

QUALITY AUDIT | SEVEN-LESSON SERIES

Red-team report: can students finish the work inside the unit?

Evidence, scaffolds, and Socratic decision points checked against the revised decks

EXECUTIVE VERDICT The prior series had a strong teaching pattern but was not closed-loop. All seven lessons contained at least one task whose needed figure, case evidence, vocabulary support, or gene card was not supplied. The revision repairs those dependencies with a complete case file, a plain-language explainer, new biology illustrations, and claim ceilings.

Red-team questions

- Was every item needed to complete the task supplied before students were asked to use it?
- Does each lesson build from the previous take-home rather than restart the story?
- Can a student answer without leaving the unit for a live web search?
- Does the Socratic sequence move from picture, to student inference, to real biology, to a concrete decision?

Repair scorecard

Before revision	7 of 7 lessons had at least one outside-unit dependency.
After revision	7 of 7 lessons map to a supplied figure, explainer section, evidence card, and case decision.
Outside lookup	Not required. Sources are labeled enrichment only.
Case safety	Composite, de-identified, no diagnosis assigned.

Lesson 1 | Meet Mateo

Student task: Generate questions from the case record and separate observation from explanation.

Evidence supplied: CF-001 case file, case illustration, known/unknown fields, opening question stem.

Gap found: The deck named a composite case but did not provide a complete medical-style record or image evidence.

Repair in the revised unit: Start with the case file. Students identify observations, unknowns, and one testable question before IRF6 appears.

RED-TEAM PASS Students can complete this task with the decks, case file, and explainer. No outside lookup is required.

Lesson 2 | How a Face Is Built

Student task: Label facial prominences and place a process on a developmental timeline.

Evidence supplied: Face-build illustration, four-window timeline, plain-language definitions of prominence, fusion, and time window.

Gap found: Students were asked to label and sequence without a supplied scaffolded figure or unit clock.

Repair in the revised unit: The timeline is in the case file and the same illustration appears in the deck and explainer.

RED-TEAM PASS Students can complete this task with the decks, case file, and explainer. No outside lookup is required.

Lesson 3 | A Cleft Marks a Step That Did Not Finish

Student task: Classify a cleft as a growth, contact, or remodeling question and use an IRF6 example.

Evidence supplied: Fusion-gap illustration, IRF6 evidence card, claim ceiling, cleft definition.

Gap found: Examples and gene evidence were named but not supplied.

Repair in the revised unit: Students first infer from the picture, then use IRF6 as a real mechanism, then choose the next test for CF-001.

RED-TEAM PASS Students can complete this task with the decks, case file, and explainer. No outside lookup is required.

Lesson 4 | The Cells That Build the Face

Student task: Draw a neural crest route and interpret a marker such as SOX10.

Evidence supplied: Neural crest migration illustration, SOX10 card, marker limitation in the explainer.

Gap found: There was no cross-section figure or explanation of what a marker can and cannot prove.

Repair in the revised unit: The figure is visible before the question, and the answer must stay below the marker claim ceiling.

RED-TEAM PASS Students can complete this task with the decks, case file, and explainer. No outside lookup is required.

Lesson 5 | How Cells Choose What to Become

Student task: Apply cue, internal state, WNT/ β -catenin, RUNX2, and SOX9 to a cell-fate decision.

Evidence supplied: Cell-fate illustration, WNT/RUNX2/SOX9 card, minimal-jargon explainer.

Gap found: Students were asked to apply mechanisms that were not explained inside the unit.

Repair in the revised unit: Students point to cue and internal program in the figure before deciding which fate is more likely.

RED-TEAM PASS Students can complete this task with the decks, case file, and explainer. No outside lookup is required.

Lesson 6 | Fusion Requires Sculpting

Student task: Sequence approach, contact, seam, and remodeling and distinguish contact from completion.

Evidence supplied: Seam-remodeling and fusion-gap illustrations, TGFB3 card, four-step sequence.

Gap found: Mechanism terms such as seam remodeling, EMT, and apoptosis were not supported by a visual evidence card.

Repair in the revised unit: The explainer defines each term before use and the case board asks which step changed.

RED-TEAM PASS Students can complete this task with the decks, case file, and explainer. No outside lookup is required.

Lesson 7 | From a Gene Instruction to a Cell Behavior

Student task: Trace DNA to RNA to protein to cell behavior and reason about an IRF6 variant.

Evidence supplied: Gene-to-protein illustration, IRF6 mechanism card, context and evidence ceiling.

Gap found: Students were asked to reason about variants without a supplied sequence or an explicit evidence boundary.

Repair in the revised unit: The chain is visual, the vocabulary is plain language, and the decision asks for a mechanism plus one limit.

RED-TEAM PASS Students can complete this task with the decks, case file, and explainer. No outside lookup is required.

Socratic sequence check

1. 1. Picture first: one analogy or biology illustration is visible before the explanation.
2. 2. Student inference: questions ask what the learner notices, predicts, or cannot yet claim.
3. 3. Real biology: the same step is named in a supplied gene, cell, or developmental example.
4. 4. Concrete decision: a situation gives the learner a choice about CF-001 or a model experiment.
5. 5. Carry-forward: the answer becomes the next lesson's starting point and take-home.

Final QA gates

- Every task has its source figure, card, or case field inside the packet.
- Every specialized term has a plain-language definition before students must use it.
- Every visual is provided before students interpret it.
- Every decision includes a situation, a choice, evidence, and a reasoning prompt.
- No live web lookup is required to finish the seven lessons.
- Each deck keeps minimal copy, one main illustration, and one claim per slide.
- The case is composite and de-identified; no diagnosis is assigned.
- The overflow checker passes for all seven decks after the illustration update.

REMAINING CAVEAT The unit teaches mechanism and evidence discipline. It does not replace clinical evaluation, genetic counseling, or a medical record.

Sources for enrichment

The seven lessons are self-contained. These links are for optional teacher or student follow-up, not required homework.

- National Institute of Dental and Craniofacial Research, Cleft Lip and Palate:
<https://www.nidcr.nih.gov/health-info/cleft-lip-palate>
- Craniofacial development review, PubMed Central: <https://pmc.ncbi.nlm.nih.gov/articles/PMC3039913/>
- Cranial neural crest and facial development review, PubMed Central:
<https://pmc.ncbi.nlm.nih.gov/articles/PMC11072871/>
- IRF6 and epithelial seam biology, PubMed Central: <https://pmc.ncbi.nlm.nih.gov/articles/PMC2659566/>
- Palatal fusion and seam remodeling review, PubMed Central:
<https://pmc.ncbi.nlm.nih.gov/articles/PMC3552505/>