Exercises 6 (week 7) Bio-105 2024

Question 1 Translation

Here is a sequence (180 bases) from the backer yeast (Saccharomyces cerevisiæ) genome. This sequence is located directly downstream from a promoter: it is a transcribed sequence. The sequence of the coding strand is given below: the mARN produced by transcription has the same sequence, except for T replaced with U. There is no intron in this sequence.

10 60

5'cacccgaaac gacgtcgtaa gtcccgttca gggccttcgt tctcacggta taaccatgat
cggtgaccga actttcagct gtctcatggt gccaacgtca agcgaagcgg gggttgttgt
tgcgagaatg tatccttagc atgatgctgg cggcgccacg caaattttct gagtgtattt 3'

1.1 What is the size in amino acids of the protein encoded by this sequence ?

_____

1.2 What is the size of the protein when the only mutation introduced into the sequence is at position 20 : A is replaced by T (20 a → t)

_____

1.3 What is the size of the protein when the only mutation introduced into the sequence is at position 56 : A is replaced by T (56 a → t)

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1.4 What is the size of the protein when the only mutation introduced into the sequence is at position 64 : T is replaced by A (64 t → a)

_____

1.5 What is the size of the protein when the only mutation introduced into the sequence is at position 82 : T is replaced by A (82 t → a)

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1.6 What is the size of the protein when the only mutation introduced into the sequence is at position 166 : a T is added during DNA replication by stuttering

caaattttct → caaatttttct

_____

1.7

You want to PCR amplify the sequence given above. To do that you have to order 20 nucleotides long primers. Indicate the sequences of the primers you order to di the PCR :

Sequence of primer 1 : 5' _____ 3'

Sequence of primer 2 : 5' _____ 3'

Question 2

During translation, the energy cost of one round of elongation is

A. 1 ATP
B. 1 GTP
C. 3 ATP
D. 1 ATP + 2 GTP
E. 2 ATP + 2 GTP

Question 3
Amino acids are attached to
a. the 3' end of tRNA
b. the 5' end of tRNA

Question 4
What amino acid should be attached to a tRNA with the anticodon sequence 5'-UGA-3' ?

Question 5
When one of the enzymes linking amino acids to tRNA makes a mistake (e.g. an Alanine is linked to a tRNA with a 5' CCC 3' anti-codon assigned to Glycine), what is the consequence?
a. the tRNA will not participate to translation because it will be unable to bind eEF-1.
b. the tRNA will not participate to translation because it will be unable to bind eEF-2.
c. the tRNA will not participate to translation because it will be rejected by the ribosome.
d. the tRNA will participate to translation and an Alanine will be incorporated instead of a Glycine in one protein.