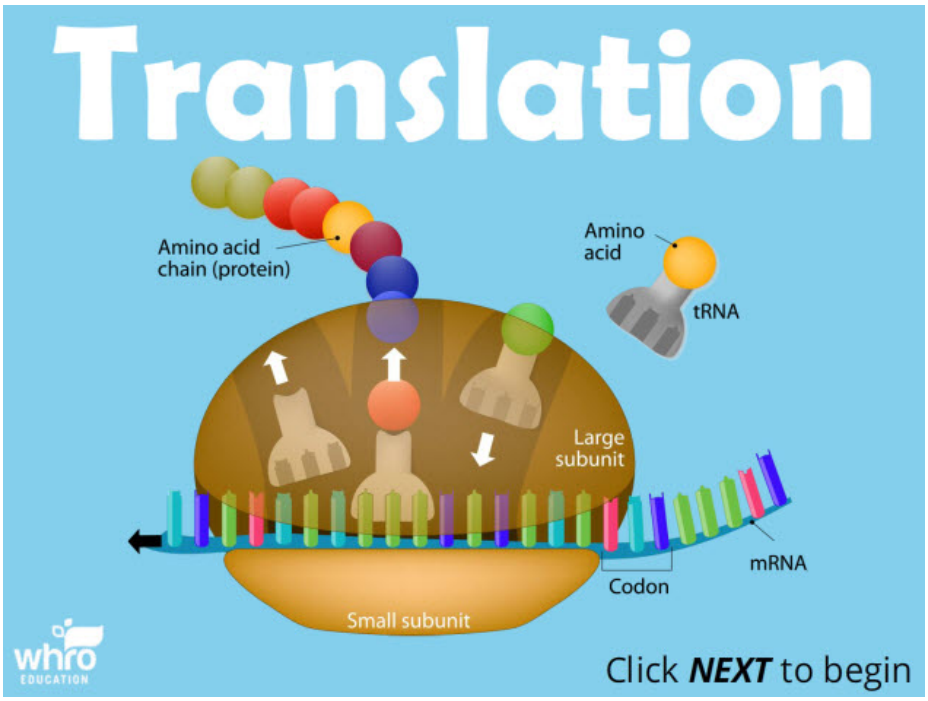
Module 6: DNA, RNA, and Molecular Genetics
Topic 3 Content: Translation Notes

Introduction



Translation

Click ***NEXT*** to begin.

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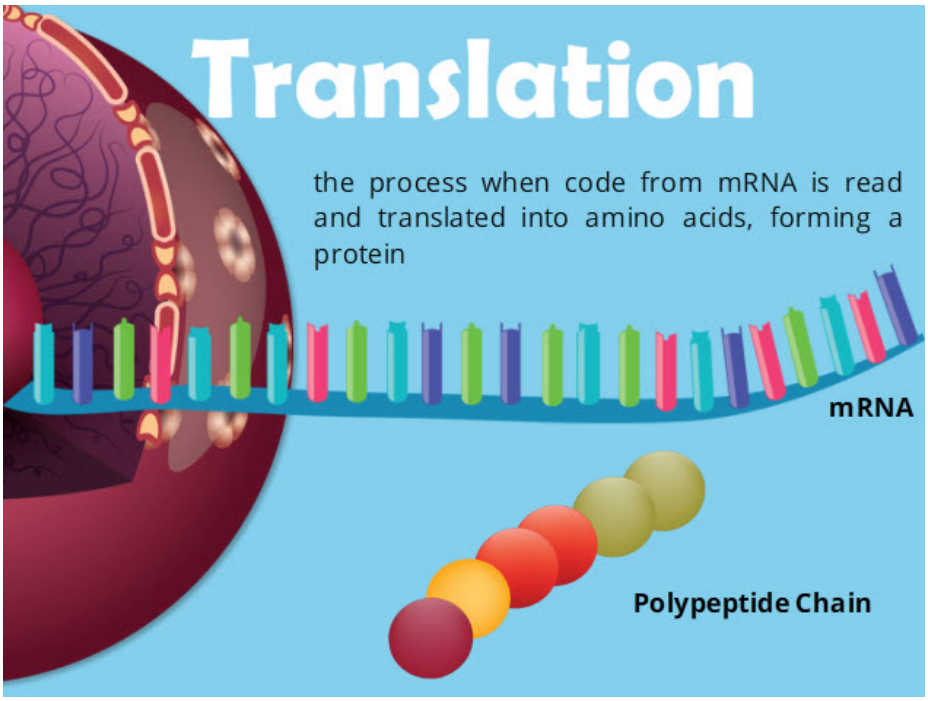
Translation



After transcription has taken place, the mRNA takes the transcribed code out of the nucleus and into the cytoplasm. This is where the next phase of protein synthesis called translation occurs. Translation is the process when the code from mRNA is read and translated into amino acids. These amino acids are arranged in a protein chain called a polypeptide chain.

