

Unit 2. Molecular bases of the inheritance: Interpretation of genetic code. Mutations.

Genetic engineering

First letter	Second letter				Third letter
	U	C	A	G	
U	UUU } Phe	UCU } Ser	UAU } Tyr	UGU } Cys	U
	UUC } Leu	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

Amino acid names and abbreviations		
Amino acid	Three letter code	Single letter code
Alanine	Ala	A
Arginine	Arg	R
Aspartic acid	Asp	D
Asparagine	Asn	N
Cysteine	Cys	C
Glutamic acid	Glu	E
Glutamine	Gln	Q
Glycine	Gly	G
Histidine	His	H
Isoleucine	Ile	I
Leucine	Leu	L
Lysine	Lys	K
Methionine	Met	M
Phenylalanine	Phe	F
Proline	Pro	P
Serine	Ser	S
Threonine	Thr	T
Tryptophan	Trp	W
Tyrosine	Tyr	Y
Valine	Val	V

1. Find the correct amino acids that are coded by the following codons. You can help you using the two tables above:

CCC

UGC

GAA

AUG

2. What is the correct sequence of nucleotides of the mRNA that code for the following polypeptide chain (*The first is an example*)? You can help you using the two tables above.

NH₂ - Arg - Gly - Leu - Leu - Ile - Tyr - COOH
 5' - CGU - 3'

3. Drag and drop the following tags to cover up the "start" and "stop" condons in each one of these sequences of mRNA:

STAR

STOP

5' - AAU UAU AUG CGC CGU UAG UCC CAA AGG - 3'

STAR

STOP

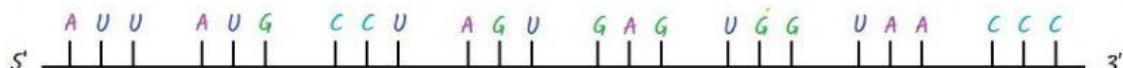
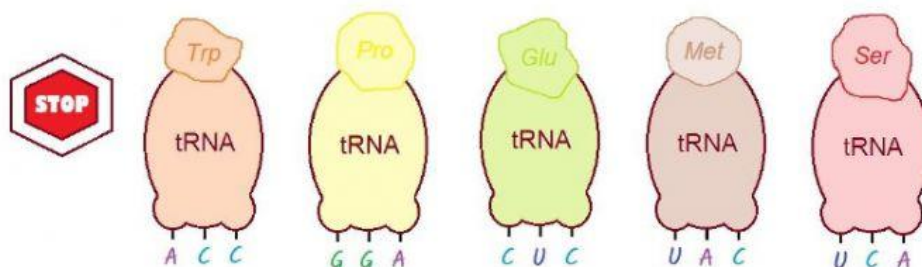
5' - AUG GGG AAG UAA CGU UGG UCA CAC UCG - 3'

STAR

STOP

5' - GUG GGG AAG AUG CGU AAG UCA UGA UCG - 3'

4. Drag and drop the following tRNAs to the correct position of this sequence of mRNA according to the rule of complementarity of bases. Use the tables on the previous page:



5. Find the correct sequence of amino acids that are code for the following mRNA. Write the correct code of three letters in each one of these gaps. You can help you with the tables on the previous page.

5' - GUG AGG AAG GAG CGU AAG UCA GGA UCG - 3'
 NH₂ - ————— - COOH

6. Complete the following text with the correct words. Then select the correct type of mutation according to the definitions:

Mutation is the _____ of DNA sequence that can be _____ to the next generation of cells.

We can classify mutations according to three different criteria:

- According to _____ we can distinguish spontaneous mutations or induced mutations.
- According to _____ we can distinguish point mutations, chromosomal mutations and numeric mutations.
- According to _____ we can distinguish somatic mutations and germ line mutations.
- _____ are responsible for the genetic diversity.

7. Select the options that are related to each one of these types of mutations (there are five correct options in each column):

According to the type of cell	According to the cause	According to the DNA involved
Somatic mutations can produce cancer	These mutations are classified as spontaneous and induced mutations	There are three types of mutagens: physical, chemical and biological mutagens
Germ line mutations affect to egg cell and sperm cell	Germ line mutations create genetic diversity	Point mutations affect only the sequence of a gene
These mutations are classified in spontaneous and induced mutations	Chromosomal mutations cause diseases such as a lot of types of cancer	Chromosomal mutations cause diseases such as a lot of types of cancer
Somatic mutations occur in body cells	UV radiation is a physical mutagen	Trisomy of the chromosome 21 causes the Down syndrome
Germ line mutations create genetic diversity	Occurs in a genome when a single base pair is added, deleted or changed	There are five types of chromosomal mutations
UV radiation is a physical mutagen	Some viruses can cause mutations	Germ line mutations create genetic diversity
Germ line mutations can pass on to offspring	Spontaneous mutations occur naturally	Numerical mutations affect the number of chromosomes
Trisomy of the chromosome 21 causes the Down syndrome	Smokers have more risk to suffer from cancer	Some environmental agents can multiply the risk of mutation

8. Complete the following sentence with the correct words

.The genetic _____ is the _____ manipulation, modification, and recombination of DNA or other nucleic acid molecules in order to _____ an organism or population of organisms.

9. Select the correct example of genetic engineering that are related with the sentences below:

- This technique allows the creation of clones of microorganisms that contain an outside gene.
- With this technique is possible obtain a lot of copies of the same sequence of DNA.
- Now, we associate this genetic engineering with the detection of COVID-19.
- This technique consists of passing a gene to a host cell.