

**GRADE 7**  
**Overview of the Science Standards**  
**Focus on Life Science**

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**I. CELL BIOLOGY**

- *All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope.*
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**II. GENETICS**

- *A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences.*
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**III. EVOLUTION**

- *Biological evolution accounts for the diversity of species developed through gradual processes over many generations.*
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**IV. EARTH AND LIFE HISTORY (Earth Science)**

- *Evidence from rocks allows us to understand the evolution of life on Earth.*
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**V. STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

- *The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function.*
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**VI. PHYSICAL PRINCIPLES IN LIVING SYSTEMS**  
**(Physical Science)**

- *Physical principles underlie biological structures and functions.*
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**VII. INVESTIGATION AND EXPERIMENTATION**

- *Scientific progress is made by asking meaningful questions and conducting careful investigations.*
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## *Aligning the Instructional Program with the Grade Level Standards and Benchmarks*

In order to align the instructional program with the prescribed content standards for the grade, it is critical that the standards and their affiliated benchmarks are reviewed regularly so as to become very familiar with them. At the outset of each quarter/trimester an initial decision must be made as to which standards and benchmark proficiencies will be included in the instructional program. At the end of each quarter/trimester the teacher should fill out the **response section next to each benchmark**. This activity will serve as a checkpoint and will help gauge what still needs to be taught or what should be re-taught.

### *Complete the Response Section*

**ST/B** = Standard and Benchmark    **P**: Priority benchmark    **Q**: Quarter 1 or 2 or 3 or 4

**At the start of the quarter/trimester**, select the benchmarks you consider to be your “priority benchmarks.” Mark the box under the “P” code.

At the end of each quarter/trimester complete the response section **of the standard/benchmark listings, indicating to what extent students have mastered the benchmark.**

**A: Fewer than 20% of the students are proficient**

**B: About *half* (50%) of the students are proficient**

**C: 80% or more of the students are proficient**

## **Sample Recording of the Response Form GRADE 2**

### I. PHYSICAL SCIENCE

*The motion of objects can be observed and measured. As a basis for understanding this concept, students in the SECOND GRADE will ...*

ST/B	P	ST/B: Standard/Benchmark    P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more    B=about half    C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
ST1.A	P	<i>know</i> that the position of an object can be described by locating it in relation to another object or to the background.	A	B	B	C
ST1.B		<i>know</i> that an object's motion can be described by recording the change in position of the object over time.	A	A	B	B

**GRADE 7**  
**Science Standards and Benchmark Proficiencies**  
**Focus on Life Science**

**I. CELL BIOLOGY**

*All living organisms are 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 in the SEVENTH GRADE will ...*

ST/B	P	ST/B: Standard/Benchmark P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
ST1.A		<i>know</i> that cells function similarly in all living organisms.				
ST1.B		<i>know</i> the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.				
ST1.C		<i>know</i> the nucleus is the repository for genetic information in plant and animal cells.				
ST1.D		<i>know</i> that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.				
ST1.E		<i>know</i> that cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.				
ST1.F		<i>know</i> that as multi-cellular organisms develop, their cells differentiate.				

**II. GENETICS**

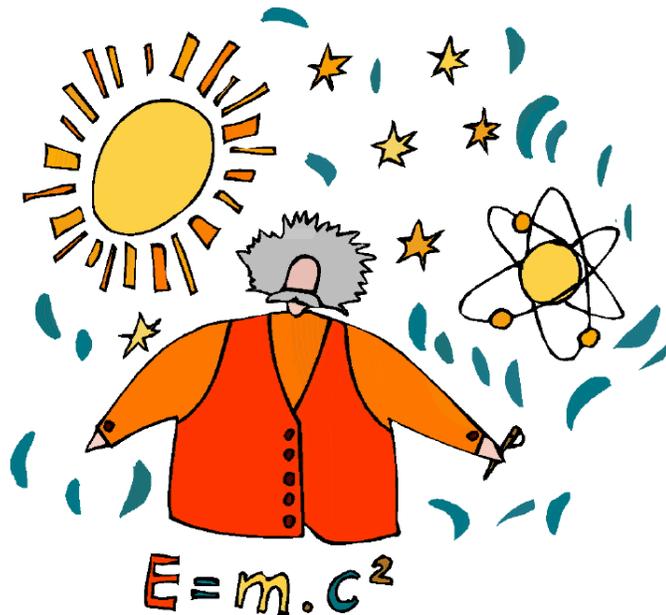
*A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for under-standing this concept, students in the SEVENTH GRADE will ...*

ST/B.	P	ST/B: Standard/Benchmark P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
ST2.A		<i>know</i> the differences between the life cycles and reproduction methods of sexual and asexual organisms.				
ST2.B		<i>know</i> that sexual reproduction produces offspring that inherit half their genes from each parent.				
ST2.C		<i>know</i> that an inherited trait can be determined by one or more genes.				
ST2.D		<i>know</i> that 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.				
ST2.E		<i>know</i> that DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.				

