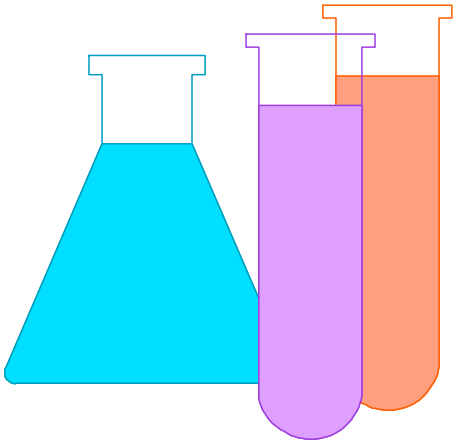
Chippewa Local Schools



SCIENCE EXIT SKILLS
Grades K – 12

SCIENCE EXIT SKILLS
GRADE KINDERGARTEN

- The student will explain how things (events, actions, chemicals, etc.) cause changes in our world and some changes take longer than others.

- The student will recognize and explain the difference between living (organic) and non-living (inorganic) substances.

- The student will explain that living things have basic needs and will provide examples. (Life activities)

- The student will identify that tools are needed to make things and that non-living things can also be made by nature.

- The student will explain that if people cooperate and communicate they can solve problems.

SCIENCE EXIT SKILLS
GRADE ONE

Earth and Space Science

- The student will identify organism and explain that organisms cause change in their environments.

- The student will explain how resources can be reduced and recycled.

- The student will identify/explain that the Earth contains non-living substances (inorganic) and living things (organic); will define each term.

Life Science

- The student will explain that all living organisms have basic needs and will understand how their basic needs are met and how they can be affected by seasonal change.

Physical Science

- The student will identify and explain the properties of matter and how they change.

- The student will explain why the sun's energy is necessary.

- The student will explore how energy makes things work and that it comes from many sources.

Science and Technology

- The student will explain the importance of following directions and using scientific tools.

Scientific Inquiry

- The student will explain that people can answer questions and solve problems by working together. (The scientific method)

Physical Science

- The student will explore how some objects can change other objects even when they do not touch each other.

- The student will investigate how things move and what makes them change speed, direction and/or stop.

SCIENCE EXIT SKILLS
GRADE TWO

EARTH AND SPACE SCIENCES: Understanding the interconnected cycles and systems of the universe, solar system and Earth.

The student will:

- Understand that there are more stars in the sky than anyone can count.
- Describe how the sun, moon and stars all appear to move slowly across the sky.
- Describe how the moon appears a little different every day but looks the same again about every four weeks.
- Notice that some weather changes occur throughout the day while others occur in a season.
- Describe weather by measuring temperature and precipitation.

LIFE SCIENCES: Understanding the structure and function of living systems and how they interact with the environment.

The student will:

- Understand that people and animals need air, food, water, living space and shelter and that plants need air, water, nutrients, living space and light to survive.
- Understand that there are many types of environments that support many different kinds of living things.
- Explain why organisms can survive only in environments that meet their needs.
- Notice what is similar and different among individuals of the same kinds of plants and animals, including people.
- Explain that food is a basic need of plants and animals and is important because if is a source of energy.
- Explore the different structures of plants and animals which help them live in different environments.
- Compare the habits of different kings of Ohio plants and animals and some of the ways animals depend on plants and other animals.
- Compare the activities of Ohio's common animals during the different seasons and describe their changes in behavior and body covering.
- Compare Ohio plants during the different seasons by describing changes in the way they look (appearance).

PHYSICAL SCIENCES: Understanding physical systems, concepts and properties of matter, energy, forces and motion.

The student will:

- Explore how things make sounds.
- Explore and describe sounds produced by objects that vibrate.
- Explore with flashlights and shadows how light travels in a straight line until it strikes an object.

SCIENCE EXIT SKILLS
GRADE TWO (continued)

SCIENCE AND TECHNOLOGY: Understanding the relationship between science and technology to design and construct devices to solve problems.

