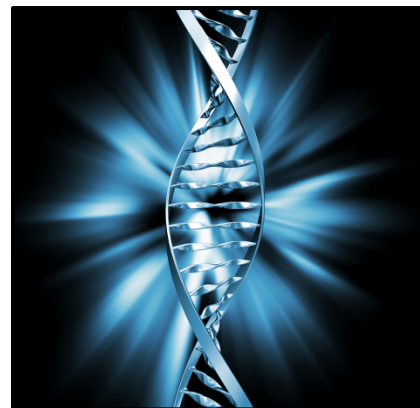




Name: \_\_\_\_\_ Date: \_\_\_\_\_ Group: \_\_\_\_\_

## The Father of Modern Genetics

- 1 Between 1856 and 1863, Gregor Mendel made over 29,000 experiments in a monastery garden. This curious and observant priest was an avid gardener. He spent many hours gardening. He noticed that the same type of plants would grow in highly predictable ways. What he found out is that heredity happens in a foreseeable manner. Heredity is the passing of traits from parent to offspring. No one noticed his work until 40 years after his death. Scientists found it again while trying to figure out how traits are passed from one generation to another. Our understanding of heredity is built on his work.
- 2 Mendel grew vegetables in the monastery garden. He spent many hours growing peas. Some peas were tall plants. He noticed, however, that others were short plants. At the time, most people believed in blended inheritance. If one parent is tall and one is short, blended inheritance predicts a child of medium height.
- 3 However, Gregor Mendel was very observant. Mendel mixed purebred tall and purebred short peas. He saw that they only produced tall peas. Blended inheritance theory predicts peas somewhere in-between in height. That never happened. In fact, a mix of short and tall peas always produced tall peas. The tall trait always won over the short trait. This made no sense. How could short peas keep showing up if it were so easy to erase the short trait? This mystery was solved when the first generation of offspring ( $F_1$ ) were mixed. That usually produced three tall plants and one short plant. The second generation ( $F_2$ ) showed that hidden traits carry on to future generations.
- 4 Traits are controlled by genes. Different forms of genes are called alleles. Hair color is determined by genes. Red hair is a particular allele of the hair color gene. Each organism inherits two possibilities for each trait. This is called its genotype. Some of these possibilities are expressed, or observable. If they are visible, they are called phenotypes. Some of these possibilities are not expressed. They are recessive, or hidden by the dominant allele. Even if an allele is not visible because it is recessive, it is still present. Like the short trait in impure pea plants, it is hiding in the genotypes. The recessive allele is waiting to be matched with another recessive allele and become visible again.





- 5 The discovery of recessive alleles changed how we thought about heredity. Now a red-headed child born to brown-haired parents could be explained. Each brown-haired parent could carry both the brown-hair and red-hair allele. The brown-hair allele is dominant. Thus, the parents would each have brown hair. They would still be able to pass on their recessive red-hair allele. Both could pass on the red-hair allele to the same offspring. That child would have red hair.
- 6 Generations may pass before recessive alleles are matched with another to become phenotypes. Recessive alleles explain many inherited disorders like sickle cell anemia and Huntington's disease. Inherited traits had seemed like surprises from nature. We can now calculate the chance that an offspring will have a certain trait. We can do that using a chart called Punnett Square. We must start with the genotype of the parents. A Punnett Square shows all the combinations of alleles possible for offspring of those parents. Before Mendel's discovery, no one could have imagined this was possible. Mendel is now called the Father of Genetics. It is unfortunate that he never learned how important his work would be for science.



- 1** Which words in the story help the reader understand the meaning of the word **avid** in paragraph 1?
- A** "What he found out"
  - B** "Many hours gardening"
  - C** "This curious and observant"
  - D** "He noticed"
- 
- 2** Eye color is also determined by genes. Brown eyes are dominant, and blue eyes are recessive. What must be true for two brown-eyed parents to produce a blue-eyed child?
- A** One person passes on the blue-eye allele.
  - B** They each pass on the blue-eye allele.
  - C** One person's parents are blue-eyed.
  - D** One person's grandparents are blue-eyed.
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- 3** What can the reader reasonably conclude based on the information in this passage?
- A** Gregor Mendel was well paid for his research.
  - B** Gregor Mendel noticed other things about peas.
  - C** Gregor Mendel won a Nobel Prize for his work.
  - D** Gregor Mendel hated gardening.



- 4 What can a Punnett Square be used to determine?
- A the possible combinations of alleles in offspring
  - B what an offspring will look like
  - C the height of offspring
  - D genetic heritage
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- 5 Which words in the story help the reader understand the meaning of the word **foreseeable** in paragraph 1?
- A "Same type of plants"
  - B "No one noticed"
  - C "The passing of traits"
  - D "Highly predictable ways"
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- 6 What will the result be if a purebred tall pea plant is mixed with a purebred short pea plant?
- A a short pea plant. due to chance
  - B a short pea plant, because short is the dominant allele
  - C a tall pea plant, because tall is the dominant allele
  - D a tall pea plant. due to chance