

## Biology I Item Sampler

### **Purpose**

The purpose of this Item Sampler is to provide teachers and students with examples of the types of questions that will appear on the *ISTEP+*: Biology I End-of-Course Assessment. The types of questions include multiple choice and constructed response.

For schools testing online, there is an online practice test to be given prior to the actual test. The purpose of the online practice test is to help familiarize students with the online functionalities and item types. Schools testing online are encouraged to use this item sampler.

Teachers are encouraged to use this Item Sampler to:

- Familiarize themselves and their students with the types of items that will be part of the Biology I End-of-Course Assessment.
- Gather information about students' knowledge of the standards and use that information to drive instruction.
- Assist in creating other assessments and activities.

### **Depth of Knowledge (DOK)**

Every item on the Biology I test is assigned a “depth of knowledge” level by a committee of Indiana educators consisting of teachers and science specialists. The assignment of Depth of Knowledge (DOK) levels ensures the items on each test represent a range with regard to the cognitive demand required from students as they respond to test questions. The No Child Left Behind Act requires different levels of complexity within assessments.

See the Biology I Depth of Knowledge PowerPoint for a general overview at <http://www.doe.in.gov/core40eca/>.

### **Scoring**

**Multiple-Choice:** All multiple-choice items on the *ISTEP+*: Biology I End-of-Course Assessment are machine-scored.

#### **Constructed Response:**

Each CR question is scored according to its own rubric. For all CR questions, the maximum score point value is desired, but students can receive partial credit on questions. For some questions, students are expected to explain and justify their responses. Students' ability to communicate concepts is critical in understanding science and is emphasized in Indiana's Science Standards.

### Reporting Category 1: Molecules and Cells

1. Intravenous saline injections are often given as a treatment for severe dehydration. The concentration of saline (0.9% NaCl) in these injections is that same as that present in human cells. What would happen if pure water was introduced into the body instead of saline?
  - A The cells would gain water and swell.
  - B The cells would lose water and shrivel.
  - C The cells would become impermeable to sodium (Na<sup>+</sup>) ions.
  - D The cells would become impermeable to chlorine (Cl<sup>-</sup>) ions.
2. Which organelle produces proteins?
  - A nucleus
  - B lysosome
  - C ribosome
  - D Golgi body

### Reporting Category 2: Developmental and Organismal Biology

3. What is the primary purpose of the receptor proteins located within a cell membrane?
  - A diffusion
  - B communication
  - C active transport
  - D energy production
4. Animals that are active at night are MOST likely to have which of the following features?
  - A oval-shaped eyes to reduce friction and pressure
  - B a membrane behind the eye to reflect light back to the retina
  - C tear ducts to wet the eyes and eyelids to sweep dirt from the eye
  - D eyes located on the sides of the head to produce a wide field of view

**Reporting Category 3: Genetics**

5. The curled ears of the American Curl cat are caused by an autosomal dominant allele. What are the chances of a heterozygous female and a homozygous recessive male producing offspring with curled ears?
- A 1 in 4
  - B 2 in 4
  - C 3 in 4
  - D 4 in 4

**Reporting Category 4: Evolution and Historical Perspectives**

6. The Giant Anteater of South America, the Giant Armadillo of North America, the Giant Pangolin of Africa, and the Spiny Anteater of Oceania share many characteristics. They all eat ants, have long narrow snouts, few teeth, and large salivary glands, yet they do not share a common ancestor. This is an example of which of the following?

- A genetic drift
- B founder effect
- C adaptive radiation
- D convergent evolution

7. In 1859, twenty-four European rabbits were brought to Australia for sport hunting. The rabbits had no natural predators, resulting in an exponential growth pattern for the rabbits. They ate crops and became a serious, destructive pest within a relatively short period of time. In an attempt to control the rabbit population, the *myxoma* virus was introduced into the rabbit population in 1950. Initially, the virus was highly effective, reducing the rabbit population by 99%. Currently, the *myxoma* mortality rate is less than 50%.

A. Describe one scientifically probable change in the rabbit population of Australia that resulted in the reduced effectiveness of the *myxoma* virus in controlling the number of wild rabbits.

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B. Describe one scientifically probable change in the *myxoma* virus that resulted in the reduced effectiveness of the virus in controlling the number of wild rabbits.

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8. List TWO significant contributions made by Gregor Mendel to the field of biology.

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### Reporting Category 5: Ecology

9. Which of the following desert organisms is a producer?

- A fox
- B lizard
- C cactus
- D scorpion

10. What is the maximum percentage of food energy available to a wolf that consumes a herbivorous field mouse?

- A 0.1%
- B 1%
- C 10%
- D 100%

**Answer Key**

1. A
2. C
3. B
4. B
5. B
6. D

**7. Rubric:**

**2 points** Two key elements

**1 point** One key element

**0 points** Other

**Key Elements:**

**A. Any one of the following probable changes in the rabbit population:**

- Some rabbits had a genetic immunity.
- Some rabbits had a genetic mutation that made them immune to the virus.
- Natural selection selected for the rabbits that were able to survive the virus and then pass that immunity to their offspring.
- Any other plausible reason for the change in the immunity of the rabbit population.

**NOTE:** Do not award key element for the term *Natural Selection* if there is no accompanying explanation.

AND

**B. Any one probable change in the *myxoma* virus:**

- Only the less deadly strains of the virus were able to survive and reproduce within the rabbit population.
- The virus mutated to a less deadly strain.
- Natural selection selected for only the less deadly strains of the virus.
- Any other plausible reason for the change in the *myxoma* virus.

**8. Rubric:**

**2 points** Two key elements

**1 point** One key element

**0 points** Other

**Key Elements:**

- An inherited characteristic (trait) is determined by the combination of a pair of hereditary factors (genes).

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- For each trait, offspring receive one version of the gene (allele) from each of the parents' reproductive cells.
- Different offspring of the same parents receive different sets of alleles.
- During fertilization, gametes randomly pair to produce four combinations of alleles.
- Inherited traits are dominant or recessive.
- Hybrids do not breed true.
- Many traits are inherited in pairs.
- The law of independent assortment (the emergence of one trait will not affect the emergence of another)
- The law of segregation
- Keeping meticulous records
- The study of only one trait at a time
- Any other significant contribution

9. C

10. B