The student will:

- Explain that using technology involves benefits and risks.
- Explore why people make or invent new things to meet their own wants and needs.
- Predict how building or trying something new might affect other people and the environment.
- Communicate orally, pictorially or through writing the design process used to make something.

SCIENTIFIC INQUIRY: Using scientific processes to ask questions, conduct investigations, gather, analyze and communicate information.

The student will:

- Ask "How can I/we" questions.
- Ask "How do you know" questions in appropriate situations and attempt to give reasonable answers when others ask questions.
- Explore "how" questions of other students.
- Use the correct safety processes when completing a science experiment.
- Use evidence to come up with explanations of scientific investigations.
- Understand that explanations are made when responding to an observation or event.
- Use the correct tools to gather data.
- Measure properties of objects using tools such as rulers, balances and non-breakable thermometers.
- Share explanations to give others the chance to ask questions, review the evidence and suggest other explanations.

SCIENTIFIC WAYS OF KNOWING: Learning how to think scientifically and understanding how people have shaped the study and practice of science.

The student will:

- Describe that scientific investigations usually work the same way under the same conditions.
- Explain why scientists review and ask questions about the results of other scientists' work.
- Describe ways where using the answer to a problem might affect other people and the environment.
- Show that in science it is helpful to work with a team and share findings with others.

SCIENCE EXIT SKILLS
GRADE THREE

- The student will identify and describe the characteristics of different types of rocks and soils.

- The student will identify and explain steps in the life cycle animals.

- The student will identify the relationships of organism's adaptations to their environment.

- The student will explain how motion and speed of objects is affected by gravity, force, friction and magnetism.

- The student will give accurate presentations with regard to the interpretation and record keeping of data.

- The student will identify and explain the basic safety procedures used in science lab settings.

- The student will understand that science careers are universal.

SCIENCE EXIT SKILLS
GRADE FOUR

- The student will define and describe changes in the Earth's surface and how they occur to include: weathering, erosion, deposition.

- The student will define and explain the basic principles of weather to include: atmosphere, precipitation, symbols, maps, fronts, etc.

- The student will define plant adaptations with regards to: characteristics, life cycles, and survival strategies.

- The student will list and explain the difference between chemical change and physical change.

- The student will explain and give examples of the value of new technology to human lives through areas such as agriculture, health, and communication.

- The student will accurately and appropriately use devices and instruments to measure, record, and analyze data.

- The student will analyze and record cycles and patterns in nature and explain the importance of these cycles and patterns: seasons, weather climates, migrations.

- The student will employ, explain, and demonstrate understanding of the scientific method in the completion of projects.

SCIENCE EXIT SKILLS
GRADE FIVE

- The student will define scientific investigation and identify steps involved.
- The student will be able to create, follow, and explain a simple procedure to carry out an investigation.
- The student will use appropriate instruments safely to observe, measure, and collect data when conducting a scientific investigation.
- The student will correctly use data to make an inference and support that inference with facts and logic.
- The student will explain the relationship of the Sun, Moon, and Earth and the effects on tides, phases and eclipses.
- The student will describe the Earth's resources and the ways in which they can be preserved.
- The student will analyze weather and changes that occur over a period of time.
- The student will differentiate between the life cycles of different plants and animals and explain the functions needed for survival.
- The student will summarize the way changes in temperature can be produced and thermal energy transferred.
- The student will explain and trace how electric energy flows through a simple circuit.
- The student will describe the properties of light and sound energy.
- The student will describe how technology affects human life and its importance to science.
- The student will describe and illustrate the design process.

SCIENCE EXIT SKILLS
GRADE SIX

EARTH AND SPACE SCIENCES: Understanding the interconnected cycles and systems of the universe, solar system and Earth.

The student will:

- Describe the rock cycle and explain that there are sedimentary, igneous and metamorphic rocks that have distinct properties and are formed in different ways.
- Explain that rocks are made of one or more minerals.
- Identify minerals by their properties.

LIFE SCIENCES: Understanding the structure and function of living systems and how they interact with the environment.

