

Growth and Development: Genetic and Environmental Factors

Your genes contain the basic instructions for your body to grow and function. However, they are not the only factor affecting your traits. Most traits are influenced by both genetic and environmental factors.

- **Genetic factors** are inherited from your parents through your genes. For example, you may inherit your brown hair from one parent and your nose shape from the other parent.
- **Environmental factors** are local conditions that affect growth and development. For example, you may have more freckles if you spend more time in the sun, or you may develop large muscles if you go to the gym a lot.

Read the story below about the growth of two plants. Then, answer the questions that follow.

Eleanor absolutely loves flowers. Her yard is always full of fragrant blooms in the spring. However, she has no flowers in her yard that bloom in the fall or winter. One day, she decided to change that. Eleanor went to a Camellia plant nursery and purchased two different packages of seeds of the species *Camellia sasanqua*. She planted the two seeds in identical pots containing the same amount of soil and fertilizer. She placed both pots in the same bright window, and she consistently watered the soil in each pot to keep it moist.



Soon, seedlings sprouted. One Camellia plant, Plant A, had dark green leaves. The other plant, Plant B, had leaves that were both light green and dark green. Once the seedlings sprouted a few leaves apiece, Eleanor transplanted them outside. She planted Plant A in her front yard underneath her kitchen window. Because it was so close to the house, Plant A was often in the shade. It received only a few hours of direct sunlight each day. Eleanor planted Plant B in her backyard, at the bottom of the hill near a stream. There, Plant B received direct sunlight all day long.

After a few years, the seedlings grew into full-grown shrubs. Plant A bloomed each year around October and produced white blooms about 4–5 inches in diameter. Plant B bloomed each year around December and produced pink blooms about 3 inches in diameter. Overall, Plant B was taller and bushier than Plant A.



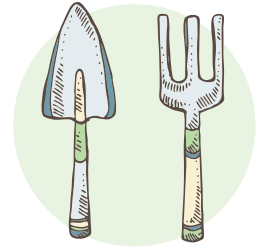
One particularly rainy season, the stream in Eleanor's backyard overflowed. Down at the bottom of the hill, Plant B's roots became submerged in water. The soil did not drain for weeks. Soon, the leaves on Plant B grew shriveled and yellow. December came, but its flower buds did not bloom. Eleanor decided to transplant Plant B to a pot of sandy soil. After some time, when its leaves finally returned to normal, she planted it next to Plant A in her front yard.

Plant B soon returned to its normal cycle of producing pink blooms about 3 inches in diameter every December, while Plant A continued to produce white blooms about 4–5 inches in diameter every October. However, Plant B was now decidedly smaller than Plant A.

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Based on the reading, answer the questions below.

1. Identify and describe at least two environmental factors that influenced the growth of both plants. How did these factors affect the growth of the plants? _____



2. Name at least three additional environmental factors that could affect the plants' growth in the future.

3. Identify and describe at least two observable traits of the plants that demonstrate how genetic factors influenced their development. _____

4. Think about a different example. Two of the largest horses on a farm mate and produce a foal. Is it a guarantee that their foal will grow up to be the largest horse on the farm? Explain why or why not. Cite both environmental and genetic factors in your answer. _____

5. Identical twins share all of their genes. Scientists often study identical twins to better understand how nature and nurture work together. Why do you think studying twins is helpful to understand the interaction between environmental and genetic factors? _____

6. Identical twins share all of their genes, while fraternal twins share only half of their genes. For twins with the disorder *schizophrenia*, about 50% of identical twins share the disease, while only about 10-15% of fraternal twins do. What does this tell you about the way genetic and environmental factors affect schizophrenia?
