



# ISTEP+ Part 1 for Science

## Grade 10



Indiana  
Department of Education

Glenda Ritz, NBCT

Indiana Superintendent of Public Instruction

# Part 1: Applied Skills Items

## Sample Items:

The following items are samples, designed to use with

- \* teachers, as part of professional development, and
- \* students, to familiarize them with items aligned to the Indiana Academic Standards for Science.

# There are two types of questions for Part 1 of ISTEP+:

- \* Constructed-response
- \* Extended-response

# Sample Item

## Constructed-Response

**Describe the main function of a chloroplast.**

**Explain the relationship between the main function of a chloroplast and the main function of a mitochondrion in a plant cell.**

# Constructed-Response Rubric

## Science

### 2-point Constructed-Response (CR) Rubric

Key elements:

- \* Any response indicating that the main function of a chloroplast is to perform photosynthesis and make food for the plant.
- \* Any response indicating that a chloroplast makes food for the plant and a mitochondrion breaks down food to provide energy for the plant.

**2 points: Response contains both key elements**

**1 point : Response contains one of the two key elements**

**0 point : Response contains neither key element**

# Example 2-point response

- \* The chloroplast combines water and carbon dioxide in the presence of sunlight to make food for a plant.
- \* The chloroplast makes food for a plant and the mitochondrion breaks down food to release energy for the plant.

# Example 1-point response

- \* The chloroplast is the place in a plant cell where photosynthesis happens to make food for the plant.
- \* The mitochondrion is the place in a cell where respiration happens.

# Example 0-point response

- \* The chloroplast breaks down food into energy for the plant.
- \* The mitochondrion performs photosynthesis and makes food for the plant and the chloroplast breaks down food to release energy for the plant.

# Sample Item

## Extended-Response

A tall plant with red flowers is crossed with another plant of the same species that is short and has white flowers. The offspring (F<sub>1</sub>) of this cross are all tall with red flowers.

Identify the genotype of the F<sub>1</sub> generation plants and label each allele with its trait.

Explain why there were no short plants with white flowers in the F<sub>1</sub> generation.

# Constructed-Response Rubric

## Science

### 4-point Constructed-Response (CR) Rubric

Key elements:

- \* Any response indicating that the genotype of the F1 generation is RrTt AND
- \* Any response indicating that R=red flowers, r=white flowers, T=tall plants and t=short plants
- \* Any response indicating that all of the plants in the F1 generation have one dominant allele for each gene AND
- \* Any response indicating that when a dominant allele is present, it is expressed and the recessive allele is masked/not expressed

**4 points: Response contains all four key elements**

**3 points: Response contains three of four key elements**

**2 points: Response contains two of four key elements**

**1 point: Response contains one of four key elements**

**0 point: Response contains no key elements**

# Example 4-point response

- \*  $RrTt$  and  $R$ =red flowers,  $r$ =white flowers,  $T$ =tall plants and  $t$ =short plants
- \* All  $F_1$  plants have a dominant allele for each trait. The dominant alleles traits (tall plants with red flowers) are expressed , and the traits of the recessive alleles (short plants with white flowers) are masked by the presence of the dominant alleles.

# Example 3-point response

- \*  $RRTt$  and  $R$ =red flowers,  $r$ =white flowers,  $T$ =tall plants and  $t$ =short plants
- \* All  $F_1$  plants have at least one dominant allele for each trait. Because of this, the dominant alleles traits are expressed, and the recessive alleles traits are not seen.

# Example 2-point response

- \*  $RrTT$  and  $R$ =red flowers,  $r$ =white flowers,  $T$ =tall plants and  $T$ =tall plants
- \* All  $F_1$  plants have at least one dominant allele for each trait. Because of this, the dominant alleles traits are expressed, and the recessive alleles traits are not seen.

# Example 1-point response

- \*  $RrTt$  and  $Rr$ =red flowers,  $Tt$ =tall plants
- \* The recessive traits are not as strong as the dominant traits and are lost in the  $F_1$  generation.

# Example 0-point response

- \* RR TT and R=red flowers, T=tall plants
- \* The short plants with white flowers did not survive the cross and are not part of the F<sub>1</sub> generation.

# Questions



- \* For questions on the Science 10 Item Sampler or for any content area-related concerns, please contact the Office of Student Assessment via email at [INassessments@doe.in.gov](mailto:INassessments@doe.in.gov).