

Grade 4 Biology — 30-minute Lesson: Natural Selection

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Lesson Overview

- Topic: Natural selection (grade-appropriate introduction)
- Duration: 30 minutes
- Approach: Classical (I-do / We-do / You-do; explicit instruction, shared reading/annotation, co-construction, reflection)
- Materials (low): Whiteboard or chart paper, markers, worksheet with 2 short scenarios (printed or drawn), pencil, 6 simple cut-out animal pictures or students draw small sketches (optional)

Learning Objectives (measurable)

- Students will define natural selection in their own words, including the role of traits, environment, and survival/reproduction.
- Students will identify which traits help organisms survive in specific environments and explain why.
- Students will apply the concept to two short scenarios and predict which trait will become more common over time.

Success Criteria (whole-lesson)

- Academic mastery: Students can correctly explain natural selection including trait + environment + survival/reproduction in one sentence, and correctly identify the advantageous trait in 2 out of 3 example scenarios during class.
- Assessment threshold: For the quiz checkpoints, mastery is 8/10 correct responses.

Standards Alignment (grade-appropriate focus)

- Life sciences emphasis: organisms have traits; some traits help individuals survive and reproduce in particular environments; over time, traits that help survival become more common in populations.

Materials and Preparation

- Whiteboard/chart paper and marker
- Teacher-prepared drawings or printed pictures showing simple organism traits in different environments (e.g., light vs dark ground mice, white vs brown rabbit in snow/forest)
- Short worksheet with 2 scenarios and room for 1–2 sentence explanations (one page per

student)

- Optional: counters or colored chips to show population change (low materials)

Lesson Timeline and Script (30 minutes)

0–3 min: Hook / Activate prior knowledge

- Show two quick drawings on the board: a light-colored mouse on light ground, a dark mouse on dark ground.
- Ask one quick question aloud to the class: "Which mouse is harder for a bird to see?" (I-do begins immediately after response collection.)

3–10 min: I-do (Teacher modeling + direct explanation) – 7 minutes

- Define natural selection clearly and concisely on the board:
 - "Natural selection: when individuals with traits better suited to an environment survive and reproduce more, so those traits become more common."
- Model annotation on the mouse drawings:
 - Label "trait" (fur color), "environment" (light/dark ground), "selective pressure" (predator vision).
 - Explain the chain: trait → affects chance of being seen → affects chance of survival → affects chance to reproduce.
- Use a second quick modeled example (white rabbit in snow vs brown rabbit in forest) and annotate similarly.
- Pulse Check 1 (after modeling – see details below).

10–20 min: We-do (Guided practice and co-construction) – 10 minutes

- Co-construct two new short scenarios with class input. Teacher guides students to identify:
 - The trait
 - The environment
 - Which trait gives an advantage and why
- Example scenarios to guide:
 - Scenario A: Beetles on dark tree bark – dark vs light beetles.
 - Scenario B: Seeds in windy area – plants with heavy seeds vs very light seeds.
- Teacher writes student responses and explicitly models the reasoning sentence linking trait to survival and reproduction.

- Pulse Check 2 (during guided practice – see details below).

20–27 min: You-do (Independent practice) – 7 minutes

- Distribute the 1-page worksheet with two short scenarios (low reading demand).
- Students work independently to:
 - Identify the advantageous trait in each scenario.
 - Write one sentence explaining why that trait will likely become more common.
- Teacher circulates and observes, offers brief corrective feedback to individuals.
- Pulse Check 3 (during independent practice – see details below).

27–30 min: Reflection / Exit ticket & Metacognition – 3 minutes

- Students complete a quick written exit ticket (1–2 sentences):
 - Metacognition prompt: "Name one example from your neighborhood or home where a trait helps an organism survive. Explain how the trait and the environment connect."
- Collect exit tickets as formative evidence.

Pulse Checks (embedded formative checks with explicit success criteria)

- Pulse Check 1 (after I-do; minute ~10)
 - Task: Teacher shows three quick pictorial mini-scenarios (e.g., white rabbit in snow, dark mouse on dark rock, green insect on green leaf). Students point or hold up cards to show which trait helps survival.
 - Success criteria: Student correctly identifies the advantageous trait in at least 2 out of the 3 scenarios.
- Pulse Check 2 (during We-do; minute ~15)
 - Task: For the co-constructed beetle and seed scenarios, each student writes one label for each: trait, environment, advantage (3 labels total).
 - Success criteria: Student correctly labels at least 2 of the 3 items for both scenarios (4 of 6 labels correct across the two scenarios).
- Pulse Check 3 (during You-do; minute ~22–26)
 - Task: On the independent worksheet (2 scenarios), student selects the favored trait and

writes one sentence explaining why.

- Success criteria: Student correctly chooses the favored trait and provides a clear explanation in both scenarios (2 of 2).