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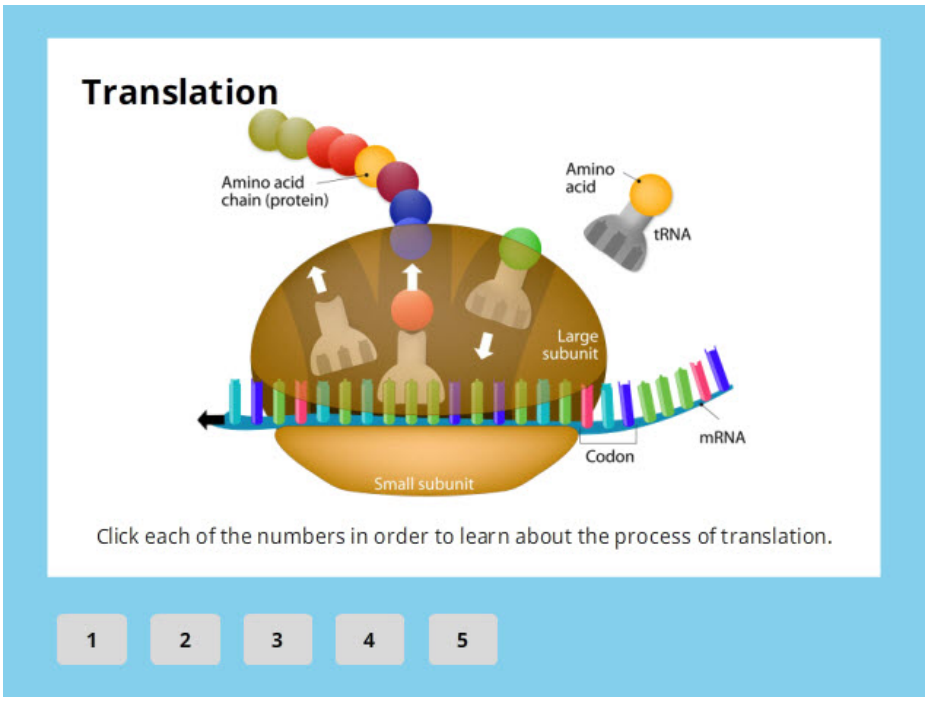
Instructions



Click each of the numbers in order to learn about the process of translation.

