THE STANDARD

Models for Genetic Variation

Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

DCI
DISCIPLINARY CORE IDEA

LS1.B · Growth and Development of Organisms (secondary)

> *Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.*

One parent or two. That single difference drives everything else. Asexual reproduction copies one parent's genes directly into the offspring, so the offspring is genetically identical. Sexual reproduction takes half the genes from each parent and shuffles them together, so the offspring has a brand-new combination. **Same biological goal, two completely different genetic outcomes.**

SEP
SCIENCE & ENGINEERING PRACTICE

Developing and Using Models

> *Develop and use a model to describe phenomena.*

Students aren't memorizing a definition of meiosis. They're building models (Punnett squares, diagrams, simulations) that show how genes move from parents to offspring. The model has to predict or describe a real cross. **If a Punnett square can't show why two brown-eyed parents could have a blue-eyed child, the student doesn't understand the gene transmission yet.**

CCC
CROSSCUTTING CONCEPT

Cause and Effect

> *Cause and effect relationships may be used to predict phenomena in natural systems.*

This standard is built on a clean cause-and-effect chain. The cause is the reproduction type (one parent vs two). The effect is the genetic outcome (identical vs varied). **Students trace the chain in both directions: predict the offspring from the parents, and reason backward from offspring variation to what kind of reproduction produced it.**