LT: I can create a model of DNA in order to illustrate mutations and an amino acid chain that would result from protein synthesis. **Standard: 2.1f ; 2.1h; 2.1g**

Create a 3-D model of the DNA molecule using recycled/found materials.
Use this as a guideline to make sure your project is done correctly.

_____DNA model is 3D (20 points)

_____ Minimum of 15 base pairs bonded correctly (30 points)

_____ Hydrogen bond between base pairs (5 points)

_____Base pairs bond to Sugar/phosphate backbone (5 points)

_____Shows correct double helix shape (10 points)

_____Key/Labels Included (10 points)

_____Model shows creativity and time invested (20 point)

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1. Draw your DNA strand. (15 points)
   _____ Minimum of 15 base pairs labeled and bonded correctly (15 points)
   _____Base pairs bond to Sugar/phosphate backbone (without backbone, subtract 2 points per side)

Select one of your DNA strands (DNA template strand) to be copied into mRNA for undergoing protein synthesis.

Codons Found in Messenger RNA

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

2. Show your DNA template strand having each of the following mutations:
   *****(You will need to draw 3 separate images.)
   a. Deletion (14 points)
   b. Addition (16 points)
   c. Substitution (15 points)

*For each mutation type, annotate the mutation type **and** location (without- subtract 2 points per error)
* For each mutation type, annotate if the mutation type will cause a frameshift. (without- subtract 2 points per error)

3. Record the mRNA strand nitrogen bases for the DNA template strand. (15 points)

4. Use the chart to record the amino acid chain that will result from protein synthesis. (15 points)

5. Identify the structure that is responsible for:
   a. Copying DNA into RNA (2 points)
   b. Assembling codons into amino acids (2 points)

6. Describe the relationship between codons, amino acids, and nitrogen bases. (4 points)

7. How does protein synthesis lead to gene expression? (2 points)

TASK Resource: http://learn.genetics.utah.edu/content/basics/