

The *Solutions File*

Guided Notes · Application Worksheet · Science Quiz — all answers and explanations.

::: 01 Guided Notes — Key Vocabulary & Fill-Ins

Extinction	zero / 99	The dying out of a species - when its last members fail to survive or reproduce and the population drops to _____. More than _____% of all species that ever lived are now extinct.
Natural Selection	environment / inheritance	Individuals with traits better suited to their _____ survive and reproduce more, so those traits become more common over generations. It needs variation, survival differences, and _____ of traits.
Adaptation	natural / dry	A heritable trait that improves survival and reproduction in a particular environment, spread through a population by _____ selection. A cactus's water-storing stem is an adaptation to a _____ climate.
Variation	select / extinct	The differences in traits among individuals in a population - the raw material natural selection acts on. Without variation there is nothing to _____, so a population with no variation in a key trait cannot adapt and may go _____.

::: 02 Application Worksheet — Part A: Make the Call

Case File 001	Variation in coat color already existed; the bird caught more dark mice, so light mice survived and reproduced and passed on the trait, and the population evolved	Natural selection acts on variation that is already present. Dark mice stood out against the sand and were caught more o...
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Case File 002	Not enough variation - with no differences in resistance, natural selection had nothing to act on	Natural selection can only work when individuals differ in a trait. Because every honeycreeper was equally susceptible t...
Case File 003	Some cacti had tougher outer layers than others; those held more water and survived and reproduced better in dry conditions, and their offspring inherited tougher layers, so the population gradually evolved tough skins	Natural selection starts from existing variation: some cacti had tougher layers than others. In a drying climate those p...

:: 02B

Part B: Build the Theory

Step 1 - The environment changes →	Earth's climate, atmosphere, or food web shifts (e.g., a drying climate, a new predator, or the loss of a partner species), changing the con...
Step 2 - Check for variation →	Natural selection can only act if individuals differ in a useful trait. If the population has variation in a trait that fits the new conditi...
Step 3 - Selection acts (if there is time and the trait is possible) →	Individuals with better-suited traits survive and reproduce more; their offspring inherit those traits. This needs enough time and a trait t...
Step 4a - Outcome: ADAPT →	Over generations the population changes and becomes well-suited to the new environment - like cacti evolving tough, water-storing bodies for...
Step 4b - Outcome: DIE →	If there is not enough time, the trait is not possible, or there is not enough variation, the population cannot keep up and goes extinct - l...
Conclusion →	Adapt or die is not a choice a species makes. When a changing world meets a population, natural selection works on whatever variation exists...

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Science Quiz — Answers at a Glance

Q1 B SC.7.L.15.2	Q2 B SC.7.L.15.2	Q3 C SC.7.L.15.2	Q4 B SC.7.L.15.3	Q5 B SC.7.L.15.3
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Q1	B	Evolution by natural selection requires three things: variation in traits among individuals, differences in survival and reproduction based on those traits, and inheritance so offspring receive successful traits. It is not random (the environment determines which traits are favored), it does not produce perfect adaptations (only selects among what already exists), and organisms cannot decide what to evolve.
Q2	B	Variation in coat color already existed. Dark mice stood out on the sand and were caught more often, so light mice survived and reproduced more and passed coat color to their offspring. Over generations the population shifted toward light coats. The mice did not change their own fur, mutate on demand, or decide to adapt - natural selection acted on existing variation.
Q3	C	Abiotic factors are non-living conditions such as temperature, sea level, ocean acidity, and nutrient levels - so rising ocean temperature or acidity is abiotic. Competitors, lost algal partners, and disease-causing organisms are all living things, making them biotic factors. Both abiotic and biotic environmental changes can drive a population toward extinction.
Q4	B	When the climate warmed, the animal that ate the torrey's fruit and spread its seeds went extinct, and its toxic fruit meant no other animal would move its seeds. Stuck in one small area and now attacked by fungal diseases, the tree cannot adapt fast enough, so its population is dying out - an inability to adapt within a changing environment contributing to extinction.
Q5	B	Natural selection has limits. Environmental change can happen faster than a population can adapt (not enough time), some traits simply cannot be built from an organism's existing body plan (not possible - a pig cannot evolve wings), and selection needs differences to act on (not enough variation). When any of these blocks adaptation in a changing environment, the population can go extinct - which is why extinction has been so common throughout Earth's history.