Quiz-style Checkpoints (10 items with clear success criteria)

- Overall mastery target: 8 of 10 items correct.

1. Short answer: Define natural selection in one sentence.

- Success criteria: Response mentions traits (or variation), environment, and survival/reproduction (e.g., "Natural selection is when organisms with traits that help them survive and reproduce in an environment become more common").

2. True/False: "Natural selection always creates new traits." (Answer: False)

- Success criteria: Student selects False and gives brief explanation that selection acts on existing variation.

3. Multiple choice: Which trait helps a white rabbit survive in snowy fields?

- Options: A) Brown fur B) White fur C) Big ears D) Short legs
- Correct: B
- Success criteria: Student selects B.

4. Short answer: Give one example of an inherited trait and one example of a learned behavior.

- Success criteria: Inherited trait example (e.g., fur color, leaf shape) and learned behavior example (e.g., song learned, using tools), clearly labeled.

5. Multiple choice: What causes natural selection to favor one trait over another?

- Options: A) Random guessing B) Environmental pressures that affect survival and reproduction C) Wishes of the organisms D) Short-term trends only
- Correct: B
- Success criteria: Student selects B and may give a short reason.

6. Short answer: In an area where seeds are small, which plant trait will be favored: large heavy seeds or many tiny seeds? Explain why.

- Success criteria: Student picks the trait that improves reproduction or survival in that environment and explains briefly (e.g., many tiny seeds spread more, or if wind is strong, lighter seeds disperse – correct reasoning required).
7. True/False: "If the environment changes, a trait that used to be helpful can become harmful." (Answer: True)
- Success criteria: Student selects True and gives a one-sentence example or reason.
8. Short answer: Describe two beetles: one green on green leaves and one brown on green leaves. Which beetle is more likely eaten by birds? Why?
- Success criteria: Student indicates brown beetle more likely eaten and explains camouflage advantage.
9. Multiple choice: Which of these is necessary for natural selection to occur?
- Options: A) All individuals are identical B) Differences among individuals C) Magic D) Everyone moves to a new place
 - Correct: B
 - Success criteria: Student selects B.
10. Short answer: A disease affects only short-finned fish. Over time what will likely happen to fin length in the population? Explain.
- Success criteria: Student states that longer fins become more common and explains that short-finned fish die or reproduce less, so the trait frequency changes.

Scoring and Use of Checkpoints

- Use pulse checks for immediate instructional adjustments.
- End-of-lesson quiz target: 8/10 correct indicates meeting the lesson objective.
- For students scoring 5–7 correct, provide targeted reteach during next lesson focusing on linking trait -> survival -> reproduction with additional modeled examples.
- For students scoring 0–4, plan small-group re-teaching that repeats I-do with simpler visuals and more guided practice.

Metacognition Prompts (to be used during reflection and exit ticket)

- Prompt A (exit ticket): "Name one example from your neighborhood or home where a trait helps an organism survive. Explain the trait, the environment, and how it helps survival or reproduction."
- Success criteria: 1–2 clear sentences linking trait + environment + survival/reproduction (example given).
- Prompt B (oral wrap-up if time): "How could knowing about natural selection help people who grow food, take care of pets, or control pests? Give one specific application."
- Success criteria: Student names one real-world application and explains the connection in 1–2 sentences (e.g., plant breeders select traits that survive drought).
- Prompt C (written homework idea): "Describe one change in an environment (e.g., a town becomes darker because of ash) and explain which native plant or animal trait might become more common and why."
- Success criteria: 2–3 sentences with a logical link from environment change to trait advantage to probable increase in that trait.

Differentiation and Accommodations

- Struggling learners: Provide sentence starters (e.g., "The trait is _____. The environment is _____. This helps because _____"), fewer scenarios, or one-on-one guided practice during You-do.
- Advanced learners: Ask for a third scenario to analyze or require a two-sentence explanation that includes "population" language (e.g., "Over time, more individuals will have this trait").
- ELL students: Use picture supports and allow verbal responses or bilingual glossaries for key vocabulary (trait, environment, survive, reproduce).

Teacher Notes and Classroom Management

- Keep language concrete and avoid technical evolutionary jargon beyond the essential terms.
- Use clear, visible labels during modeling (trait / environment / selective pressure / result).
- Time reminders: watch the clock—spend no more than 7 minutes modeling and 10 minutes guiding to ensure time for independent work and reflection.
- Collect worksheets and exit tickets for assessment and plan remediation based on pulse check and quiz outcomes.

Materials for the Worksheet (teacher copy)

- Scenario 1 (image or text): "In a field of black lava rocks, there are two kinds of mice: light and

dark. Which is more likely to survive? Explain in one sentence."

- Scenario 2 (image or text): "On island trees with dark bark, beetles can be black or yellow. Which beetle will be seen more by birds? Explain in one sentence."
- Exit ticket prompt as above for metacognition.