THE STANDARD

Genetic Variation for Survival

Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

ANCHORING PHENOMENON

The Peppered Moth Color Shift

Before England's Industrial Revolution, peppered moths were mostly light with speckled wings, blending into lichen-covered tree bark. As factories blackened the trees with soot, the population shifted hard. By the late 1800s, dark moths made up over 95% of the population in industrial areas. After clean-air laws in the 1950s cleaned up the bark, light moths bounced back. Same species, same forest, two opposite shifts driven by what the environment rewarded.

> DRIVING QUESTION
>
> *"How can the same species end up looking completely different in two different decades?"*

INVESTIGATIVE 1

Galapagos Finch Beaks After a Drought

On the small island of Daphne Major, researchers measured every medium ground finch they could catch. After a severe drought in 1977, soft seeds disappeared and only big tough seeds were left. The next year's surviving finches had measurably bigger, stronger beaks. The average beak depth in the population jumped in a single generation. Use this to sharpen the proportional-reasoning lens the moth anchor is pushing on: selection isn't a story, it's a measurable shift in numbers.

> DRIVING QUESTION
>
> *"How much can a population change in one generation when the environment changes fast?"*

INVESTIGATIVE 2

MRSA in Hospitals

Staphylococcus aureus is a common bacterium. Decades ago, penicillin wiped it out almost every time. Today, a strain called MRSA (methicillin-resistant Staphylococcus aureus) survives most common antibiotics. Hospitals fight outbreaks of it every year. The same selection logic from the moth anchor, only on a clock that runs in hours instead of decades. Bacteria reproduce so fast that resistance spreads through a population in a matter of days under drug pressure.

> DRIVING QUESTION
>
> *"How can a hospital's most-used drug stop working in just a few decades?"*