Inside the Flower

Model how inherited DNA can affect a pea plant's flower color.

L.8.2A.1 "Use a model to show the relationship of genes, chromosomes, and DNA, and construct explanations comparing their relationship to inherited characteristics."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentences that show how chromosomes, DNA, and genes fit together. Circle the allele combination that gives Seedling B white flowers.

Why Are Some Pea Flowers Purple?

1. In a school greenhouse, two pea plants may have the same shape of leaves but different flower colors. Inside each plant cell, chromosomes hold long DNA molecules wrapped around proteins. A gene is a stretch of DNA at a particular place on a chromosome. Think of a chromosome as a packed length of DNA, not as a container holding a separate substance called DNA. Many genes carry instructions that help cells make proteins. Some proteins help produce the purple pigment seen in pea flowers.

2. A pea seedling gets one set of chromosomes from its pollen parent and one set from its seed parent. It therefore receives two copies of the flower-color gene, one on each chromosome of a matching pair. Different versions of a gene are called alleles. In the pea plants in this example, a purple-associated allele gives cells instructions for making a protein needed for purple pigment. The white-associated allele does not provide working instructions for that protein. Both alleles are stretches of DNA, even though their sequences differ.

3. Imagine two seedlings from these plants. Seedling A inherited a purple-associated allele from the pollen parent and a white-associated allele from the seed parent. It has purple flowers because its cells can make enough of the pigment-related protein with one working allele. Seedling B inherited a white-associated allele from each parent. Its flowers are white because neither copy supplies working instructions for that protein. Both seedlings have flower-color genes on matching chromosomes, but their allele combinations differ. This simple model focuses on one gene, while many other traits involve several genes and the environment.

2 ANSWER WITH EVIDENCE

Use the passage

1. Write a model using arrows or words to show how a chromosome, DNA, and a flower-color gene fit together.

2. Place Seedling A's two alleles on its matching chromosomes, one from each parent. How does this pair lead to purple flowers?

3. Suppose Seedling B received a purple-associated allele instead of one white-associated allele. Predict its flower color and explain why.

4. A classmate draws Seedling B's alleles floating outside its chromosomes. What should change in the model, and why would its flowers still be white?

3 YOUR TURN

Your own words

Invent a fictional flowering plant with two versions of a gene for one visible trait. In the box, sketch and label a matching chromosome pair, DNA on each chromosome, and one gene version inherited from each parent; then write two sentences explaining how those versions produce the trait.

ANSWER KEY

Inside the Flower

GRADE 8 · L.8.2A.1

PART 1 · READ AND MARK

Underline the sentences that show how chromosomes, DNA, and genes fit together. Circle the allele combination that gives Seedling B white flowers. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Write a model using arrows or words to show how a chromosome, DNA, and a flower-color gene fit together.	**A chromosome contains packed DNA, and the flower-color gene is a stretch of that DNA.**
2	Place Seedling A's two alleles on its matching chromosomes, one from each parent. How does this pair lead to purple flowers?	**The pollen-parent chromosome has a purple-associated allele, and the seed-parent chromosome has a white-associated allele. The working purple-associated allele lets cells make enough of the protein needed for purple pigment.**
3	Suppose Seedling B received a purple-associated allele instead of one white-associated allele. Predict its flower color and explain why.	**Its flowers would be purple. One purple-associated allele would provide working instructions for enough pigment-related protein.**
4	A classmate draws Seedling B's alleles floating outside its chromosomes. What should change in the model, and why would its flowers still be white?	**Each white-associated allele should be shown as a stretch of DNA on one chromosome of the matching pair. The flowers would still be white because neither allele provides working instructions for the pigment-related protein.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Sketch labels: pollen-parent chromosome with DNA containing spot gene S; seed-parent chromosome with DNA containing spot gene s. In my imaginary glimmerpea, S provides instructions for blue pigment, while s does not. This plant has blue spots because one S allele supplies enough working instructions.

Accept models that place both alleles within DNA on matching chromosomes and connect the inherited allele pair to the trait. For the invented plant, accept any internally consistent explanation of how its two gene versions affect the visible trait.