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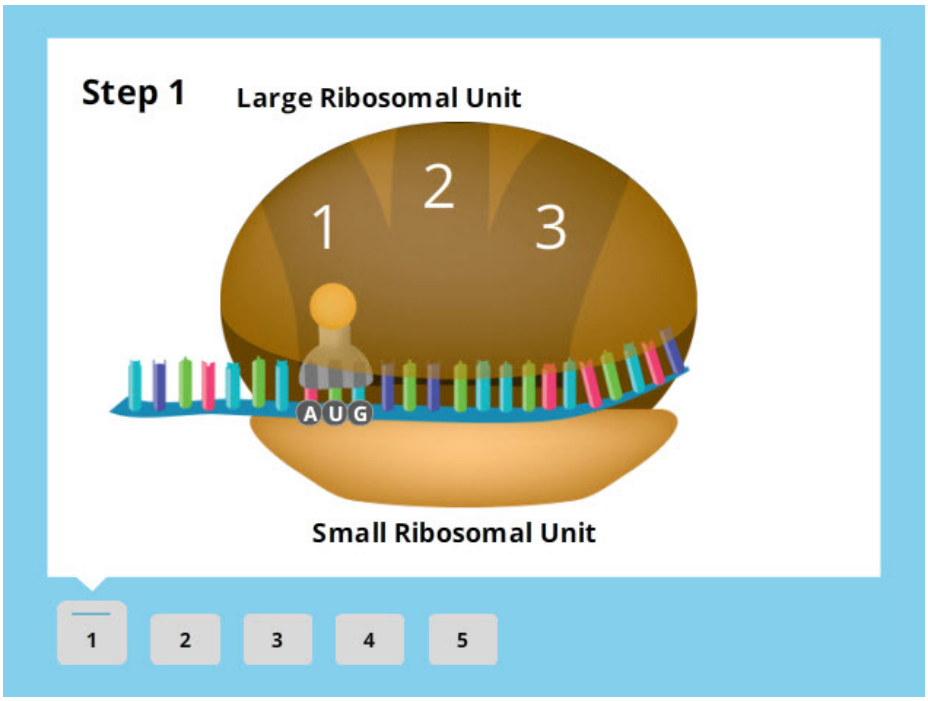
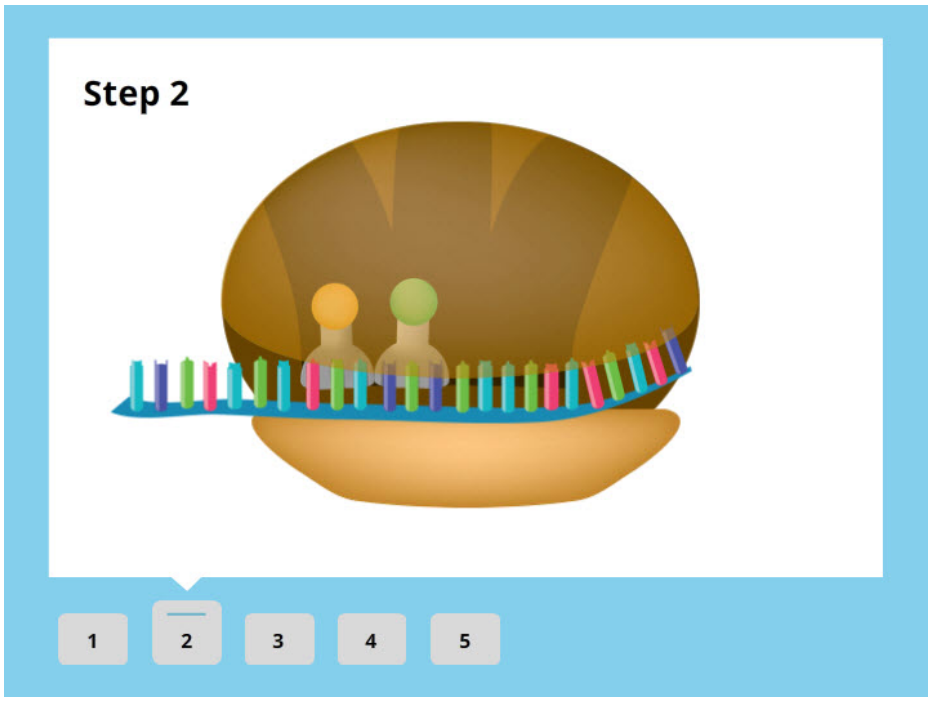
Step 1



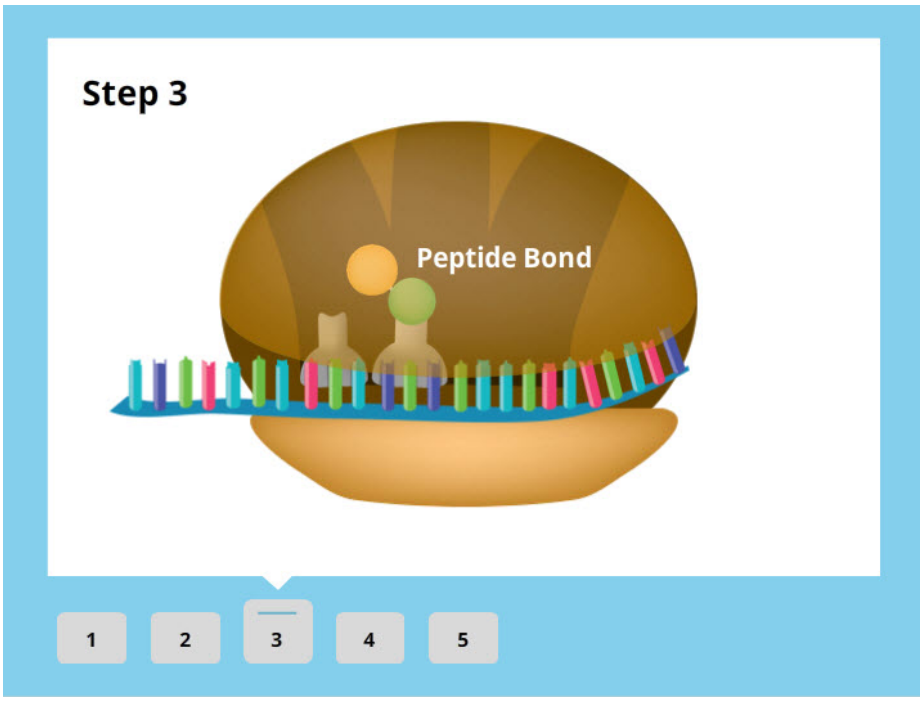
Translation begins when a small ribosomal subunit binds with the mRNA stand in the cytoplasm. Then, a tRNA with the amino acid methionine binds with the codon AUG. This is the start codon and signals the large ribosomal unit to join. The large ribosomal unit has three different binding sites for tRNA molecules.

