

**Lesson Outline****LESSON 2*****Understanding Inheritance*****A. What controls traits?**

1. Inside each cell is a nucleus that contains threadlike structures called \_\_\_\_\_.
2. Mendel's factors are parts of chromosomes, and each cell in the offspring contains chromosomes from both \_\_\_\_\_.
3. A(n) \_\_\_\_\_ is a section on a chromosome that has genetic information for one trait.
4. The different forms of a gene are called \_\_\_\_\_.
5. Geneticists refer to how a trait appears, or is expressed, as the trait's \_\_\_\_\_.
6. The two alleles that control the phenotype of a trait are called the trait's \_\_\_\_\_.
  - a. In genetics, \_\_\_\_\_ letters represent dominant alleles, and \_\_\_\_\_ letters represent recessive alleles.
  - b. When two alleles of a gene are the same, its genotype is \_\_\_\_\_.
  - c. If two alleles of a gene are different, its genotype is \_\_\_\_\_.

**B. Modeling Inheritance**

1. In a situation based on chance, such as flipping a coin, the chance of getting a certain outcome can be represented by a(n) \_\_\_\_\_ such as 50:50, or 1:1.
2. A(n) \_\_\_\_\_ is a model that is used to predict possible genotypes and phenotypes of offspring.
  - a. To create a Punnett square, you need to know the \_\_\_\_\_ of both parents.
  - b. If you count large numbers of \_\_\_\_\_ from a particular cross, the overall ratio will be close to the ratio predicted by a Punnett square.
3. A(n) \_\_\_\_\_ is a diagram that shows phenotypes of genetically related family members. It also gives clues about their \_\_\_\_\_.

## Lesson Outline continued

### C. Complex Patterns of Inheritance

1. Alleles show \_\_\_\_\_ when the offspring's phenotype is a blend of the parents' phenotypes.
2. Alleles show \_\_\_\_\_ when both alleles can be observed in a phenotype.
3. Unlike the genes in Mendel's pea plants, some genes have \_\_\_\_\_ alleles.
4. ABO \_\_\_\_\_ type is a trait that is determined by multiple alleles.
5. \_\_\_\_\_ occurs when multiple genes determine the phenotype of a trait.
6. Human eye \_\_\_\_\_ is an example of polygenic inheritance.

### D. Genes and the Environment

1. \_\_\_\_\_ are not the only factors that can affect phenotypes. An organism's \_\_\_\_\_ can also affect its phenotype.
2. The flower color of one type of hydrangea is determined by the \_\_\_\_\_ in which the hydrangea grows.
3. \_\_\_\_\_ choices can affect a person's phenotype.

**Lesson Outline****LESSON 3*****DNA and Genetics*****A. The Structure of DNA**

1. Genes provide \_\_\_\_\_ for a cell to assemble molecules that express traits such as eye color or seed shape.
2. Chromosomes are made of proteins and deoxyribonucleic acid, or \_\_\_\_\_, which is an organism's genetic material.
3. Strands of DNA in a chromosome are tightly \_\_\_\_\_ like a telephone cord.
4. The work of several scientists revealed that DNA is shaped like a twisted ladder, or a(n) \_\_\_\_\_.
5. DNA is made of \_\_\_\_\_, which are molecules made of a nitrogen base, a sugar, and a phosphate group.
6. There are four \_\_\_\_\_ bases—adenine (A), cytosine (C), thymine (T), and guanine (G).
7. \_\_\_\_\_ copies a DNA molecule to make another DNA molecule. It produces two \_\_\_\_\_ strands of DNA.

**B. Making Proteins**

1. The DNA of each cell carries a complete set of genes that provides instructions for making all the \_\_\_\_\_ a cell requires.
2. Segments of DNA that are not parts of genes are often called \_\_\_\_\_ DNA.
3. Ribonucleic acid, or \_\_\_\_\_, is a type of nucleic acid that carries the code for making proteins from the nucleus to the cytoplasm.
  - a. Like DNA, RNA is made of \_\_\_\_\_.
  - b. Unlike DNA, RNA is single-stranded and has the sugar \_\_\_\_\_. It has the nitrogenous base \_\_\_\_\_ instead of thymine.
4. The process of making mRNA from DNA is \_\_\_\_\_.
5. The three types of RNA are transfer RNA, ribosomal RNA, and \_\_\_\_\_ RNA.
6. The process of making a protein from RNA is called \_\_\_\_\_.

## Lesson Outline continued

7. The order of the nitrogen bases in mRNA determines the order of the \_\_\_\_\_ in a protein.
8. Each series of three nitrogen bases on mRNA is called a(n) \_\_\_\_\_.
  - a. Most codons code for \_\_\_\_\_.
  - b. One of the codons codes for an amino acid that is at the \_\_\_\_\_ of a protein. This codon signals that \_\_\_\_\_ should start. Three of the codons do not code for any \_\_\_\_\_. Instead, they code for the \_\_\_\_\_ of the protein.

### C. Mutations

1. A change in the nucleotide sequence of a gene is a(n) \_\_\_\_\_.
2. Mutations can be triggered by exposure to X-rays, \_\_\_\_\_ light, radioactive materials, and some kinds of chemicals.
3. Types of DNA mutations include deletion mutations, \_\_\_\_\_ mutations, and substitution mutations.
4. Each type of mutation changes the sequence of nitrogen base pairs, which can cause a gene to code for a different \_\_\_\_\_ than a normal gene.
5. Because mutations can change proteins, they can change \_\_\_\_\_.
6. Mutations can have \_\_\_\_\_ effects, positive effects, or no effect on traits.