

# BIOLOGY EOC

## Models and Evidence Study Guide



Connect the hands-on model to why the science works.

### 1 DNA cells and growth

LA/NGSS: HS-LS1-1; HS-LS1-4



DNA → protein → cell  
4 chromosomes → 4 per  
typical mitotic daughter

**What we did.** We modeled gene/function links and chromosome copying.

**Why it works.** DNA guides protein production. Specialized cells interact in systems; typical mitosis preserves chromosome number.

**Apply.** How can similar DNA support different cell functions?

### 2 Feedback and a changing demand

LA/NGSS: HS-LS1-3

**Change in demand**



**Response → recovery**

Pulse is one piece  
of feedback evidence.

**What we did.** We compared pulse at rest and timed recovery.

**Why it works.** Return toward a resting range fits regulation; pulse alone does not measure every feedback component.

**Apply.** Which procedure should stay consistent when repeating?

### 3 Matter cycles energy flows

LA/NGSS: HS-LS1-5; HS-LS1-7  
HS-LS2-4

CO<sub>2</sub>



Light → sugar

Respiration → work  
and heat; carbon  
returns as CO<sub>2</sub>.

**What we did.** We counted atoms and compared energy-transfer models.

**Why it works.** Atoms rearrange; light becomes chemical energy. Respiration supports work and releases heat. Decomposers return matter to reservoirs.

**Apply.** Why can actual transfer differ from 10%?

### 4 Limits stability and a design

LA/NGSS: HS-LS2-1; HS-LS2-6  
HS-LS2-7



1 lane: 4/12, cost 2  
2 lanes: 8/12, cost 4  
Need ≥8; budget ≤6

**What we did.** We compared resource slots and refined paper crossing lanes.

**Why it works.** Capacity depends on conditions. Designs need criteria, constraints and retesting; paper rules do not prove wildlife outcomes.

**Apply.** What field evidence would you collect next?

### 5 Inheritance and evidence

LA/NGSS: HS-LS3-3; HS-LS4-1

|    |    |
|----|----|
| AA | Aa |
| Aa | aa |

Aa × Aa  
aa expected 25%  
Not a guarantee.

**What we did.** We modeled allele draws and compared corresponding DNA.

**Why it works.** Expected ratios are not guaranteed small counts. Independent evidence strengthens common-ancestry claims.

**Apply.** Why compare more than one short sequence?

### 6 Selection and immune defenses

LA: HS-LS4-4; HS-LS1-8  
NGSS: HS-LS4-4\*

**Variants → descendants  
population changes**

Antigen → recognition  
memory → later response

**What we did.** We modeled variants and evaluated immune information.

**Why it works.** Selection changes population frequencies; memory affects host responses. Antibiotics do not treat viruses.

**Apply.** How does resistance differ from immune memory?

\*LA HS-LS4-4 has broader wording; HS-LS1-8 is Louisiana-specific. Selected connections shown here; see the packet's full standards map.

**Use model evidence + biology knowledge. Explain a mechanism, then state a limitation.**