Step 2



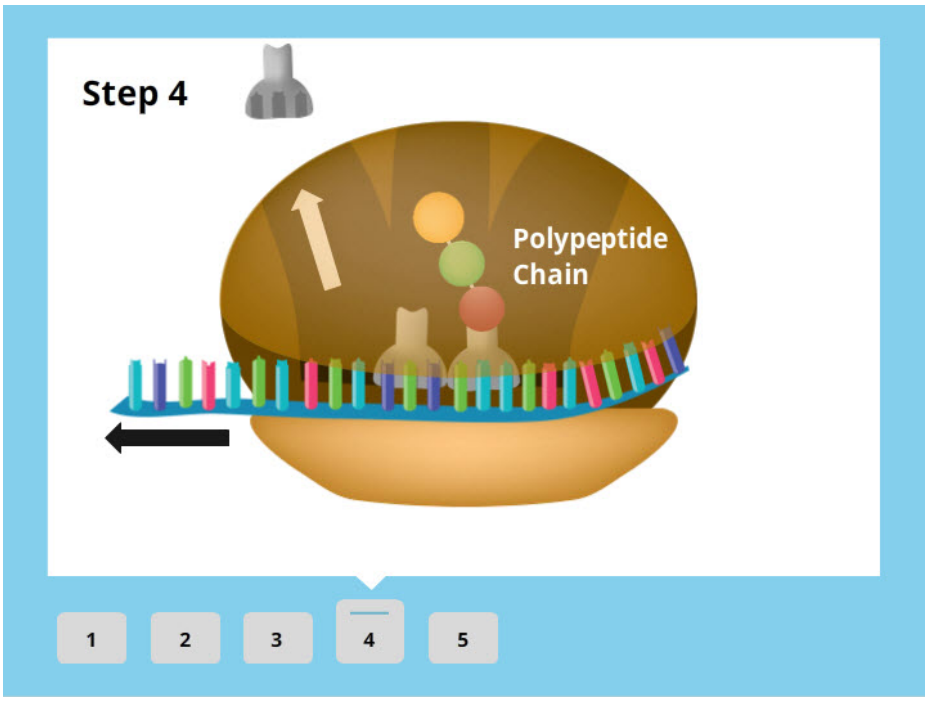
The empty binding site with an exposed codon attracts a complementary tRNA molecule with an amino acid. The tRNA anticodon and mRNA codon join together. Now, both tRNA molecules are close together.

Step 3



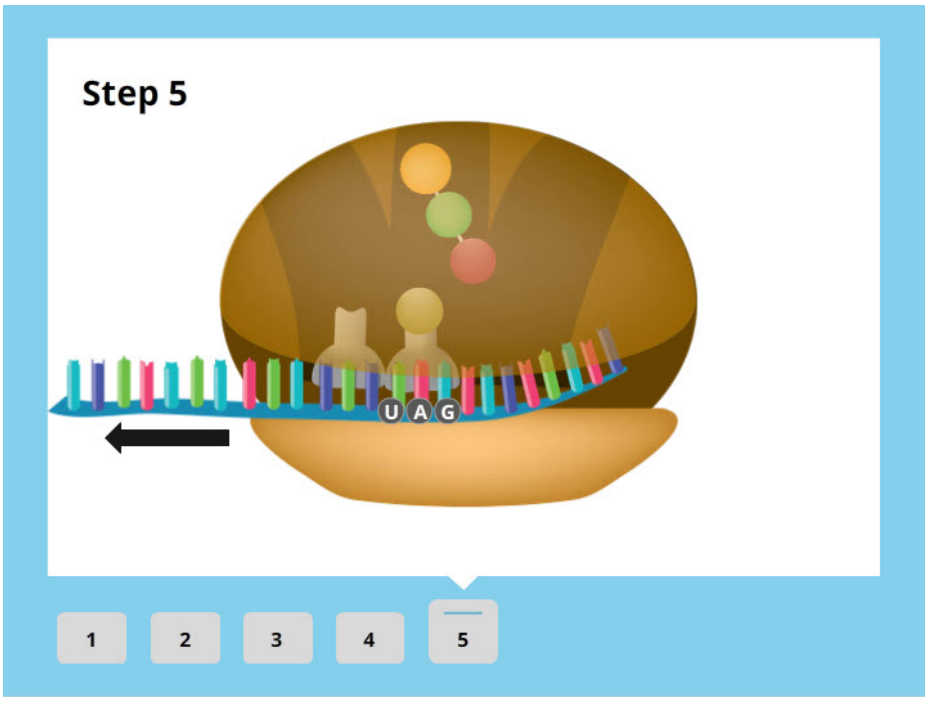
The ribosome breaks the bond between the first tRNA molecule and its amino acid. The ribosome forms a peptide bond between the two amino acids.

