EXCEL ACADEMY
Est. 2012
A Public Charter Program

California Pacific Charter Schools • Community Collaborative Schools

California Standards
Grade Seven Science

Cell Biology

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

Does your student:

□ know cells function similarly in all living organisms.
□ know the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
□ know the nucleus is the repository for genetic information in plant and animal cells.
□ know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.
□ Students know cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.
□ know that as multicellular organisms develop, their cells differentiate.

Genetics

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

Does your student

□ know the differences between the life cycles and reproduction methods of sexual and asexual organisms.
□ know sexual reproduction produces offspring that inherit half their genes from each parent.
□ know an inherited trait can be determined by one or more genes.
□ know 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.

□ know DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

Evolution

3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations.

Does your student

□ know both genetic variation and environmental factors are causes of evolution and diversity of organisms.
□ know the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
□ know how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.
□ know 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.
□ know that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

Earth and Life History (Earth Sciences)

4. Evidence from rocks allows us to understand the evolution of life on Earth.

Does your student

□ know 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.
□ know the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.
□ know 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.
□ know 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.
□ know fossils provide evidence of how life and environmental conditions have changed.
□ know 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.
□ know how to explain significant developments and extinctions of plant and animal life on the geologic time scale.

Structure and Function in Living Systems

5. The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function.

Does your student

□ know plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
□ know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.
□ know how bones and muscles work together to provide a structural framework for movement.
□ know how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.
□ know the function of the umbilicus and placenta during pregnancy.
□ know the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.
□ know how to relate the structures of the eye and ear to their functions.

Physical Principles in Living Systems (Physical Sciences)

6. Physical principles underlie biological structures and functions.

Does your student

□ know visible light is a small band within a very broad electromagnetic spectrum.
□ know that for an object to be seen, light emitted by or scattered from it must be detected by the eye.
□ know light travels in straight lines if the medium it travels through does not change.
□ know how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.
□ know that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.
□ know light can be reflected, refracted, transmitted, and absorbed by matter.
□ know the angle of reflection of a light beam is equal to the angle of incidence.
□ know 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).
□ know how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
□ know that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.

Investigation and Experimentation

7. 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.

Can your student

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

□ Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.

□ Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.

□ Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).

□ Communicate the steps and results from an investigation in written reports and oral presentations.