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| **Cracking the Code: What is DNA?**  | The genetic material in cells is contained in a molecule called \_\_**DNA**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?  |
| Where is DNA found? P. 220 | It is found within a \_\_**chromosome**\_\_\_\_\_\_\_\_\_\_\_. It is also located inside the nucleus of the cell.  |
| Compared to a recipe, DNA is like the…?  | **Information in a book** |
| DNA contains a code… | A code is a set of **rules** and symbols used to carry information. For example, your computer uses a code of ones and zeroes that is translated into numbers, letters, and graphics on a computer screen.  |
| **What does DNA look like? P. 222** | The shape of DNA is a **double-helix**. The two sides of the ladder, often referred to as the DNA backbone, are made of alternating sugars and phosphate groups. The **rungs** of the ladder are made of a pair of **bases**, each attached to one of the sugars in the backbone.  |
| Where are phosphate groups found in a DNA molecule?  | Sugar and phosphates are the **BACKBONE** |
|  | The steps of the DNA ARE pairs of bases each attached to one of the sugars in the backbone. The rails of DNA are the sugars and alternating phosphates on the backbones.  |
| What is DNA made up of? P223 | DNA is made up of \_**nucleotides**\_.  |
| What makes up a nucleotide?  | A nucleotide is made up of a base, **sugar**, and a phosphate group. |
| What are the four nitrogenous bases?  | There are four different nucleotides in DNA, identified by their bases: adenine (A), **thymine** (T), Cytosine (C), Guanine (G).  |
| Which base always pairs with adenine? Hint: Apples in a tree | **A with T** |
| Which base always pairs with cytosine? Hint: Car in a garage  | **C with G** |
| What are genes? P. 223 | Genes are segments of \_**DNA\_** that are organized and carried on the chromosomes. The thousands of genes arranged in each chromosome are the same in each cell, and relate to traits, such as eye color, blood type, and handedness.  |
| What is the gene code? P 223 | The code stores information about which **protein** the cells should build. The types of proteins your body makes help to determine your traits.  |
| Answer question 10 on page 223! 😊  | A T to C G |
|  | If one strand of DNA has the nucleotide sequence TCGAACT, what must the matching sequence on the other strand be?  **AGCTTGA** |
| How are copies of DNA made?  | By \_**\_replication** |
| What is replication?  | Replication is when the cell is able to make \_**copy** of DNA molecules.  |
| What happens during replication?P 224  | 1. Two strands of DNA are **separated**
2. As the bases on the original molecule are exposed, complementary **nucleotides** are added.
3. When replication is complete, there are **\_\_two identical\_\_\_** DNA molecules.
4. Each new DNA molecule is made of one strand of old DNA and one strand of new DNA.
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| Complete question 12 on page 224 | 1. **DNA; two strands B. Nucleotides C. two identical molecules**
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| **When are copies of DNA made?**  | Copies of DNA are made during replication. |
| Summarize the paragraph “When are copies of DNA made” | When copies of DNA are replicated, two strands of DNA separate and form two identical DNA molecules. Each DNA molecule is one strand of the old DNA and one strand of the new DNA |
| What are mutations?  | A mutation is a \_**change**\_ in the number, type, or order of bases on a piece of DNA  |
| P 225 | The different types of mutations are -insertion extra base is added -deletion base is left out -substitution -> most common is when one base replaces another. |
| What is deletion?  | When a base is left \_\_**out**.  |
| What is insertion?  | An extra base is \_**added\_\_\_\_\_\_\_\_\_.**  |
| What is a substitution?  | This is the most common type of mutation. It occurs when one base **replaces** another base.  |
| How do mutations happen?  | 1. Random errors can occur during replication
2. DNA can also be damaged by \_\_**physical\_\_\_** or \_**chemical\_\_\_\_\_\_** agents called MUTAGENS.

\*UV light and the chemicals in cigarette smoke are examples of mutagens. |
| What do cells make that can fix errors in DNA?  | Proteins! -BUT it does not always work and the mistake isn’t corrected. It then becomes a part of the genetic code.  |
| Mutations to DNA can be… | 1. **Beneficial**
2. **Neutral**
3. **Harmful**
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| What is the role of DNA and RNA in building proteins? \*Cookbook Recipe analogy\* | 1. Some of the information in the DNA is **copied** to a separate molecule called **ribonucleic acid** or RNA. 2. Then, the copy is used to **build proteins.**  |
| What is RNA made up of?  | RNA has a sugar-phosphate backbone and the bases adenine, guanine, and cytosine. BUT instead of thymine, RNA contains the base URACIL (U).  |
| What are the different types of sugars in RNA?  | 1. **Messenger RNA**
2. **Ribosomal RNA**
3. **Transfer RNA**

Each type has a special role in making proteins.  |
| **Transcription** |  **The information in DNA is copied to Messenger RNA (DNA---🡪 mRNA)** Code----decode |
| What is transcription?  | When a cell makes an RNA copy of the necessary section of DNA. -involves DNA and **messanger RNA (mRNA**)-**only individual** strands of genes are transcribed, not the whole DNA molecule.  |
| What is the process of transcription?  | 1. The DNA opens where the **gene** is located
2. Then **RNA** bases match up to complementary bases on the **DNA** template.
3. When transcription is complete, the **mRNA** is released and the DNA molecule closes.
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| **Translation: The Information in Messenger RNA is used to Build Proteins**  |  |
| Where does the mRNA go after it has been made? | The mRNA is fed through a protein assembly line within a ribosome |
| What is a Ribosome? | A Ribosome is a cell organelle made of ribosomal RNA (rRNA) and protein |
| What happens as mRNA passes through the Ribosome?  | * Each group of three bases on the mRNA strand codes for one amino acid. So, the genetic code determines the order in which amino acids are brought to the Ribosome.
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| What do the amino acids join together to form? | Amino acids join to form a protein. |
| What is the process of making proteins from RNA called? | The process of making proteins from RNA is called translation. |