



St. Mel's Catholic School

## SCIENCE STANDARDS

### Grade Seven

#### Focus on Life Science

##### Cell Biology

**1.0 God made all living things to be composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. As a basis for understanding this concept, students know:**

- 1.1 the way in which cells function is similar in all living organisms.
- 1.2 the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
- 1.3 the nucleus is the repository for genetic information in plant and animal cells.
- 1.4 mitochondria liberate energy for the work that cells do, and chloroplasts capture sunlight energy for photosynthesis .
- 1.5 cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
- 1.6 As multi-cellular organisms develop, their cells differentiate.
- 1.7 observe plant and animal cells through microscopes.
- 1.8 how immune system cells fight disease.
- 1.9 how HIV destroys T-cells.
- 1.10 cell organelles and their function.
- 1.11 the cell in its environment.
- 1.12 chemical compounds in cells.
- 1.13 diffusion; osmosis; passive and active transport across cell membrane.
- 1.14 cell mutation causing cancer.

##### Genetics

**2.0 A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept, students know:**

- 2.1 the differences between the life cycles and reproduction of sexual organisms .
- 2.2 sexual reproduction produces offspring that inherit half of their genes from each parent.
- 2.3 an inherited trait can be determined by one or by many genes.
- 2.4 plant and animal cells contain many thousands of different genes, and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
- 2.5 DNA is the genetic material of living organisms and is located in the chromosomes of each cell.
- 2.6 human genetic disorders and disease



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## **Evolution**

**3.0 God initiated the biological evolution process which accounts for the diversity of species developed through gradual processes over many generations. As a basis for**

**understanding this concept, students know:**

3.1 both genetic variation and environmental forces act to cause evolution and diversity of organisms.

3.2 the reasoning used by Darwin in his conclusions that natural selection is the mechanism of evolution.

3.3 how independent lines of evidence from geology, fossils, and comparative anatomy provide a basis for the theory of evolution.

3.4 how to construct a simple branching diagram to classify several living groups of organisms by shared derived characteristics, and that a branching diagram can be expanded to include fossil organisms.

3.5 extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival.

## **Earth And Life History (Earth Science)**

**4.0 Evidence from rocks allows us to understand the evolution of life on Earth. As the basis for understanding, students know:**

4.1 Earth processes today are similar to those that occurred in the past and slow geologic

processes have large cumulative effects over long periods of time.

4.2 the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impact of an asteroid.

4.3 the rock cycle includes the formation of new sediment and rocks. Rocks are often found in layers with the oldest generally on the bottom.

4.4 evidence from geologic layers and radioactive dating indicate the Earth is approximately 4.6 billion years old, and that life has existed for more than 3 billion years.

4.5 fossils provide important evidence of how life and environmental conditions have changed.

4.6 how movements of the Earth's continental and oceanic plates through time, with associated changes in climate and geographical connections, have affected the past and

present distribution of organisms.

4.7 how to explain significant developments and extinctions of plant and animal life on the geologic time scale.

4.8 viruses and bacteria; how infectious diseases spread.

4.9 research report on virus/bacterial disease using paraphrasing of resource materials.

4.10 types of protists and algae.

## **Structure And Function In Living Systems**



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**5.0 The anatomy and physiology of plants and animals of God's world illustrate the complimentary nature of structure and function. As a basis for understanding this concept, students know:**

5.1 plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.

5.2 organ systems function because of the contributions of individual organs, tissues, and

cells. The failure of any part can affect the entire system.

5.3 how bones and muscles work together to provide a structural framework for movement.

5.4 how the reproductive organs of the human female and male generate eggs and sperm,

and how sexual activity may lead to fertilization and pregnancy.

5.5 the function of the umbilicus and placenta during pregnancy.

5.6 the structures and processes by which flowering plants generate pollen and ovules, seeds, and fruit.

5.7 relate the structures of the eye and ear to their functions.

**Physical Principles In Living Systems (Physical Science)**

**6.0 Physical principles underlie biological structures and functions of God's universe. As a basis for understanding this concept, students know:**

6.1 visible light is a small band within a very broad electromagnetic spectrum.

6.2 for an object to be seen, light emitted by or scattered from it must enter the eye.

6.3 that light travels in straight lines except when the medium it travels through changes.

6.4 how simple lenses are used in a magnifying glass, the eye, camera, telescope, and microscope.

6.5 white light is a mixture of many wavelengths (colors), and that retinal cells react differently with different wavelengths.

6.6 the angle of reflection of a light beam is equal to the angle of incidence.

6.7 how to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints)

6.8 how levers confer mechanical advantage and how the application of this principle applies to the muscular-skeletal system.

6.9 that contractions of the heart generate blood pressure, and that heart valves prevent back flow of blood in the circulatory system.

6.10 light interacts with matter by transmission (including refraction), absorption, or scattering (including reflection).

6.11 the steps of the scientific method and application for problem solving; understanding

and demonstrating.

**Investigation And Experimentation**



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**7.0 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in the other three strands, students should develop their own questions and perform investigations. Students will:**

7.1 develop a hypothesis.

7.2 select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes and binoculars) to perform tests, collect data and display data.

7.3 construct appropriate graphs from data and develop qualitative statements about the relationships between variables.

7.4 communicate the steps and results from an investigation in written reports and verbal presentations.

7.5 recognize whether evidence is consistent with a proposed explanation.

7.6 read a topographic map and a geologic map for evidence provided on the maps, and

construct and interpret a simple scale map.

7.7 interpret events by sequence and time from natural phenomena.

7.8 identify changes in natural phenomena over time without manipulating the phenomena.