

*Definition of the domain  
for summative evaluation*

BLG-5065-2

# Biology Secondary V

## The Transmission of Hereditary Characteristics

**Reach** for  
your **Dreams**

Québec 

*Definition of the domain  
for summative evaluation*

BLG-5065-2

# Biology Secondary V

## The Transmission of Hereditary Characteristics

Formation professionnelle et technique  
et formation continue

Direction de la formation générale  
des adultes

© Gouvernement du Québec  
Ministère de l'Éducation, 2004 — 03-01080

ISBN 2-550-42064-0

Legal deposit—Bibliothèque nationale du Québec, 2004

## 1. Introduction

This definition of the domain for summative evaluation describes and classifies the essential and representative elements of the *Biology* program—specifically, for the course *The Transmission of Hereditary Characteristics*. It presents an overview of the program, but should by no means replace the program itself. The purpose of defining the domain is to ensure that all the instruments for summative evaluation are consistent with the overall program.

This definition of the domain is organized in the same way as it is in other courses. The content of each section is, however, specific to this course.

The definition of the domain for summative evaluation is used to prepare examinations that are valid from one version to another, from year to year, and from one school board to another, taking into account the responsibilities shared by the Ministère de l'Éducation and the school boards.

**2. Program Orientations and Consequences for Summative Evaluation**

**Orientations**

The purpose of this program is to help students acquire knowledge of human anatomy and physiology.

The purpose of this program is to help students understand how the human body functions.

The purpose of this program is to help students understand the causes and effects of the principal health disorders associated with the human body.

**Consequences**

Evaluation will test the students' knowledge of concepts related to the transmission of hereditary characteristics.

Evaluation will test the students' understanding of how hereditary characteristics are transmitted.

Evaluation will test the students' ability to establish relationships between acquired concepts of heredity and the principal hereditary disorders or defects in humans.

### **3. Course Content for Purposes of Summative Evaluation**

#### **Themes**

- **Basic Principles of Heredity**
  - Structure of a cell nucleus, chromosome and gene
  - Terms related to heredity:
    - dominant trait and recessive trait
    - genotype and phenotype
    - homozygote and heterozygote
    - monohybrid cross and dihybrid cross
    - genotypic ratio and phenotypic ratio
  - Blood types and Rhesus factor
  
- **Mechanisms of Heredity**
  - Mendel's laws
  - Determination of blood type and Rhesus factor
  - Gender of unborn child
  - Problem solving:
    - dihybrid cross
    - incomplete dominance
    - blood types and Rhesus factor
    - gender-related genes
  
- **Hereditary Disorders**
  - Consanguineous unions and hereditary disorders
  - Hereditary diseases
  - Mutations and mutagens
  - Chromosome mutations and hereditary defects in humans

**Skills**

- **Describing:** Observing, identifying or recalling the characteristics of a phenomenon or the components of a system.
- **Explaining:** Showing in a structured way the nature and interaction of complex relationships between objects or phenomena.
- **Analyzing:** Examining the components, the relationships between components, and the laws or mechanisms of a system or complex set of components.

**4. Table of Dimensions**

Themes Skills	Basic Principles of Heredity 30%	Mechanisms of Heredity 50%	Hereditary Disorders 20%
<b>Describing 35%</b>	Structure of nucleus, chromosome and gene (5%)  Terms related to heredity (20%) - dominant trait and recessive trait - genotype and phenotype - homozygote and heterozygote - monohybrid cross and dihybrid cross - genotypic ratio and phenotypic ratio  <b>(1) 25%</b>		Hereditary diseases (5%)  Chromosome mutations and hereditary defects in humans (5%)  <b>(5) 10%</b>
<b>Explaining 25%</b>	Blood types and Rhesus factor  <b>(2) 5%</b>	Mendel's laws (5%)  Gender of unborn child (5%)  <b>(3) 10%</b>	Consanguineous unions and hereditary disorders (5%)  Mutations and mutagens (5%)  <b>(6) 10%</b>
<b>Analyzing 40%</b>		Determination of blood type and Rhesus factor (8%)  Problem solving (32%) - dihybrid cross - incomplete dominance - blood type and Rhesus factor - gender-related genes  <b>(4) 40%</b>	



**5. Observable Behaviours**

**Dimension 1**

- Given a series of statements, choose those that correctly describe the structure of cell nuclei, chromosomes and genes, and that correctly associate them with the transmission of hereditary traits. Correct false statements to make them valid. (5%)
- Associate statements with the following terms: dominant trait, recessive trait, genotype, phenotype, homozygote, heterozygote, monohybrid cross, dihybrid cross, genotypic ratio, phenotypic ratio. (The statements refer to definitions or examples. A term may be associated with more than one statement.) (20%)

**Dimension 2**

- Given the blood type and Rhesus factor of two individuals, justify whether it is possible or not for these individuals to be donors or recipients. (5%)

**Dimension 3**

- Given the results of crossbreeding experiments involving peas, state which of Mendel's laws explains the results, and justify the answer. (5%)
- Explain briefly why a popular misconception concerning gender determination of an unborn child is unfounded. (5%)

**Dimension 4**

- Interpret the results of experiments designed to determine blood type and Rhesus factor. (8%)
- Problem solving:
  - Solve a dihybrid cross problem, and answer questions on the interpretation of results. (8%)
  - Solve a cross problem involving incomplete dominance of hereditary traits, and answer questions on the interpretation of results. (8%)
  - Solve a cross problem involving hereditary traits related to blood type and Rhesus factor, and answer questions on the interpretation of results. (8%)

Solve a cross problem involving gender-based hereditary traits, and answer questions on the interpretation of results. (8%)

**Dimension 5**

- Given a list of diseases, classify the diseases as infectious or hereditary, and justify the classification. (5%)
- Given karyotypes, descriptive elements and true statements on mutations, choose the elements of information that relate to a given defect. (5%)

**Dimension 6**

- Given a series of statements, choose those that correctly explain how the risk of hereditary defects increases in consanguineous unions. Correct false statements to make them valid. (5%)
- Given a series of statements, choose those that correctly explain the problems of genetic or chromosome mutation and the way in which certain mutagens operate. Correct false statements to make them valid. (5%)

**6. Explanation of Content and Weighting**

In establishing the relative importance of the themes *Basic Principles of Heredity*, *Mechanisms of Heredity* and *Hereditary Disorders*, greater weight has been assigned to understanding how hereditary characteristics are transmitted and what disorders are transmitted through heredity, than to memorizing their basic principles.

The relative importance of each skill to be developed has been determined by adding up the weightings given to the observable behaviours pertaining to that skill.

On the basis of the tasks prescribed by the terminal objectives of the program, the weighting of the themes and skills has been established as follows:

Dimensions related to the theme <i>Basic Principles of Heredity</i>	30%
Dimensions related to the theme <i>Mechanisms of Heredity</i>	50%
Dimensions related to the theme <i>Hereditary Disorders</i>	20%
Dimensions related to the skill <i>Describing</i>	35%
Dimensions related to the skill <i>Explaining</i>	25%
Dimensions related to the skill <i>Analyzing</i>	40%

## **7. Description of the Examination**

### **A. Type of Examination**

The summative examination is a written examination administered at the end of the course. It is designed to measure all of the dimensions and counts for 100% of the final mark. It consists of structured-response and short-response items.

### **B. Characteristics of the Examination**

The examination is written at the end of the course in a single session lasting no more than 120 minutes.

### **C. Pass Mark**

The pass mark for the entire examination is 60%.

