

# DeRuyter Central School District

**Living Environment:**

**Grade 10**

## **27 Benchmarks**

**► Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers and develop solutions.**

LE 1.1.1 and LE 1.1.2 Understand the nature of scientific knowledge and inquiry.

- Objectivity when observing and evaluating phenomena and science
- Understand metric measurement, laboratory equipment and laboratory safety
- Understand and identify the use of a controlled experiment using the Scientific Method and be able to measure, organize, evaluate data

LE 1.1.3. Understand that Scientific knowledge changes through time

- New technology allows for more in-depth study
- Facts, theories and laws

LE 1.1.4 Understand basic Biological Theories and the historical transitions of those theories

- Cell
- Genetics
- Evolution
- Origin of life

LE 1.2.1, 1.2.2, 1.2.3 and 1.2.4 Develop a controlled experiment using the Scientific Method and be able to measure, organize, evaluate and present data

- Causation and correlation
- Measurable and significant data
- Use of proper lab equipment and technology

LE 1.3.1 -1.3.5 Understand how to decipher data from various charts, graphs and data tables and be able to organize data into the appropriate vehicle for interpretation

- Data tables
- Independent and dependant variables
- Graphing, line, bar and pie(traditional paper and computer)
- Best fit line
- Extrapolation
- Analysis/Interpretation/peer evaluation

**► Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of the ideas in science.**

LE 4.1.1 Living things are similar and different from each other

- Life functions
- Cell theory and cellular organelle function
- Classification
- Nutritional and symbiotic relationships and competition for limited resources
- Food chain vs. web
- Stability in a diverse, self sustaining ecosystem and cyclic changes
- Interdependence of populations and the effect of disruption of the stability (man made and natural)

LE 4.1.2 Human anatomy/physiology and homeostasis

- Levels of organization (organelle, cell, tissue, organ, organ system and organism)
- Passive and active transport
- Chemistry and biochemistry
- Dehydration synthesis and enzymatic hydrolysis
- Synthesis and assimilation
- Digestive system
- Respiratory system and cellular respiration
- Reproductive
- Circulatory
- Excretory
- Locomotion
- Regulation, both nervous and endocrine

LE 4.1.3 Unicellular organisms cellular functions similarity to organ systems

- different kingdoms
- aquatic (fresh and marine)

LE 4.2.1 Genetic material structure, function, replication and inheritance

- DNA, chromatin, chromatid, chromosome
- Karyotype and homologous chromosome
- Gene/chromosome theory and inheritance (probability)
- Pure dominance, co dominance and incomplete dominance (probability)
- Variation and asexual and sexual reproduction
- RNA(3 types) and DNA structure/function
- DNA replication
- Protein synthesis

- All cells have same information in an organism, but not all cells activate that genetic information(differentiation)

#### LE 4.2.2 Humans interaction with genetics

- Cultivation of plant and animal species and domestication
- Modern agricultural practices use genetic engineering to obtain desired characteristics
- DNA/gene splicing and recombinant DNA (specifically humalin and diabetes)

#### LE 4.3.1 Individual organisms and species change over time

- Biological theory of evolution today's species came from previous, different species
- Characteristics are inherited, and if mutations occur in reproductive cells, can be passed to the offspring
- Mutations can be spontaneous or caused by mutagenic agents
- Favorable characteristic are selected for and non favorable characteristics are selected against
- Time and species change over time(evolution)
- Lamarckian evolution and Weismann experiment
- Darwinian Evolution
- Modern Evolution
- extinction
- Gradualism and punctuated equilibrium
- Heterotrophic hypothesis

#### LE 4.4.1 Reproduction and development

- Asexual vs. sexual and genetic variation
- Mitosis
- Meiosis
- Fertilization, zygote, cleavage, blastula, differentiation, gastrula.
- Internal/external fertilization/development

#### LE 4.5.1 Organisms and dynamic equilibrium (cycles)

- Energy/Biomass pyramids, sun source for almost all systems
- Light and dark reactions of photosynthesis and the carbon cycle
- Cellular respiration (ATP cycle)
- Water cycle
- Nitrogen cycle
- Synthesis and assimilation
- Biochemical reactions are controlled by enzymes and are effected by concentration, temperature and pH

#### LE 4.5.2 Disease

- Diseases will be taught with the appropriate system/organism that is effected
- Pathogens and the immune response

- Genetic diseases
- Environmentally caused diseases
- Cancer

LE 4.5.3 Understanding dynamic equilibrium at the cellular and system level

- Homeostasis
- Negative and positive feedback

LE 4.6.1 Plants and animals depend on each other and on the physical environment

- Abiotic vs. biotic
- Population, community, ecosystem, biosphere
- Energy flow and material recycling
- Carrying capacity and seasons/predator-prey relationships
- Finite resources limit population growth
- Mutualistic symbiosis, commensalism and parasitism

LE 4.6.2 Importance of species diversity and habitat diversity

- Diversity of organisms and role (niche) in the environment
- Importance of diversity to human kind
- Interrelationships and interdependence of organisms in an ecosystem
- Ecological succession (primary, secondary and pond) to climax stage
- Ecosystems and the effect latitude and altitude

LE 4.7.1 Human impact with the living and non living environment

- Finite resources and increase consumption
- Natural ecosystems provide for humans quality atmosphere, hydrosphere, and lithosphere by cycles. Man has shifted/alterd some of these cycles
- Humans are organisms that have had the most dramatic effect on the environment

LE 4.7.2 Human population growth and the impact of the technological growth on the living and non living environment

- Pollution(land, water and air)
- Mans effect on ecosystems, over harvest vs. proper management
- Effects of the Industrial Age(+ and -)and possible solutions

LE 4.7.3 Individual choices and society's actions can improve the environment

- Think globally act locally
- Proactive vs. reactive
- Long term consequences of our action (+ and -)
- Analyze risk, costs benefits and trade offs of the decisions we make

Lab skills

- Laboratory safety
- Follow direction from instructor, lab and labels

- Use of various laboratory equipment
- Use of dissecting and compound microscope
- Dichotomous keys
- Objective observation
- Dissect
- Chromatography
- Electrophoresis
- Design a controlled experiment with the scientific method
- Organize and analyze data