How DNA Controls the Workings of the Cell

Below are two partial sequences of DNA bases (shown for only one strand of DNA) Sequence 1 is from a human and sequence 2 is from a cow. In both humans and cows, this sequence is part of a set of instructions for controlling a bodily function. In this case, the sequence contains the gene to make the protein insulin. Insulin is necessary for the uptake of sugar from the blood. Without insulin, a person cannot use digest sugars the same way others can, and they have a disease called diabetes.

Instructions:

1. Using the DNA sequence, make a complimentary RNA strand from both the human and the cow. Write the RNA directly below the DNA strand (remember to substitute U's for T's in RNA)

2. Use the codon table in your book to determine what amino acids are assembled to make the insulin protein in both the cow and the human. Write your amino acid chain directly below the RNA sequence.

Sequence 1 – Human

C C A T A G C A C G T T A C A A C G T G A A G G T A A

RNA : **G G U A U C G U G C A A U G U U G U A C U U C C A U U**

Amino Acids: **Gly – Ile – Val – Gln – Cys – Cys – Thr – Ser - Ile**

Sequence 2 – Cow

C C G T A G C A T G T T A C A A C G C G A A G G C A C

RNA: **G G C A U C G U A C A A U G U U G C G C U U C C G U G**

Amino Acids: **Gly – Ile – Val – Gln –Cys – Cys – Ala – Ser - Val**

Analysis

1. Comparing the human gene to the cow gene, how many of the codons are exactly the same? _____**5**_____

2. How many of the amino acids in the sequence are exactly the same? _____**7**_____

3. Could two humans (or two cows) have some differences in their DNA sequences for insulin, yet still make the exact same insulin proteins? Explain.

They could still make the exact same insulin proteins if the sequences coded for the same amino acids as those in the insulin protein.