### III. EVOLUTION

***Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept, students in the SEVENTH GRADE will...***

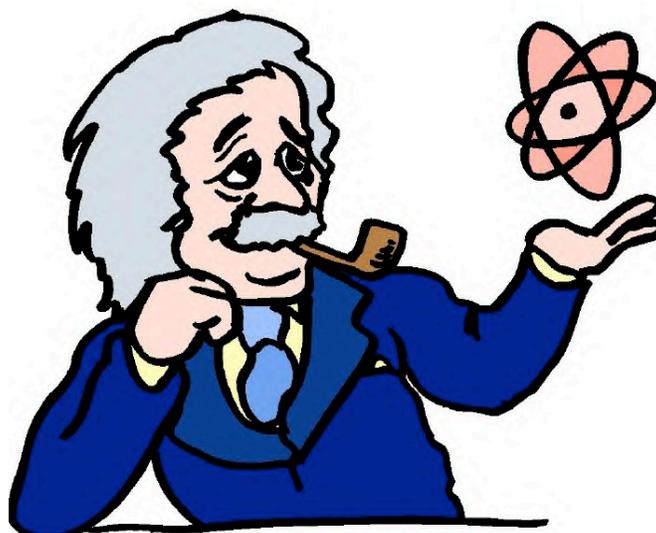
ST/B	P	ST/B: Standard/Benchmark P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
ST3.A		<i>know</i> that both genetic variation and environmental factors are causes of evolution and diversity of organisms.				
ST3.B		<i>know</i> that the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.				
ST3.C		<i>know</i> how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.				
ST3.D		<i>know</i> how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organisms.				
ST3.E		<i>know</i> that extinction of a species occurs when the environment changes and that the adaptive characteristics of a species are insufficient for its survival.				



## IV. EARTH AND LIFE HISTORY (Earth Science)

*Evidence from rocks allows us to understand the evolution of life on Earth. As a basis for understanding this concept, students in the SEVENTH GRADE ...*

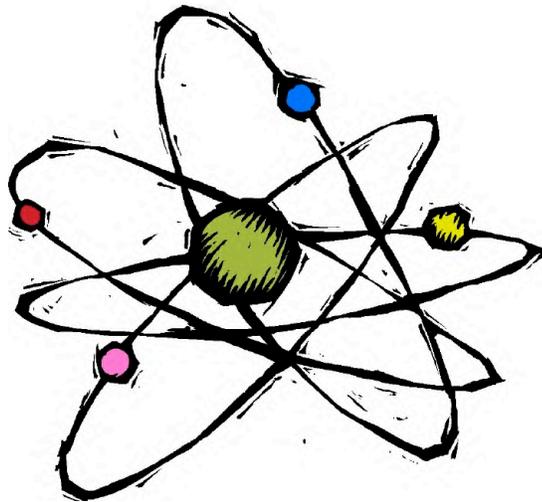
ST/B	P	ST/B: Standard/Benchmark    P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more    B=about half    C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
ST4.A		<i>know</i> that Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.				
ST4.B		<i>know</i> that the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.				
ST4.C		<i>know</i> that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.				
ST4.D		<i>know</i> that evidence from geologic layers and radioactive dating indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.				
ST4.E		<i>know</i> that fossils provide evidence of how life and environmental conditions have changed.				
ST4.F		<i>know</i> how movements of Earth's continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms.				
ST4.G		<i>know</i> how to explain significant developments and extinctions of plant and animal life on the geologic time scale.				



## V. STRUCTURE AND FUNCTION IN LIVING SYSTEMS

*The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept, students in the SEVENTH GRADE will ...*

ST/B.	P	ST/B: Standard/Benchmark P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more B=about half C=fewer than 25%	Q 1	Q 2	Q 4	Q 4
ST5.A		<i>know</i> that plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.				
ST5.B		<i>know</i> that organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.				
ST5.C		<i>know</i> how bones and muscles work together to provide a structural framework for movement.				
ST5.D		<i>know</i> how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.				
ST5.E		<i>know</i> the function of the umbilicus and placenta during pregnancy.				
ST5.F		<i>know</i> the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.				
ST5.G		<i>know</i> how to relate the structures of the eye and ear to their functions.				



## VI. PHYSICAL PRINCIPLES IN LIVING SYSTEMS (Physical Science)

*Physical principles underlie biological structures and functions. As a basis for understanding this concept, students in the SEVENTH GRADE will ...*

