

**GENETIC MUTATIONS**

1. What is a karyotype?
2. Are all mutations harmful? If not, what are types of mutations are there?
3. Look at the following sequence: THE FAT CAT ATE THE RAT.  
Delete the first H and regroup the letters in groups of three- write out the new groups of three.
  1. Does the sentence still make sense?
  2. What type of mutation is this an example of?
4. Below is the base sequence for the normal protein for normal hemoglobin and the base sequence for the sickle cell hemoglobin. Transcribe and translate the normal and sickle cell DNA.

Type of DNA	DNA Strand	Transcribed DNA (mRNA)	Translate into Protein Sequence (Amino Acid)
Normal	GGG CTT CTT TTT		
Sickel	GGG CAT CTT TTT		

1. Identify this as a point or frameshift mutation. Explain.
2. If the base sequence read GGG CTT CTT AAA instead, would this result in sickle cell hemoglobin? Explain.

**PEDIGREES**

Nearsightedness, or myopia, is a recessive trait. Use the symbols **N** and **n** to label the genotype for each of the numbered individuals. The shaded ones are nearsighted.

direction is RNA read?