ANSWER KEY.

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Translation

Biology | ANSWER KEY

Directions: Answer each question in the space provided. Show your work for every calculation. For Claim, Evidence, Reasoning (CER) questions, write all three parts.

1. Use the genetic code chart to find the amino acid for each codon.

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

AUG (Met) is the start codon. UAA, UAG, and UGA are stop codons.

a. GCU = _____ b. UGG = _____ c. AAA = _____ d. CGC = _____

a. Ala b. Trp c. Lys d. Arg

2. Translate this mRNA, starting at the start codon: AUGCCCUUUGGAUAG

AUG CCC UUU GGA UAG = Met - Pro - Phe - Gly - Stop. The protein has 4 amino acids.

3. Write the tRNA anticodon that pairs with each codon: GGA, UUC, CAU, AAG.

GGA: CCU, UUC: AAG, CAU: GUA, AAG: UUC.

4. A protein has 80 amino acids. How many nucleotides are in the mRNA from the start codon through the stop codon? Show your work.

80 codons for amino acids + 1 stop codon = 81 codons. 81 x 3 = 243 nucleotides.

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5. An mRNA coding region is 270 nucleotides long, including the stop codon. How many amino acids are in the protein? Show your work.

270 / 3 = 90 codons. The stop codon does not code for an amino acid: 90 - 1 = 89 amino acids.

6. The codons GCU, GCC, GCA, and GCG all code for alanine. Does this mean the genetic code is ambiguous? Explain.

No. Several codons can code for the same amino acid, but every codon codes for only one amino acid. The code has no ambiguity, because one codon never gives two different amino acids.

7. Put the stages of translation in order (1 to 3): ____ A stop codon is reached and the chain is released. ____ The ribosome assembles at the start codon AUG. ____ tRNAs bring amino acids and the chain grows.

1 The ribosome assembles at the start codon AUG, 2 tRNAs bring amino acids and the chain grows, 3 a stop codon is reached and the chain is released.

8. Describe the job of each: (a) mRNA, (b) tRNA, (c) rRNA.

a. mRNA carries the codons that specify the amino acid order. b. tRNA carries one amino acid and pairs its anticodon with a codon. c. rRNA, with proteins, forms the ribosome that holds the mRNA and tRNAs and builds the chain.

9. Why does the start codon matter for the protein that is made? Use the idea of reading frame.

The ribosome reads codons in groups of three starting at AUG. Starting at a different base would group the bases differently, which would give different amino acids and probably an early stop codon.

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