid

Overall, complementary base pairing enables conservation of information transfer from DNA to RNA to polypeptide

⑥

DNA replication	Transcription
uses DNA polymerase III to synthesize strand	uses RNA polymerase to synthesis RNA strand
two new DNA molecules synthesized	one complementary mRNA strand synthesized
uses helicase to separate DNA strands	uses RNA polymerase to separate DNA strands
deoxyribose nucleotides used	ribose nucleotides used

⑦