

Name _____

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Date _____

Guided Reading Chapter 1: The Science of Heredity

Section 1-1: Mendel's Work

- Gregor Mendel experimented with hundreds of pea plants to understand the process of _____.

Match the term with its definition.

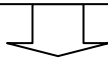
Term

Definition

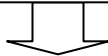
- _____ heredity
 - _____ genetics
 - _____ traits
- The scientific study of heredity
 - Physical characteristics
 - The passing of traits from parents to offspring
- Circle the letter of characteristic in pea plants that make them good for studying the passing of traits from parent to offspring.
 - Peas produce small numbers of offspring.
 - Peas readily cross-pollinate in nature.
 - Peas have many traits that exist in only two forms.
 - Peas do not have stamens.
 - In a flower, the female sex cells, or eggs, are produced by the _____. Pollen, which contains the male sex cells, is produced by the _____.
 - Why did Mendel use purebred plants in his experiments?
 - Complete the flowchart below, which summarizes Mendel's first experiment with pea plants.

Mendel's Experiment

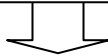
Purebred tall plants are crossed with purebred _____ plants.



F₁ offspring are all _____.



F₁ offspring are allowed to self-pollinate.



F₂ offspring are _____ and _____.

9. Circle the letter of other traits in garden peas that Mendel studied. Look at Figure 3 on page 21.
- seed size, seed shape, seed color
 - seed color, pod color, flower color
 - flower size, pod shape, seed coat color
 - pod color, seed shape, flower position
10. Two forms of the trait of seed shape in pea plants are _____ and _____.
11. Circle the letter of each sentence that is true about alleles.
- Genes are factors that control traits.
 - Alleles are different forms of a gene.
 - Dominant alleles always show up in the organism when the allele is present.
 - Recessive alleles mask dominant alleles.
12. Is the following sentence true or false? Only pea plants that have two recessive alleles for short stems will be short.

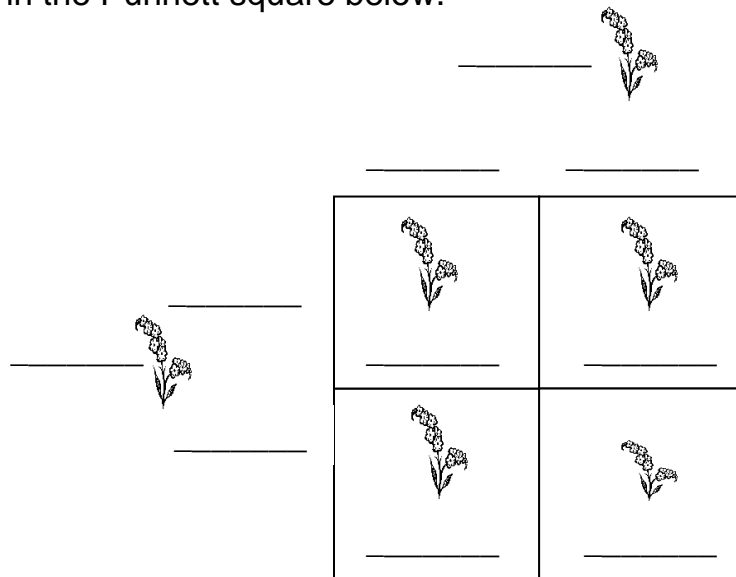
Match the pea plant with its combination of alleles.

- | Pea Plant | Combination of Alleles |
|-------------------------|---|
| 13. ____ purebred short | a. Two alleles for tall stems |
| 14. ____ purebred tall | b. One allele for tall stems and one allele for short stems |
| 15. ____ hybrid tall | c. Two alleles for short stems |
16. A dominant allele is represented by a(n) _____ letter.
17. A recessive allele is represented by a(n) _____ letter.
18. How would a geneticist write the alleles to show that a tall pea plant has one allele for tall stems and one allele for short stems?
19. Is the following sentence true or false? Some scientists during Mendel's time thought Mendel should be called the Father of Genetics.
20. Is the following sentence true or false? The importance of Mendel's work was not recognized until 34 years after presented his results to a scientific society.

Section 1-2: Probability and Genetics

- The likelihood that a particular event will occur is called _____.
- Circle the letter of each answer that equals the probability that a tossed coin will land heads up.
 - 1 in 2
 - $\frac{1}{2}$
 - 50 percent
 - 20 percent

3. Is the following sentence true or false? When you toss a coin 20 times, you will always get 10 heads and 10 tails.
4. If you toss a coin five times and it lands heads up each time, will the coin to land heads up on the sixth toss? Explain.
5. When Mendel crossed two hybrid plants for stem height (Tt), what results did he always get?
6. Mendel realized that the principles of probability could be used to _____ the results of genetic crosses.
7. A chart that shows all the possible combinations of alleles that can result from a genetic cross is called a(n) _____.
8. Write in the alleles of the parents and the possible allele combinations of the offspring in the Punnett square below.



9. Calculate the probability that an offspring in the Punnett square on page 28 will be TT .
10. In the Punnett square on page 28, what possible allele combinations can a tall offspring have?

Match the term with its definition.

