The Apple Puzzle

Trace how technology can change inherited traits and visible results.

7.14 "Obtain, evaluate, and communicate information on the use of technologies that impact the inheritance and appearance of traits in organisms."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline how each technology can affect an inherited trait, then circle observations about apple color that could help test a claim.

Why Does This Apple Stay Pale?

1. At a farmers market, two apples look equally bright when they are whole. After both are sliced, one stays pale much longer. A visitor claims its pale color proves the grower used special chemicals. But a slow-browning apple may have an inherited trait changed by a technology instead. Scientists need to ask what caused the color difference, not just describe it. Two ways people can influence apple traits are selective breeding, which chooses parents, and genetic engineering, which changes genetic instructions in a plant's cells.

2. To breed apples with redder skin, a grower can choose parent trees that make red apples and use pollen from one to fertilize flowers on the other. Each seed receives a mix of inherited instructions from both parents. The grower plants many seeds and watches the new trees as they produce fruit. Some offspring may have redder skins, while others may not. Choosing parents increases the chance of a wanted trait, but it does not guarantee that every seedling will have it. This process can take years.

3. Genetic engineering offers a different route. In some commercially grown apples, inserted genetic instructions reduce the activity of genes that help make an enzyme called PPO. When a cut apple meets air, PPO helps cause browning. With less active PPO, the cut surface browns more slowly. To test the effect, compare slices kept for the same time under the same conditions, rather than comparing a fresh slice with an old one. Pale flesh alone cannot show that an apple tastes better or has more nutrients. The genetic change can be passed to offspring.

2 ANSWER WITH EVIDENCE

Use the passage

1. How can selective breeding increase the chance that new apple trees will produce redder apples? Why is the result not guaranteed?

2. Trace how the inserted genetic instructions can change the appearance of a cut apple.

3. A student compares a freshly cut apple slice with one cut an hour earlier. Why is this a weak test of which apple browns more slowly? How could the student improve it?

4. A seller says a pale cut apple must taste better and have more nutrients. Does the passage support either claim? Explain.

3 YOUR TURN

Your own words

A garden club wants tomato plants whose fruit stays firm longer after picking. In four sentences, propose a technology from the passage, explain how it could affect an inherited trait, describe a fair test using the new plants, and name one claim your test would not prove.

ANSWER KEY

The Apple Puzzle

GRADE 7 · 7.14

PART 1 · READ AND MARK

Underline how each technology can affect an inherited trait, then circle observations about apple color that could help test a claim. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How can selective breeding increase the chance that new apple trees will produce redder apples? Why is the result not guaranteed?	**The grower crosses trees that make red apples. Each seed gets a different mix of inherited instructions, so not every offspring will have redder skin.**
2	Trace how the inserted genetic instructions can change the appearance of a cut apple.	**The inserted instructions reduce the activity of genes that help make PPO. With less active PPO, the cut surface browns more slowly.**
3	A student compares a freshly cut apple slice with one cut an hour earlier. Why is this a weak test of which apple browns more slowly? How could the student improve it?	**The slices have been exposed to air for different lengths of time. The student should compare slices kept for the same time under the same conditions.**
4	A seller says a pale cut apple must taste better and have more nutrients. Does the passage support either claim? Explain.	**No. Pale flesh alone does not show that an apple tastes better or has more nutrients.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The club could use selective breeding by crossing tomato plants that produce firm fruit. Their offspring would inherit a mix of instructions, so some might produce fruit that stays firm longer. The club could pick tomatoes from the new plants and comparison plants, then check their firmness after the same number of days under the same conditions. This test would not prove that the firmer tomatoes taste better.

Accept a supported technology and a clear link between inherited instructions and the trait. The proposed test should compare plants under the same conditions, and the final claim must go beyond what firmness data can show.