

Name: _____

Period: _____

PROTEIN SYNTHESIS WORKSHEET



The DNA sequence below is the **SuPeR gene** for human development – it controls the development of many other characteristics. Scientists have found that a mutation in this gene can result in the production of new human characteristics. Start by determining the normal polypeptide produced by this gene (questions 1 and 2). Then imagine that you blast three people with high-energy gamma rays, and mutate this gene. For these three people, determine their new amino acid sequences, and then use the traits listed on the last page to determine which (if any) new superhuman traits the 3 individuals have. Note: The numbers indicate the nucleotide position. Use the DNA sequence to answer the following questions:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
T	A	C	A	A	T	C	A	A	G	C	A	C	T	T	G	C	A	A	G	A	C	T	A	A	T	T

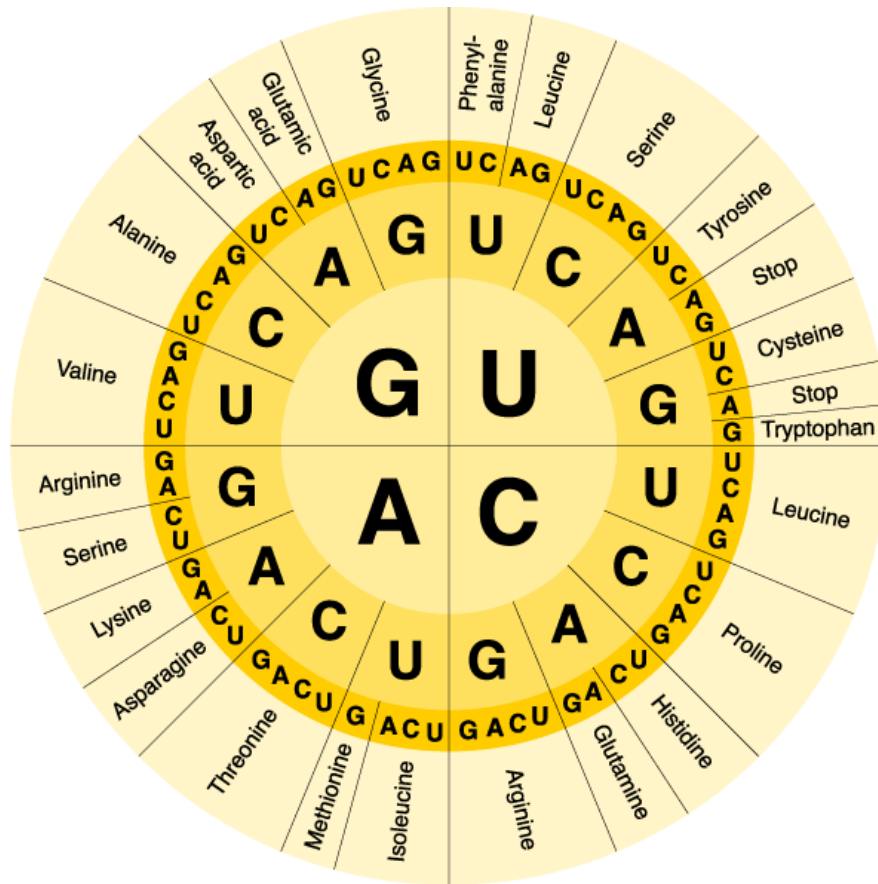
1. What is the mRNA that would be **transcribed** from this strand of DNA?

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

2. What is the sequence of amino acids that make up the SuPeR protein? (use the chart on the back to **translate**) Use 3-letter abbreviations for each amino acid – e.g. met – leu - ser...
3. Assume that a mutation occurs in the gene at position 7 changing the ‘C’ to a ‘G’. What will the new amino acid sequence be? What effect will this have on the SuPeR protein? Will it be longer? Shorter? Will the sequence of amino acids be the same? What superpower will this mutant acquire (if any)?
4. Rather than the mutation event described in question 3, assume that a mutation occurs in the gene at position 12 changing the ‘A’ to a ‘G. What will the new amino acid sequence be? What effect will this have on the SuPeR protein? Will it be longer? Shorter? Will the sequence of amino acids be the same? What superpower will this mutant acquire (if any)?
5. Rather than the mutation event described in question 4, assume that a mutation occurs in the gene at positions 18 and 19 deleting the A’s completely. What will the new amino acid sequence be? What effect will this have on the SuPeR protein? Will it be longer? Shorter? Will the sequence of amino acids be the same? Different? What superpower will this mutant acquire (if any)?

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Mutations:

met – leu – val – arg – glu acid – arg – ser - asp acid = **wild type (normal)**

met – leu – val – lys – glu acid – arg – ser – asp acid = lasers from the eyes (Cyclops-gene)

met – leu – val – arg – met – arg – ser – asp acid = climbs walls (the spidey-gene)

met – leu – val – asp – glu – arg – ser – pro = generates magnetic fields

met – leu – leu – arg – glu acid – arg – ser – asp acid = teleportation

met – leu – val – arg – glu – tyr – ser – pro = wings

met – tyr – val – arg – glu acid – arg – ser – arg = superhuman strength

met – leu – val – arg – glu acid – arg = freezes things on contact

met – leu – val – arg = retractable claws

met – leu – val – arg – glu – arg = weather manipulation

met – leu – val – arg – glu acid – arg – thr – asp acid = breathes fire