Step 4



The ribosome pulls the mRNA strand so that one tRNA molecule enters the exit site while another mRNA codon is exposed at an open site. The exiting tRNA molecule re-enters the cytoplasm. The exposed mRNA codon attracts a tRNA anticodon with an amino acid. The ribosome breaks the bond between the tRNA and its amino acid. The ribosome adds this amino acid to the polypeptide chain with a peptide bond.

Step 5



The ribosome continues to build until the polypeptide reaches the stop codon UAG on the mRNA strand. Once it reaches the stop codon, the ribosome releases the protein and disassembles.

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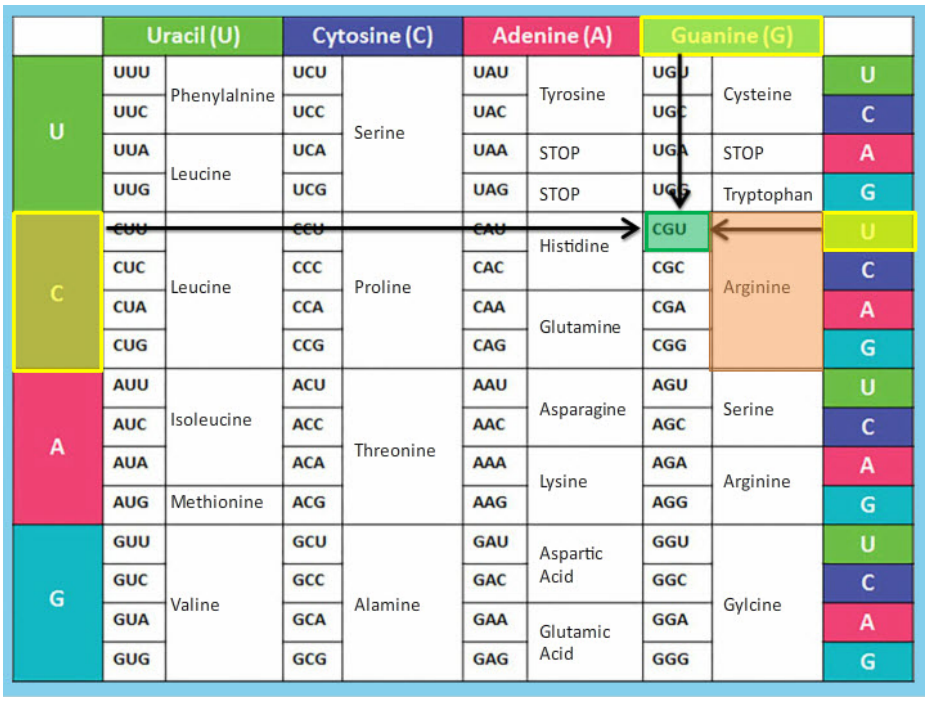
Amino Acid Sequence



	Uracil (U)		Cytosine (C)		Adenine (A)		Guanine (G)		
U	UUU	Phenylalnine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U
	UUC		UCC		UAC		UGC		C
	UUA	Leucine	UCA		UAA	STOP	UGA	STOP	A
	UUG		UCG		UAG	STOP	UGG	Tryptophan	G
C	CUU	Leucine	CCU	Proline	CAU	Histidine	CGU	Arginine	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	Glutamine	CGA		A
	CUG		CCG		CAG		CGG		G
A	AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	AGU	Serine	U
	AUC		ACC		AAC		AGC		C
	AUA		ACA		AAA	Lysine	AGA	Arginine	A
	AUG	Methionine	ACG		AAG		AGG		G
G	GUU	Valine	GCU	Alamine	GAU	Aspartic Acid	GGU	Gylcine	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		GAA	Glutamic Acid	GGA		A
	GUG		GCG		GAG		GGG		G

Throughout this interactivity, you have learned how transfer RNA, or tRNA, reads the mRNA codons and translates them into amino acids. You can translate the mRNA codon using the chart shown here. If the codon is CGU, then the first base is C, the second base is G, and the third base is U. Follow this chart using this information. The first base is to the left, the second base is on the top, and the third base is on the right. Line them up and see that it will tell you the correct amino acid. For example, if the codon is CGU, then the amino acid is arginine.