

Trait Technology Tracker

Trace how tools change inherited traits and affect society.

MS-LS4-5 "Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that explains how a technology changes genetic outcomes. Circle each impact or concern for society, then number the discoveries or tools that made a technology possible.

Tools That Shape Traits

- ① Animal husbandry uses planned breeding to increase traits already found in a population. For example, a farmer may choose dairy cattle that produce more milk and breed them over many generations. Before modern DNA tools, people still changed inherited traits by observing organisms and selecting parents. Today, DNA tests can help breeders identify gene versions linked to some traits before animals reproduce. This technology can speed choices, but breeders must also protect genetic diversity. A small breeding group can increase the chance of inherited health problems.
- ② Genetic modification can change an organism's DNA in a laboratory. Scientists might add, remove, or edit a DNA sequence to give a crop a useful trait, such as resistance to an insect pest. Discoveries about DNA structure, genes, and ways to read DNA sequences made these tools possible. A modified crop can affect society by helping reduce crop losses, yet people may question its safety, cost, or effects on ecosystems. Scientists test these questions with evidence, and government agencies review some products before they are sold.
- ③ Gene therapy is a medical technology that delivers, replaces, or edits genetic material in a patient's cells to treat or prevent some diseases. Many gene therapies change body cells, so their changes are not passed from a patient to that person's children. This differs from breeding or modifying a crop, which can alter traits in later generations. Gene therapy may offer new treatment choices, but it can be expensive and may have risks. Patients, scientists, health agencies, and communities weigh evidence, access, and ethical questions when deciding how it should be used.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Compare DNA testing in animal breeding with genetic modification. How does each technology help humans influence traits?

2 What discoveries made genetic modification possible? Then give one possible benefit and one possible concern of a modified crop.

3 Why is gene therapy usually different from breeding or modifying a crop in its effect on future generations?

4 A community is considering a gene therapy. Name two groups that might help make the decision and two factors they should weigh.

3 YOUR TURN _____ Your own words

Choose animal husbandry, genetic modification, or gene therapy. Use two reliable sources, such as a government science agency, university, or peer-reviewed science organization, and write exactly three sentences that explain how the technology affects genetic outcomes, name one benefit and one concern for society, and cite both sources by name.

PART 1 • READ AND MARK

Underline each sentence that explains how a technology changes genetic outcomes. Circle each impact or concern for society, then number the discoveries or tools that made a technology possible. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Compare DNA testing in animal breeding with genetic modification. How does each technology help humans influence traits?	DNA testing helps breeders identify gene versions and choose parents. Genetic modification directly adds, removes, or edits a DNA sequence.
2	What discoveries made genetic modification possible? Then give one possible benefit and one possible concern of a modified crop.	Discoveries about DNA structure, genes, and reading DNA sequences made it possible. A benefit is reduced crop losses. Concerns include safety, cost, or effects on ecosystems.
3	Why is gene therapy usually different from breeding or modifying a crop in its effect on future generations?	Many gene therapies change body cells, so the changes are not passed to a patient's children. Breeding or modifying a crop can alter traits in later generations.
4	A community is considering a gene therapy. Name two groups that might help make the decision and two factors they should weigh.	Possible groups include patients, scientists, health agencies, and communities. They should weigh evidence, access, ethical questions, cost, and risks.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Genetic engineering can change a crop's DNA, so farmers may grow plants with traits such as insect resistance (U.S. Food and Drug Administration). This can reduce crop damage, but scientists and communities must also consider possible ecosystem effects and who can afford the seeds (National Academies of Sciences, Engineering, and Medicine). Together, the FDA and the National Academies show why evidence and oversight guide decisions about modified crops.

Accept equivalent comparisons and impacts that are supported by the passage. For Part 3, accept varied technologies and claims when the student uses two credible sources, includes both required citations, and accurately connects genetic outcomes with a benefit and concern.