

# Amoeba Sisters | Video Recap

NAME: \_\_\_\_\_

## Amoeba Sisters Video Recap: Mutations (Updated)

1. What is a **mutation**?

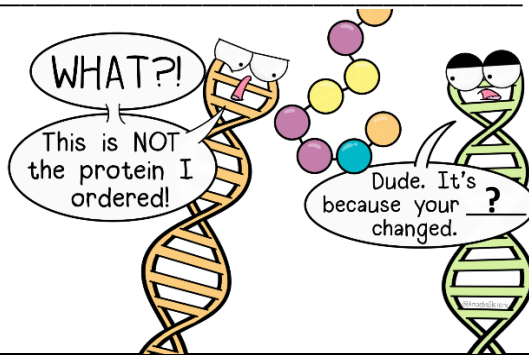
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Mutations can be harmful, helpful, or neutral in their effect. A **silent mutation** tends to have a neutral effect as it does not result in coding for a different amino acid. Using your mRNA codon chart, give another mRNA codon that this CUU could mutate to and *still* code for leucine.

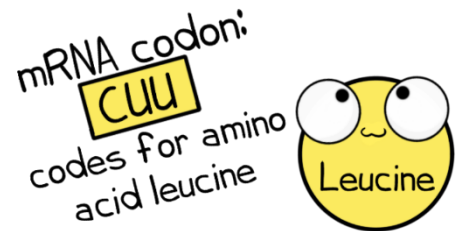
2. A specific part of a **nucleic acid** (such as DNA or RNA) experiences a mutation that could lead to a different protein produced. View the illustration below of DNA. Which part of the DNA experiences the mutation?

\_\_\_\_\_

3. On the DNA illustration, draw an *arrow* to show *where* the answer to #2 could be located.



4. The mRNA codon CUU could mutate to **C\_\_\_\_\_** and *still* code for leucine, which would not change the amino acid.



5. Which type(s) of organism(s) can experience a mutation? Mark any that apply.

- \_\_\_\_\_ Animals (this includes humans)
- \_\_\_\_\_ Archaea
- \_\_\_\_\_ Bacteria
- \_\_\_\_\_ Fungi
- \_\_\_\_\_ Plants
- \_\_\_\_\_ Protists

6. Even a **gene mutation** that is a **point mutation**, meaning it affects one nucleotide base, can still make a major change

Consider the below information for normal hemoglobin:

PORTION OF HEMOGLOBIN DNA	GGA CTC CTC
MRNA	CCU GAG GAG
AMINO ACIDS	Proline-Glutamic Acid-Glutamic Acid

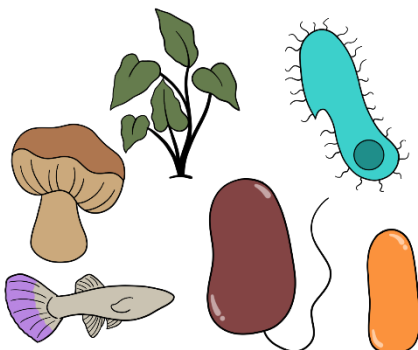
Sickle Cell Anemia is caused by a point mutation known as a **substitution**. Show what would occur *if* the *first* T ("thymine") DNA base in the portion shown above experienced a mutation with a substitution of A ("adenine").

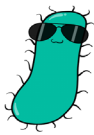
**Sickle Cell Hemoglobin:**

Portion of mutated hemoglobin DNA: \_\_\_\_\_

mRNA: \_\_\_\_\_

Amino Acids: \_\_\_\_\_





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7. An **insertion or deletion** can result in a **frameshift mutation**. To demonstrate this, complete the following.  
*Note: You will need a codon chart.*

**Normal Strand:**

DNA:            GCA            ATG            CAC

mRNA: \_\_\_\_\_

Amino Acids: \_\_\_\_\_

**Deletion (causing a frameshift):**

Taking out the first "G" in the original DNA above results in:

DNA:            CAA            TGC            AC

mRNA: \_\_\_\_\_

Amino Acids: \_\_\_\_\_

How did the frameshift change the amino acids?

\_\_\_\_\_

8. Check your understanding! Mark any that are *correct*.

\_\_\_\_\_ Mutations are random.

\_\_\_\_\_ Mutations are mostly beneficial and useful for an organism.

\_\_\_\_\_ Mutations can occur in both DNA and RNA, which are **nucleic acids**.

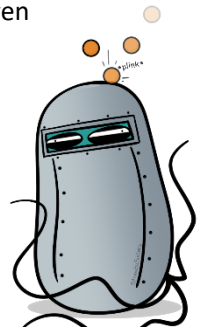
\_\_\_\_\_ Mutations can only occur during **interphase**.

\_\_\_\_\_ Not all genes code for proteins.

\_\_\_\_\_ Not all genes are "turned on" at a given time.

\_\_\_\_\_ **Substitution** mutations typically result in a **frameshift mutation**.

\_\_\_\_\_ Mutations can be **genetically inherited**.



Chromosome Mutations



**Sketch It!**

Create illustrations to show the following chromosome mutations. Note: Chromosomes exist in both prokaryotic and eukaryotic cells, but prokaryotic chromosome structure tends to be very different from eukaryotic chromosomes.

**9. Duplication**

**10. Deletion**

**11. Inversion**

**12. Translocation**

