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# Interactive Learning Objects

## Biology

### Transmission of Genes Lesson Plan

**TV**Ontario





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# Transmission of Genes

## Learning object description

This learning object introduces students to the basic concepts behind DNA structure and the gene as the basis for heredity. Through a series of increasing close-ups, students are taken inside the cell, to its nucleus and, finally, to the molecular DNA structure of a chromosome. Students can view a human karyotype, showing the relative size, shape, and staining patterns of the 23 human chromosomes of a genetically normal individual.

An interactive activity allows students to build the complementary strand of a DNA molecule by correctly matching the nucleotide bases. Students can test their understanding with the interactive quiz consisting of four questions and a game that requires students to rapidly pair nucleotides to build a DNA strand in a format similar to Tetris™.

## Learning objective

The students will be able to:

- Define heredity
- State the relationship among chromosomes, DNA molecules, nucleotides and genes

## Correlation to the Ontario Curriculum

*Grade 11 Biology – SBI3U Academic:*

- Demonstrate an understanding of the necessity of meiosis and describe the importance of genes in transmitting hereditary characteristics according to Mendel's model of inheritance
- Explain how the concepts of DNA, genes, chromosomes, and meiosis account for the transmission of hereditary characteristics from generation to generation (e.g., explain how the sex of

an individual can be determined genetically; demonstrate an understanding that the expression of a genetic disorder linked to the sex chromosomes is more common in males than in females)

- Summarize the main scientific discoveries of the nineteenth and twentieth centuries that led to the modern concept of the gene (e.g., the discoveries of Hugo de Vries, W.S. Sutton, Thomas Morgan, J. Muller, Barbara McClintock, Rosalind Franklin, James Watson, and Francis Crick)

## Vocabulary

- Heredity
- Chromosome
- DNA
- Nucleotide base
- Gene

## Pre-viewing

- Have the class organize themselves into groups depending on their eye color: blue, brown, other.
- Ask a recorder in each group to make a data table to show the eye color of each student's biological parents. Students may be surprised to find that a child's eye colour does not always match the colours of his/her parents' eyes.
- Have students infer a pattern of inheritance to account for eye color. Circulate among the groups to ensure that students have inferred that some information must come from each parent.

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## While viewing

- Have the class work either individually or in pairs, depending on your and their preference and access to computers.
- Have students take notes to summarize what they learn as they explore the four segments of the learning object:

What is Heredity?

What are Chromosomes?

What is DNA?

What are Genes?

## Post viewing

- Have students review their notes in pairs or small groups.
- Have students working individually, draw a labeled diagram to show increasing levels of magnification from cell to gene. Diagrams should be detailed enough to demonstrate students' understanding of the relationship between the DNA code, a gene, DNA structure, and the molecule's location within the cell.

## Follow-up activity

- Students will be curious to know about the original experiments that led to discoveries of the role of DNA in heredity.
- Have students do a brief research assignment to find out about the contributions of: de Vries, Sutton, Muller, McClintock, Watson and Crick, Chargaff, Griffith, Avery, Hershey and Chase, and Franklin.
- You may wish to assign each scientist to a small group of students and have them create a three-dimensional representation of the findings of the scientist, to be displayed in the classroom.

## Assessment

- Students' diagrams can be assessed for Knowledge and Understanding: understanding of concepts, principles, laws, and theories e.g., identifying assumptions; eliminating misconceptions; providing explanations.
- Products of students' research assignments can also be assessed for Application: understanding of connections among science, technology, society, and the environment.