

**Immaculate Conception Catholic School St. Kitts & Elizabeth Brison  
Foundations University of Notre Dame**

**Topic:** Inheritance and Variation of Traits (Genetics)

**Essential Questions:**

*What is the determinant of race: biology or society?*

*What is responsible for the beautiful spectrum of the eye?*

*What are your thoughts on genetic mutation?*

*Are they basically harmful?*

*How does our understanding of human genetics help to uphold human dignity?*

**Method:** This lesson is one lesson broken into two days (80 minutes per class, total 160 minutes).

Teacher will use instruction, stopping frequently to check for understanding with the students. Students will listen and engage in dialogue with the teacher. When the lesson is finished, the students will copy down the notes from the board.

Making use of the different modules in this unit.

Show video on Creation as an anticipatory set:

<https://www.youtube.com/watch?v=pH53AHPXVPU>

**1.1 Meet:** Biology Teacher and Faith Teacher/or single teacher Introduction.

**1.2 Growth & Compassion:** Guide students to reflect on events beyond their control. They will be guided to reflect on “compassion” towards those who are different from them.

**1.3 Our human diversity (the experience):** Students intentionally look at each other’s eye and observe the diversity and the beauty of the human eye; color, shape.

**1.4 Experience:** Students are guided to build a model of an eye and the teacher teaches them the complex genetics behind the color of the human eye, to understand the possible variations that can exist.

**Materials Needed per Student or Pair:** Foam ball, foam square, foam sheet, stick, google eye or draw it, toilet paper roll, paint glue.

**1.5 Engage:** Race, Genetics, and Ancestry. Students brainstorm and explore the relationship between genetics, race, and ancestry. They will be guided to understand how appreciating these differences will help to uphold human dignity and rise above prejudices.

**1.6 Assignment:** Students will be asked if they think there could be consequences for chromosomes being irregular? Those that do will form one group (Pro) and those that do not will (Con) form another group. Students will be given time to do research to defend their position in class and should do any additional preparation needed as homework. Students will debate the two sides Pro/Con in the next class session.

**Resources:**

Video <https://www.youtube.com/watch?v=pH53AHPXVPU>

Models <https://www.instructables.com/How-to-Make-3D-Human-Eye-Model-Easy-Way/>

Teacher Textbook - Essentials of Genetics 10th edition

[https://www.pearson.com/store/p/essentials-of-genetics/P100001176666/9780135209882?creative=544666367026&keyword=&matchtype=&network=u&device=c&gclid=CjwKCAjwqauVBhBGEiwAXOepkSIVmYz2vv\\_3k0seULybnRI6hV\\_Tah5wEJ2kdLVVbptczK0RZdtR-xoCXy8QAvD\\_BwE&gclsrc=aw.ds](https://www.pearson.com/store/p/essentials-of-genetics/P100001176666/9780135209882?creative=544666367026&keyword=&matchtype=&network=u&device=c&gclid=CjwKCAjwqauVBhBGEiwAXOepkSIVmYz2vv_3k0seULybnRI6hV_Tah5wEJ2kdLVVbptczK0RZdtR-xoCXy8QAvD_BwE&gclsrc=aw.ds)

- Biology for CSEC Examinations by Linda Atwaroo-Ali
- Human and social biology for CSEC Examinations by Philip Gadd
- Concise revision course for biology by Anne Tindale
- Concise revision course for human and social biology by Anne Tindale

Religion Education materials

- The promises of God
- Walking with Jesus
- Witnessing to the Faith
- young Disciples in mission

These books were published by the Archdiocesan Catechetical Office, Pastoral Center. Trinidad and Tobago

Chalkboard/Chalk

Projector

Games (Quizizz.com)

**Knowledge:**

1. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins.
2. In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.

3. Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function.
4. In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.
5. Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.

**Skills:**

Students will be able to:

1. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
2. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
3. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
4. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

**Assessment:**

1. Ask questions that arise from examining models or a theory to clarify relationships.
2. Use a model based on evidence to illustrate the relationships between systems or between components of a system.
3. Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.
4. Teachers will conduct oral formative assessments after each component of the lesson to determine the level of comprehension and reteach as needed during the two double sessions (block schedule) in the week.
5. Engage in a debate about the effects of chromosome abnormalities.
6. Express in a journal reflection whether or not altering the outcome of chromosomes

affect human dignity and God's plan.

7. Students will take a written summative assessment at the end of the unit.

**Description:** This is a lesson that will provide students with an overview of how genetics and chromosomes function. It will encompass genetic information, DNA, codes for the formation of proteins, the process of mitosis, chromosomes, and potential abnormalities. Students will consider the connection with the science of God's intentions and human dignity and whether or not we should interfere with genetics.

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