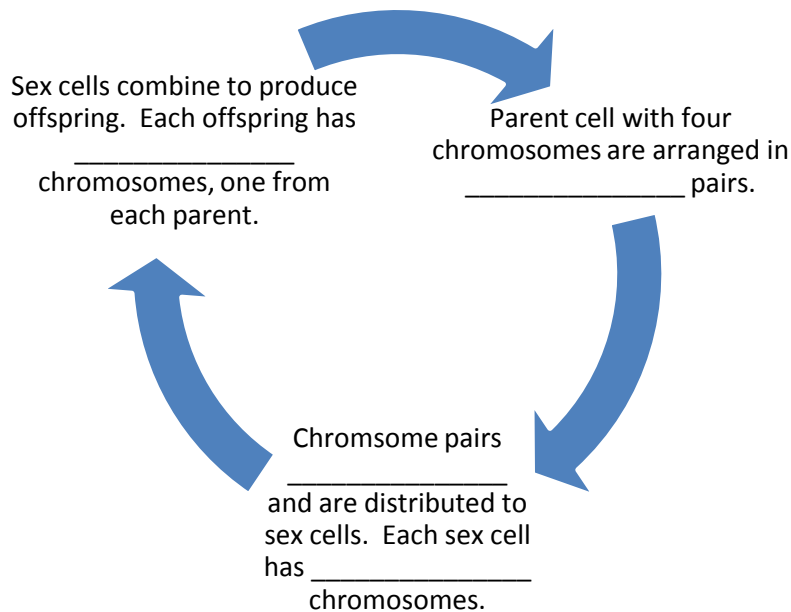
Term	Definition
___ 11. phenotype	a. Describes an organism with two identical alleles for a trait
___ 12. genotype	b. An organism's physical appearance, or visible traits
___ 13. homozygous	c. An organism's genetic makeup, or allele combinations
___ 14. heterozygous	d. Describes an organism that has two different alleles for a trait

15. Mendel used the term _____ to describe heterozygous pea plants.

16. Is the following sentence true or false? In codominance, the alleles are neither dominant nor recessive.
17. A black Erminette chicken is crossed with a white Erminette chicken. What color are the offspring?
18. In cattle, red hair and white hair are codominant. Cattle with both white hair and red hair are _____.

Section 1-3: The Cell and Inheritance

1. Circle the letter of each sentence that is true about what Sutton observed about chromosome number?
- Grasshopper sex cells have half the number of chromosomes as body cells.
 - Grasshopper body cells have half the number of chromosomes as sex cells.
 - Grasshopper body cells and sex cells have the same number of chromosomes.
 - When grasshopper sex cells join, the fertilized egg has the same number of chromosomes as the body cells of the parents.
2. What is the chromosome theory of inheritance?
3. Complete the cycle diagram, which describes the events that occur during meiosis.



4. What is meiosis?
5. A Punnett square is a shorthand way to show the events that occur at _____.
6. Is the following sentence true or false? When chromosome pairs separate into different sex cells, the alleles of genes stay together.

7. If the male parent cell is heterozygous for a trait, Tt , what alleles could the sperm cells possibly have?
8. Human body cells contain _____ pairs, or _____ chromosomes.
9. Is the following sentence true or false? Larger organisms always have more chromosomes in their body cells than smaller organisms.
10. How are the genes lined up in a pair of chromosomes?

Section 1-4: The DNA Connection

1. Circle the letter of each sentence that is true about the genes, chromosomes, and proteins.
 - a. Genes control the production of proteins in an organism's cells.
 - b. Proteins help determine the size, shape, and other traits of an organism.
 - c. Chromosomes are made up mostly of proteins.
 - d. A single gene on a chromosome contains only one pair of nitrogen bases.
2. A DNA molecule is made up of these four nitrogen bases.
3. What is the genetic code?
4. One group of three nitrogen bases codes for one _____.
5. What are the building blocks of proteins?
6. What happens during protein synthesis?
7. Proteins are made on _____ in the cytoplasm of the cell.
8. Complete this diagram to show some of the similarities and differences between DNA and RNA.

DNA	Both	RNA
1. Stays inside the nucleus	1. Adenine	1.
2. Thymine	2. Guanine	2.
	3.	

9. List the two kinds of RNA and tell their jobs.
10. Circle the letter of the first step in protein synthesis.
 - a. Transfer RNA carries amino acids to the ribosome.
 - b. The ribosome releases the completed protein chain.
 - c. Messenger RNA enters the cytoplasm and attaches to a ribosome.
 - d. DNA "unzips" to direct the production of a strand of messenger RNA.

11. Circle the letter of the last step in protein synthesis.
- a. Transfer RNA carries amino acids to the ribosome.
 - b. The ribosome releases the completed protein chain.
 - c. Messenger RNA enters the cytoplasm and attaches to a ribosome.
 - d. DNA “unzips” to direct the production of a strand of messenger RNA.
12. What is a mutation?
13. How can mutations affect protein synthesis?
14. Circle the letter of each sentence that is true about mutations.
- a. Cells with mutations will always make normal proteins.
 - b. Some mutations occur when one nitrogen base is substituted for another.
 - c. Some mutations occur when chromosomes don’t separate correctly during meiosis.
 - d. Mutations that occur in a body cell can be passed on to an offspring.
15. Mutations can be a source of genetic _____.
16. Is the following sentence true or false? All mutations are harmful.
17. Mutations that are _____ improve an organism’s chances for survival and reproduction.
18. Whether a mutation is harmful or helpful depends partly on an organism’s _____.