Name: _____
Hour: _____

Protein Synthesis

Due: _____

Protein synthesis is a complex process. In this activity you will trace the steps that are involved in the protein synthesis of a part of a molecule of oxytocin. Oxytocin is the pituitary hormone that helps regulate blood pressure, stimulates the uterus in to contract during childbirth and stimulates the production of milk after childbirth.

A. Protein synthesis begins with DNA in the nucleus. Below is a DNA sequence that codes for a part of a molecule of oxytocin. **Write the sequence of messenger RNA (mRNA) codons that would result from the transcription of this portion of DNA. The arrow marks the starting point.**

Start here!

	1	2	3	4	5	6	7	8	9	10
DNA Strand:	ACA	ATA	TAG	CTT	TTG	ACG	GGG	AAC	CCC	ATT
mRNA Codons:										
Amino Acid										

B. After transcription, mRNA attaches to a ribosome where translation takes place. Each codon of mRNA bonds with an anticodon of a transfer RNA (tRNA) and each tRNA molecule bonds with a specific amino acid. The table below shows the mRNA codons and the amino acids for which they code. For example, if you were given the codon, AGA, you can see from the table that these bases code for the amino acid Arginine. **Using the table below, determine the amino acid the mRNA codon would code for from the table above.**

First Base in Code	Second Base in Code: A	Second Base in Code: G	Second Base in Code: U	Second Base in Code: C	Third Base in Code
A	Lysine Lysine Asparagine Asparagine	Arginine Arginine Serine Serine	Isoleucine Methionine Isoleucine Isoleucine	Threonine Threonine Threonine Threonine	A G U C
G	Glutamic acid Glutamic acid Aspartic acid Aspartic acid	Glycine Glycine Glycine Glycine	Valine Valine Valine Valine	Alanine Alanine Alanine Alanine	A G U C
U	STOP STOP Tyrosine Tyrosine	STOP Trytophan Cysteine Cysteine	Leucine Leucine Phenylalanine Phenylalanine	Serine Serine Serine Serine	A G U C
C	Glutamine Glutamine Histidine Histidine	Arginine Arginine Arginine Arginine	Leucine Leucine Leucine Leucine	Proline Proline Proline Proline	A G U C

Name: _____
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Making a Protein: Extension

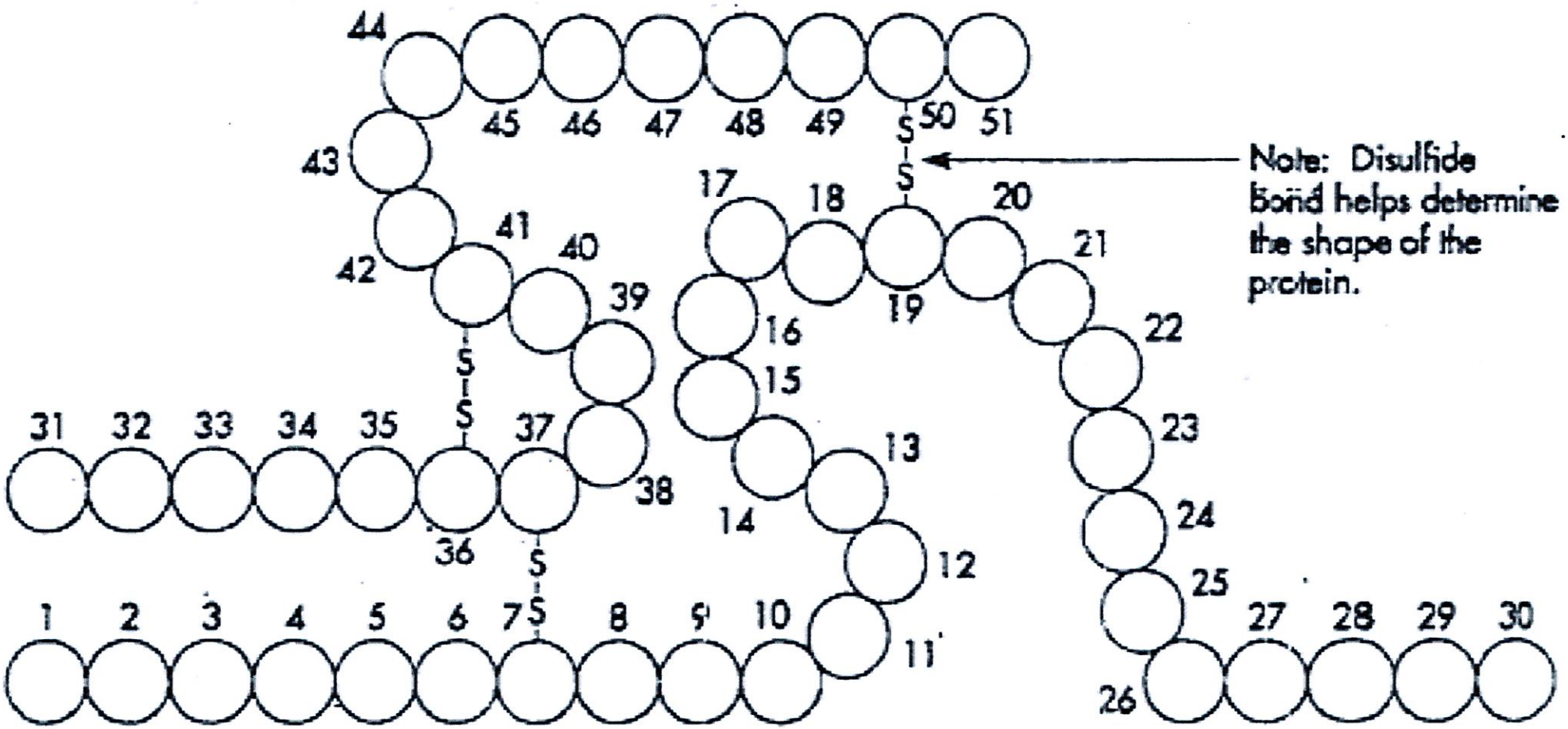
Directions:

The sequence of bases in a DNA molecule directs the formation of proteins. Genes usually code for either a single protein or a polypeptide, which is a sequence of proteins that make up a large part of a protein molecule.

Study the diagrams below. The table shows the codons for each amino acid. Below the table is the sequence of bases in the gene that makes beef insulin, a protein that breaks down sugar in a cow's blood. **Use the table and the sequence to fill in the beef insulin molecule with the appropriate Amino Acid on the next page.**

First Base in Code	Second Base in Code: A	Second Base in Code: G	Second Base in Code: U	Second Base in Code: C	Third Base in Code
A	Lysine Lysine Asparagine Asparagine	Arginine Arginine Serine Serine	Isoleucine Methionine Isoleucine Isoleucine	Threonine Threonine Threonine Threonine	A G U C
G	Glutamic acid Glutamic acid Aspartic acid Aspartic acid	Glycine Glycine Glycine Glycine	Valine Valine Valine Valine	Alanine Alanine Alanine Alanine	A G U C
U	STOP STOP Tyrosine Tyrosine	STOP Trytophan Cysteine Cysteine	Leucine Leucine Phenylalanine Phenylalanine	Serine Serine Serine Serine	A G U C
C	Glutamine Glutamine Histidine Histidine	Arginine Arginine Arginine Arginine	Leucine Leucine Leucine Leucine	Proline Proline Proline Proline	A G U C

1	2	3	4	5	6	7	8	9	10
UUU	GUC	AAU	CAG	CAU	CUG	UGU	GGG	AGU	CAC
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
CUA	GUC	CAG	GCC	CUA	UAU	UUG	GUU	UGC	GGC
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
GAG	AGA	GGG	UUC	UUU	UAC	UAC	CCC	AAA	GCA
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
GGU	AUU	GUG	GAA	CAG	UGU	UGU	CGU	UCU	GUU
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
UGU	UCG	UUG	UAC	CAA	UUG	GAG	AAU	UAU	UGU
51	**52**								
AAC	UAG								



1. Disulfide bonds in proteins form between a pair of amino acids of a certain kind. From the diagram you have just completed, what is the amino acid that the disulfide bonds have formed between?

_____

2. Disulfide bonds are a major factor in determining the overall shape of a protein molecule. What is the importance of shape?

_____

_____