

SC.912.L.16.3 – DNA Replication – Example 9 Answer

During transcription the DNA base sequence is transcribed into a complimentary mRNA sequence. A codon table like the one shown below lists the amino acids coded for by particular triads of mRNA bases. A segment of DNA has undergone a mutation in which one nucleotide has been changed. The original sequence was ACG and the new sequence is ACA. Use the codon table to determine whether or not this mutation will cause a change in the phenotype of the organism.

Codons Found in Messenger RNA

		<i>Second Base</i>					
		U	C	A	G		
<i>First Base</i>	U	Phe	Ser	Tyr	Cys	<i>Third Base</i>	
		Phe	Ser	Tyr	Cys		U
		Leu	Ser	Stop	Stop		C
		Leu	Ser	Stop	Trp		A
	C	Leu	Pro	His	Arg		G
		Leu	Pro	His	Arg		U
		Leu	Pro	Gln	Arg		C
		Leu	Pro	Gln	Arg		A
	A	Ile	Thr	Asn	Ser		G
		Ile	Thr	Asn	Ser		U
		Ile	Thr	Lys	Arg		C
		Met	Thr	Lys	Arg		A
	G	Val	Ala	Asp	Gly		G
		Val	Ala	Asp	Gly		U
		Val	Ala	Glu	Gly		C
		Val	Ala	Glu	Gly		A
					G		

- A. yes, the phenotype of the organism would change because a new amino acid will be coded for.
- B. yes, the phenotype of the organism would change because any change in the DNA sequence will cause a change in phenotype.
- C. Even though the DNA sequence changed, the sequence still codes for the same amino acid, so no change in phenotype will occur.
- D. It is impossible to determine if a change in phenotype will occur using only the DNA sequence.

Answer

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C. Even though the DNA sequence changed, the sequence still codes for the same amino acid, so no change in phenotype will occur.

ACG and ACA both code for the amino acid Thr so no phenotypic change will occur.