Strawberry Family Traits

Trace how reproduction affects genetic variation.

7.13 "Develop and use models to explain that meiosis results in new genetic combinations with increased variation. a. Construct an explanation of the advantages and disadvantages of asexual and sexual reproduction. b..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two cause-and-effect links that explain how seeds get new combinations of gene variants. Circle one advantage and one disadvantage of growing new plants from runners.

Two Ways to Grow Strawberries

1. At a school garden, a strawberry plant sends out a runner, a thin stem that grows along the soil. Where the runner touches the ground, a new plant takes root. That plant has nearly the same genes as its parent because it grew from the parent's cells, without joining reproductive cells. This is asexual reproduction. Runners make new plants quickly without a second plant. But if a disease attacks plants with those genes, many runner-grown plants may be vulnerable at once. Rare changes in DNA can still occur.

2. The same strawberry plant can also make seeds when pollen from another plant joins with an egg in its flower. To make pollen and eggs, cells undergo meiosis, a division that gives each reproductive cell half the usual number of chromosomes. During meiosis, chromosomes are sorted into different combinations, and matching chromosomes can exchange pieces. When pollen and egg join, the seed gets a full set of chromosomes and a new mix of gene variants from two parents. This sexual reproduction can help some seedlings survive changes, but making flowers and seeds takes time and energy.

3. During a dry week, a seedling with a variant linked to deeper roots stays firm while shallow-rooted seedlings wilt. Deeper roots can reach more water, so this variant is helpful here. Another seedling has a variant that reduces chlorophyll, which leaves need to capture light. Its pale leaves make less food, so it grows poorly. A third variant changes leaf-edge shape, but plants with that shape grow and make seeds just as well in this garden. This variant appears neutral here, though its effect might differ elsewhere.

2 ANSWER WITH EVIDENCE

Use the passage

1. How can runners help a strawberry plant spread quickly but also put many new plants at risk from the same disease?

2. Trace how meiosis and the joining of pollen and egg give a seedling a new mix of gene variants.

3. How does the dry week support the claim that the deeper-root variant is helpful? Connect the root's structure to what it does.

4. Why does the leaf-edge variant appear neutral in this garden rather than harmful?

3 YOUR TURN

Your own words

A grower can start mint plants from stem cuttings or from seeds. In a dry test, plants with a thick-leaf variant stay firm longer but grow more slowly; write four or five sentences explaining how meiosis and the joining of pollen and egg could produce different seeds, what the test shows about the variant, and one advantage and one disadvantage of cuttings.

ANSWER KEY

Strawberry Family Traits

GRADE 7 · 7.13

PART 1 · READ AND MARK

Underline two cause-and-effect links that explain how seeds get new combinations of gene variants. Circle one advantage and one disadvantage of growing new plants from runners. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How can runners help a strawberry plant spread quickly but also put many new plants at risk from the same disease?	**Runners grow new plants quickly without a second plant. Because those plants have nearly the same genes, a disease that attacks plants with those genes could harm many of them.**
2	Trace how meiosis and the joining of pollen and egg give a seedling a new mix of gene variants.	**Meiosis sorts chromosomes into different combinations and can exchange pieces between matching chromosomes. When pollen and egg join, the seed receives a new mix of variants from two parents.**
3	How does the dry week support the claim that the deeper-root variant is helpful? Connect the root's structure to what it does.	**Deeper roots can reach more water. During the dry week, the seedling with deeper roots stayed firm while shallow-rooted seedlings wilted.**
4	Why does the leaf-edge variant appear neutral in this garden rather than harmful?	**Plants with that leaf-edge shape grew and made seeds just as well as the other plants in this garden.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Meiosis makes pollen and eggs with different combinations of gene variants. When pollen and egg join, each mint seed may receive a new combination. The thick-leaf variant may help plants stay firm during drought, but slower growth could be a cost. Cuttings can quickly produce plants with the grower's chosen traits. Because cuttings share nearly the same genes, a disease that harms one may harm many.

Accept other accurate cause-and-effect explanations supported by the passage. For Part 3, the student should use both results of the dry test and identify a benefit and a risk of genetically similar cuttings.