Protein Synthesis & Amino Acid Worksheet

|  |  |  |  |
| --- | --- | --- | --- |
| DNA | DNA & RNA | RNA | Protein Synthesis |
| deoxyribonucleic acid | base | ribonucleic acid | amino acid |
| deoxyribose | nucleotide | ribose | codon |
| hydrogen bond | pentose sugar | messenger RNA | anticodon |
| thymine | phosphate | transfer RNA | transcription |
|  | backbone | mRNA | translation |
|  | rungs | tRNA | polypeptide |
|  | cytosine | ribosome | protein |
|  | guanine |  |  |
|  | adenine |  |  |

Label the Diagrams:

**Follow the colouring scheme for each diagram below, then label the parts listed.**

**Nucleotide Structure**

phosphate group – brown five-carbon sugar – orange nitrogen(ous) base – purple

**DNA Structure**

sugar-phosphate backbone – brown/orange adenine – red

thymine – green cytosine – blue

guanine – yellow

hydrogen bond – black

1. Fill in the complimentary DNA strand using DNA base pairing rules.
2. Fill in the correct mRNA bases by transcribing the bottom DNA code.
3. Translate the **mRNA codons** and find the correct **amino acid** using the Codon Circular Table.
4. Write in the amino acid and the correct ant-codon, the tRNA molecule.
5. Then answer the questions about protein synthesis below the amino acids.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Original****DNA** | **Complementary****DNA** | **Codon****mRNA** | **Anti-Codon****tRNA** | **Amino Acid** |
| **A** | T | A | U | Met., Methionine The start codon |
| **T** | A | U | A |
| **G** | C | G | C |
| **G** |  |  |  |  |
| **T** |  |  |  |
| **A** |  |  |  |
| **G** |  |  |  |  |
| **C** |  |  |  |
| **T** |  |  |  |
| **A** |  |  |  |  |
| **A** |  |  |  |
| **C** |  |  |  |
| **C** |  |  |  |  |
| **T** |  |  |  |
| **T** |  |  |  |

**mRNA**

Here’s another way to look at the same process. **Fill in all the circles and ovals.**

Original Strand

**C**

**A G G A**

**A**

**T**

**T**

**G C**

**T**

**C G A**

**T**

**DNA**

1. Where is mRNA synthesized, transcription or translation?

**Amino Acids**

**tRNA**

1. Does mRNA have codons or anti-codons?
2. How many codons equal one amino acid, 1 or 3?
3. Does tRNA bring amino acid to the nucleus or ribosomes?
4. Is a polypeptide a sequence of proteins or amino acids?
5. Does tRNA have codons or anti-codons?
6. Does tRNA transfer amino acids during transcription or translation?
7. Are ribosomes the site where translations or transcription takes place?

# **Codon to Amino Acid Circular Chart**

Start at center of chart with the 5´end. Then work out from center toward 3´end to find amino acid abbreviation.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Amino Acid** | **Three Letter** | **Single Letter** |  | **Amino Acid** | **Three Letter** | **Single Letter** |
| Alanine | ala | A | Leucine | leu | L |
| Arginine | arg | R | Lysine | lys | K |
| Asparagine | asn | N | Methionine | met | M |
| Aspartic Acid | asp | D | Phenylalanine | phe | F |
| Cysteine | cys | C | Proline | pro | P |
| Glutamic Acid | glu | E | Serine | ser | S |
| Glutamine | gln | Q | Threonine | thr | T |
| Glycine | gly | G | Tryptophan | trp | W |
| Histidine | his | H | Tyrosine | tyr | Y |
| Isoleucine | ile | I | Valine | Val | V |

# List of Amino Acids