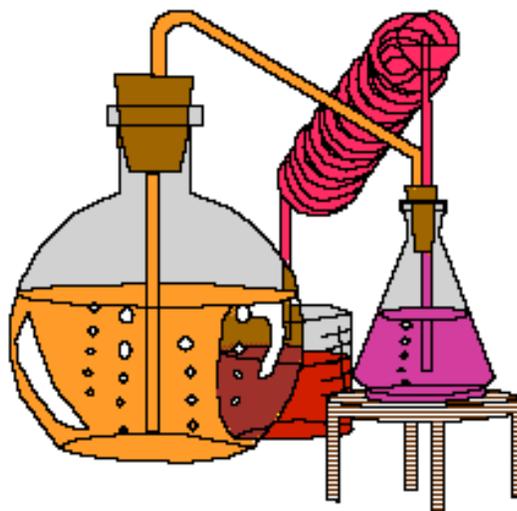
ST/B.	P	ST/B: Standard/Benchmark P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more B=about half C=fewer than 25%	Q 1	Q 2	Q 4	Q 4
ST6.A		<i>know</i> that visible light is a small band within a very broad electromagnetic spectrum.				
ST6.B		<i>know</i> that for an object to be seen, light emitted by or scattered from it must be detected by the eye.				
ST6.C		<i>know</i> that light travels in straight lines if the medium it travels through does not change.				
ST6.D		<i>know</i> how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.				
ST6.E		<i>know</i> that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.				
ST6.F		<i>know</i> that light can be reflected, refracted, transmitted, and absorbed by matter.				
ST6.G		<i>know</i> that the angle of reflection of a light beam is equal to the angle of incidence.				
ST6.H		<i>know</i> 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).				
ST6.I		<i>know</i> how levers confer mechanical advantage and how the application of this principle applies to the musculo-skeletal system.				
ST6.J		<i>know</i> that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.				



## VII. INVESTIGATION AND EXPERIMENTATION

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

ST/B	P	ST/B: Standard/Benchmark P: Priority Benchmark Degree of Mastery: % of students at end of each Q: Quarter A= 75% or more B=about half C=fewer than 25%	Q 1	Q 2	Q 3	Q 4
ST7.A		<i>select</i> and <i>use</i> appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.				
ST7.B		<i>use</i> a variety of print and electronic resources (including the world wide web) to collect information and evidence as part of a research project.				
ST7.C		<i>communicate</i> the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.				
ST7.D		<i>construct</i> scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e. g., motion of earth's plates and cell structure).				
ST7.E		<i>communicate</i> the steps and results from an investigation in written reports and oral presentations.				



# CATHOLIC VALUES TO BE INTEGRATED INTO THE SCIENCE CURRICULUM

## GRADE SEVEN Standards Based Vocabulary for Science

### Cell Biology

Cell organelles	History of the Microscope
a. nucleus	a. Hooke
b. nuclear membrane	b. Van Leewenhock
c. cell membrane	c. Robert Brown
d. cytoplasm	d. Schleiden & Schwann
e. chromosome	e. cell theory
f. nucleolus	f. eyepiece
g. mitochondrion	g. body tube
h. golgi bodies	h. objectives: scan, low, high, oil immersion
i. cell wall	i. diaphragm
j. chloroplasts	j. mirror or light source
k. vacuole	k. stage
l. mitosis	

### Genetics

asexual vs. sexual reproduction	genome	DNA located in the chromosomes
meiosis	DNA structure	phenotypes vs. genotypes
dominant and recessive genes	Punnett square	deoxyribonucleic acid (DNA)

### Evolution

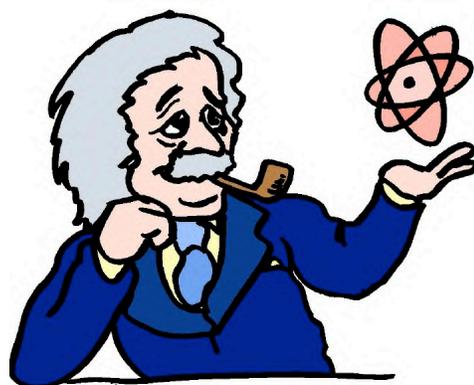
adaptation	extinction	population	competition (prey and predators)	genes
sexual reproduction	Darwin	genetic variation	similarities of embryo structure in different organisms	Galapagos Islands, finches
habitat	diversity	inherited traits	limiting factors	natural selection

## Earth and Life History (Earth Science)

age of the earth	radioactive dating	Alfred Wegener, Luis Alvarez	rock cycle	climate change, geography and effect on past and present distribution of life
sedimentary rocks: geologic layers	fossil	Theory of Uniformitarianism: processes today are similar to processes in earth's past	geologic timeline (era and epoch)	plate tectonics

## Structure and Function in Living Systems

anatomy	bones	cross pollination	animals	cellular respiration
dicot	binomial	classification	different kingdoms and their characteristics	monocot
physiology	ear structure	muscle pairs (model)	plants	fertilization vs. pollination
muscles	reproduction	history of classification	nomenclature	taxonomy
organ systems functions	photosynthesis			



## Physical Principles in Living Systems (Physical Science)

absorption	angle of incidence	blood pressure (including valve function)	comparison of simple machines to joints in the body: wrist (sliding), knee and elbow (hinge), hip and shoulder (ball and socket)	effects of lenses
electromagnetic spectrum	focal point	four chambers of the heart	infrared	lenses (eye, microscopes, telescopes, cameras)
Levers: Class 1 Class 2 Class 3	magnification	measure blood pressure	reaction of retinal cells to different wavelengths, cones and rods	real and imaginary images
reflection	refraction	refractive index of different liquids	ultraviolet light	visible light

