**Concept Check**

**Assignment Outcomes:**

* Review practical applications of the Central Dogma (i.e., flow of genetic information from DNA 🡪 RNA 🡪 protein via processes of transcription and translation) given nucleotide sequences
* Evaluate nucleotide sequences to identify specific mutations

1. Fill in each blank with the appropriate mutated mRNA codon or amino acid. Lastly, determine what specific type of mutation has occurred.

|  | Normal | Mutated |
| --- | --- | --- |
| DNA Nucleotide Base Triplet | GTT | GTC |
| mRNA Codon | CAA | **CAG** |
| Amino Acid | Gln | **Gln** |

This is an example of a **SILENT SUBSTITUTION POINT** mutation.

1. Fill in each blank with the appropriate mutated DNA triplet or amino acid. Lastly, determine what specific type of mutation has occurred.

|  | Normal | Mutated |
| --- | --- | --- |
| DNA Nucleotide Base Triplet | GTT | **GGT** |
| mRNA Codon | CAA | CCA |
| Amino Acid | Gln | **Pro** |

This is an example of a **MISSENSE SUBSTITUTION POINT** mutation.

1. Fill in each blank with the appropriate mutated mRNA codon or amino acid. Lastly, determine what specific type of mutation has occurred.

|  | Normal | Mutated |
| --- | --- | --- |
| DNA Nucleotide Base Triplet | GTT | ATT |
| mRNA Codon | CAA | **UAA** |
| Amino Acid | Gln | **STOP CODON** |

This is an example of a **NONSENSE SUBSTITUTION POINT** mutation.

1. Fill in each blank with the appropriate mutated mRNA or amino acid sequence. Lastly, determine what specific type of mutation has occurred.

|  | Normal | Mutated |
| --- | --- | --- |
| DNA Nucleotide Base Seq. | TGA GGA CTC CTC | TGA GGA CAC CTC |
| mRNA Seq. | ACU CCU GAG GAG | **ACU CCU GUG GAG** |
| Amino Acid Seq. | Thr—Pro—Glu—Glu | **Thr—Pro—Val—Glu** |

This is an example of a **MISSENSE SUBSTITUTION POINT** mutation.

1. Fill in each blank with the appropriate mutated mRNA or amino acid sequence. Lastly, determine what specific type of mutation has occurred.

|  | Normal | Mutated |
| --- | --- | --- |
| DNA Nucleotide Base Seq. | AAA ATA CGT GCA | AAG ATA CGT GCA |
| mRNA Seq. | UUU UAU GCA CGU | **UUC UAU GCA CGU** |
| Amino Acid Seq. | Phe—Tyr—Ala—Arg | **Phe—Tyr—Ala—Arg** |

This is an example of a **SILENT SUBSTITUTION POINT** mutation.

1. Fill in each blank with the appropriate mutated mRNA or amino acid sequence. Lastly, determine what specific type of mutation has occurred.

|  | Normal | Mutated |
| --- | --- | --- |
| DNA Nucleotide Base Seq. | AAA ATA CGT GCA | AAA ATA CCT GCA |
| mRNA Seq. | UUU UAU GCA CGU | **UUU UAU GGA CGU** |
| Amino Acid Seq. | Phe—Tyr—Ala—Arg | **Phe—Tyr—Gly—Arg** |

This is an example of a **MISSENSE SUBSTITUTION POINT** mutation.

1. Fill in each blank with the appropriate mutated mRNA or amino acid sequence. Lastly, determine what specific type of mutation has occurred.

| DNA Nucleotide Base Seq. | AAA ATA CGT GCA | AAA ATT CGT GCA |
| --- | --- | --- |
| mRNA Seq. | UUU UAU GCA CGU | **UUU UAA GCA CGU** |
| Amino Acid Seq. | Phe—Tyr—Ala—Arg | **Phe—STOP CODON** |

This is an example of a **NONSENSE SUBSTITUTION POINT** mutation.

1. Fill in each blank with the appropriate mutated mRNA or amino acid sequence. Lastly, determine what specific type of mutation has occurred.

|  | Normal | Mutated |
| --- | --- | --- |
| DNA Nucleotide Base Seq. | AAA ATA CGT GCA | AAA TAT ACG TGC A |
| mRNA Seq. | UUU UAU GCA CGU | **UUU AUA UGC ACG U** |
| Amino Acid Seq. | Phe—Tyr—Ala—Arg | **Phe—Ile—Cys—Thr** |

This is an example of a **FRAMESHIFT INSERTION/ADDITION** mutation.