Biology Connect Four

**Object**: Be the first player to get four of your checkers in a row - horizontally, vertically or diagonally.

**Rules: 1.** Choose who plays first.

**2.** Each player in his turn chooses any of the boxes on the bottom of the grid to answer. By writing it in.

**3.** The play alternates until one of the players gets four markers of his color in a row. The four in a row can be horizontal, vertical, or diagonal. Once four in a row are obtained then answers are checked to ensure that the winner was correct.

**4.** The first player to get four correct in a row wins. **5.** If the board is filled with pieces and neither player has 4 in a row, then the game is a draw.

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| What are a group of three mRNA nucleotides called? | What are the TWO roles of DNA polymerase? | Which type of mutation causes the most disruption to the sequence of amino acids in a protein? | Translate: UUAGAAUGGUUUGA | List 3 environmental causes of mutations | What is the job of the tRNA? | What is the building block of nucleic acids? |
| What was the main conclusion of Hershey and Chase’s experiments? | The \_\_\_\_\_\_\_\_\_ of a protein determines how it functions | If there are 45 mRNA nucleotides, including the start and stop codons, how many amino acids? | Describe the difference between a chromosome and a gene. | What is the effect of multiple replication forks have on the speed of DNA replication? | What is a three nucleotide sequence on a tRNA? | If the following sequence, GCCTAG is on one strand of DNA, what is the sequence on the other strand? |
| Where does transcription occur? | If the mRNA is GAU what would be the tRNA? | What are the 3 reasons DNA replication is necessary? | What type of RNA carries the instructions for making a protein from a gene and delivers it to the site of translation? | Explain complementary base pairing | Where SPECIFICALLY in the cell does translation occur? | These RNA molecules are part of the structure of ribosomes |
| Explain introns and exons | A gene that has the potential to cause cancer. | Traits are determined by \_\_\_\_\_\_\_\_\_\_\_ that are built according to instructions coded in DNA | What is the enzyme that is needed for transcription? | Which type of bonds are found in the DNA backbone? Are they strong or weak? | Which scientist(s) experiment showed that transformation is not affected by protein destroying enzymes? | What are 2 differences between DNA and RNA? |
| If there is 40% of A in a DNA molecule, how much T, G and C? | Where does DNA replication occur? | What does DNA strand for?. | What do DNA and RNA have in common? | Transcribe the following DNA:  TAG TTA CAT GGA | What does the enzyme helicase do? | What are the steps of protein synthesis? |
| Who is credited with describing the structure of the DNA molecule? | Griffith’s experiment showed that a change in genotype caused when cells take up foreign material?. What is that called? | What are the parts of a nucleotide? | Which kind of bonds are used to connect the two strands of DNA together? Are they strong or weak? | What molecules make up the DNA backbone? | What is another name for protein synthesis? | Which nitrogen bases are purines? |

KEY:

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| What are a group of three mRNA nucleotides called?  Codons | What are the TWO roles of DNA polymerase?  Proofread and add complimentary nucleotides to each strand | Which type of mutation causes the most disruption to the sequence of amino acids in a protein?  Frameshift mutation | Translate: UUAGAAUGGUUUGA  Met-Val | List 3 environmental causes of mutations  UV radiation (solar radiation), certain chemicals, viruses, cigarette smoke, tobacco, radiation, some drugs, hair dyes | What is the job of the tRNA?  Brings amino acids to the ribosome | What is the building block of nucleic acids?  nucleotides |
| What was the main conclusion of Hershey and Chase’s experiments?  DNA of viruses is injected into the bacterial cells | The \_\_\_\_\_\_\_\_\_ of a protein determines how it functions  shape | If there are 45 mRNA nucleotides, including the start and stop codons, how many amino acids?  44 | Describe the difference between a chromosome and a gene.  A gene is a segment of a chromosome that codes for one protein | What is the effect of multiple replication forks have on the speed of DNA replication?  Increases it | What is a three nucleotide sequence on a tRNA?  Anticodon | If the following sequence, GCCTAG is on one strand of DNA, what is the sequence on the other strand?  CGGATC |
| Where does transcription occur?  Nucleus | If the mRNA is GAU what would be the tRNA?  CUA | What are the 3 reasons DNA replication is necessary?  GRR (growth, repair/replace, reproduction) | What type of RNA carries the instructions for making a protein from a gene and delivers it to the site of translation? Messenger RNA | Explain complementary base pairing  A goes with T and G goes with C | Where SPECIFICALLY in the cell does translation occur?  At the ribosome (in the cytoplasm) | These RNA molecules are part of the structure of ribosomes  rRNA (ribosomal RNA) |
| Explain introns and exons  Introns are useless information, exons have the information needed to build proteins | A gene that has the potential to cause cancer.  Oncogene | Traits are determined by \_\_\_\_\_\_\_\_\_\_\_ that are built according to instructions coded in DNA  Proteins | What is the enzyme that is needed for transcription?  RNA polymerase | Which type of bonds are found in the DNA backbone? Are they strong or weak?  Covalent- strong | Which scientist(s) experiment showed that transformation is not affected by protein destroying enzymes?  Avery | What are 2 differences between DNA and RNA?  DNa has deoxyribose, RNA has ribose, DNA is only in the nucleus, RNA is everywhere |
| If there is 40% of A in a DNA molecule, how much T, G and C?  T is 40%, G is 10% and C is 10% | Where does DNA replication occur?  Nucleus | What does DNA strand for?.  Deoxyribose nucleic acid or deoxyribonucleic acid | What do DNA and RNA have in common?  Both are nucleic acids and both have A, C and G nitrogen bases | Transcribe the following DNA: TAG TTA CAT GGA  AUG AAU GUA CCU | What does the enzyme helicase do?  Open the double helix by breaking the hydrogen bonds | What are the steps of protein synthesis?  Transcription and translation |
| Who is credited with describing the structure of the DNA molecule?  Watson and Crick | Griffith’s experiment showed that a change in genotype caused when cells take up foreign material?. What is that called?  Transformation. | What are the parts of a nucleotide?  Phosphate, sugar, nitrogen base | Which kind of bonds are used to connect the two strands of DNA together? Are they strong or weak?  Hydrogen bonds- weak | What molecules make up the DNA backbone?  Sugars and phosphates | What is another name for protein synthesis?  Gene Expression | Which nitrogen bases are purines?  Adenine and guanine |