SMART EXAM RESOURCES
TOPIC QUESTIONS: NUCLEIC ACID AND PROTEIN SYNTHESIS
SUB-TOPIC: tRNA and Protein synthesis
SET-1-QP-MS

1 Describe the role played by tRNA in polypeptide synthesis.

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..... [4]

MARK SCHEME:

1 (tRNA) carries amino acid to ribosome ;
2 ref. to specificity of amino acid carried ; **A** role in ensuring correct primary structure
3 ref. anticodon (on tRNA): codon (on mRNA) binding ;
4 ref. complementary / base pairing ; **A** A-U, C-G
5 ref to tRNA binding sites within ribosome ;
6 two tRNAs bound to, mRNA / ribosome, at same time ;
7 amino acids held close to each other / AW ;
8 (for) peptide bond formation ;
9 (tRNA) can be reused / binds another amino acid ; [max 4]

TRNa molecule

2 Protein synthesis requires ribosomes, mRNA, tRNA, amino acids and enzymes.

Fig. 4.1 is a diagram of a molecule of tRNA.

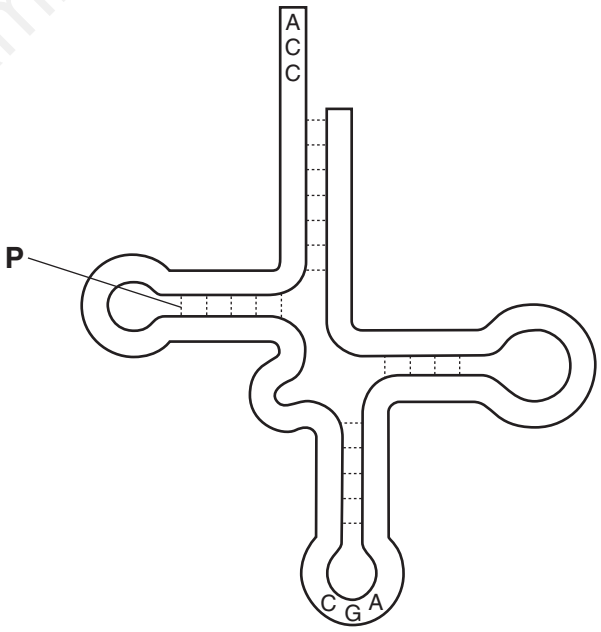

Fig. 4.1

(a) Name the bond labelled **P**.

.....[1]

(b) Use Fig. 4.1 to describe the role of tRNA in protein synthesis.

You may annotate Fig. 4.1 to help your answer.

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MARK SCHEME:

(a) hydrogen (bond) **;** [1]

(b) *three from*

1 tRNA carries an amino acid to ribosomes **;**

2 (each type of) tRNA carries a specific amino acid **;**

3 anticodon (on tRNA) binds to codon on mRNA **;** *anticodon may be labelled on Fig. 4.1*

4 tRNA molecules hold amino acids, in place / in P and A sites (of ribosome), for peptide bond formation **;**

5 tRNA molecules, reused / described **; I** tRNA leaves ribosome unqualified

6 AVP **;** e.g. amino acid is attached to ACC region **I** examples of complementary base pairing between codon and anticodon [max 3]

3 tRNA molecules are synthesised inside the nucleus of eukaryotic cells.

Outline the process by which tRNA molecules are synthesised in the nucleus.

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.....[3]

MARK SCHEME:

max 2 if in context of making mRNA

1 gene for each tRNA (molecule) is transcribed **;**
2 hydrogen bonds in DNA are broken **;**
I unwinding / unzipping
3 one strand of DNA is the template **;**
4 RNA polymerase **;**
5 (free RNA) nucleotides joined together / formation of phosphodiester bonds **;**
I complementary base pairing
6 AVP **;** e.g. correct ref. to helicase in breaking hydrogen bonds [max 3]

Outline the role of transfer RNA (tRNA) in the production of a polypeptide.

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..... [2]

MARK SCHEME:

collects / attaches to, specific amino acid
or
takes specific amino acid / activated tRNA, to ribosome ;

idea of, adjacent / two, amino acids and codon-anticodon binding ;
peptide bond formation / ref. elongation, (to form polypeptide) ; [max 2]