The student will:

- Explain that many of the basic functions of organisms are carried out by or within cells and are similar in all organisms.
- Explain that multi-cellular organisms have a variety of cells, tissues, organs, and organ systems that perform certain functions.
- Understand how plant cells differ from animal cells.
- Recognize that an organism does not live forever, therefore reproduction is necessary for the continuation of a species. Traits are passed on to the next generation through reproduction.
- Describe that in sexual reproduction an egg and a sperm unite and some traits come from each parent. Therefore, the offspring is never exactly like either of the parents.
- Recognize that the similarities between parents and their offspring, such as eye color, are inherited.
- Describe how organisms may interact with one another.

PHYSICAL SCIENCES: Understanding physical systems, concepts and properties of matter, energy, forces and motion.

The student will:

- Explain that equal volumes of different substances usually have different masses.
- Describe that in a chemical change new substances are formed with different properties than the original substance.
- Describe that in a physical change the chemical properties no not change.
- Explain that the energy found in nonrenewable resources, such as fossil fuels, originally came from the sun and may renew slowly over millions of years.
- Describe how electric energy can be produced from a variety of sources such as the sun, wind or coal.

SCIENCE EXIT SKILLS
GRADE SIX (continued)

SCIENCE AND TECHNOLOGY: Understanding the relationship between science and technology to design and construct devices to solve problems.

The student will:

- Explain how technology influences the quality of life.
- Explain how decisions about the use of the products and systems can result in desirable or undesirable social and environmental consequences.
- Design and build a product or create a solution to a problem given on constraint or limitation.

SCIENTIFIC INQUIRY: Using scientific processes to ask questions, conduct investigations, gather, analyze and communicate information.

The student will:

- Choose the correct tools or instruments and use safety procedures to complete a scientific investigation.
- Know the difference between an observation and an inference.
- Explain that a single example can never prove that something is always correct, but sometime a single example can disprove something.

SCIENTIFIC WAYS OF KNOWING: Learning how to think scientifically and understanding how people have shaped the study and practice of science.

The student will:

- Identify that hypotheses are valuable, even when they are not supported.
- Describe why it is important to keep clear, thorough and accurate records.
- Describe how the pursuit of scientific knowledge can benefit any career or even daily life.
- Research how men and women of all countries and cultures have contributed to science.

SCIENCE EXIT SKILLS
GRADE SEVEN

- The student will select and use correctly the appropriate tools for microscopic observation (microscopes, slides, and specimens). The student will:
    - identify parts of a microscope
    - correctly prepare slides for lab observations
    - correctly handle specimens
    - demonstrate understanding of the operation of a microscope
    - use the microscope appropriately and correctly during lab work.

- The student will demonstrate the skills of the scientific inquiry process and will define investigation, observation, experiment and identify components of each. The student will use appropriate means for making an observation.

- The student will group objects and life forms in terms of their similarities and characteristics in lab activities.

- The student will employ the Scientific Method in research and completion of the required Science Fair Project.

- The student will distinguish between the Plant and Animals Kingdom:
    - use of sunlight to make food
    - characteristics of each group
    - many organisms can not be neatly classified as either plants of animals
      (Fungi, Protist, and Moneran Kingdoms).

- The student will explain how energy entering ecosystems supports the life of organisms through photosynthesis and the transfer of energy through organisms and the environment.

- The student will explain renewable and nonrenewable resources and their importance to our environment now and in the future.

SCIENCE EXIT SKILLS
GRADE EIGHT

- The student will define and explain the scientific method; the student will show or explain the relationship of the
  Scientific method to the historical advances of science. The student will provide examples in these explanations.
    - The student will define and differentiate between:
        - fact and opinion
        - inference and observation
        - safety symbols
        - safety rules and procedures.

- The student will define, explain, and demonstrate proper procedures for safe conduct in laboratory practices.

- The student will define matter and atoms; will explain the relationship of matter and atoms in chemical and physical changes with earth process:
    - physical and chemical changes
    - the nature of atoms
    - properties of matter
    - matter and changes.

- The student will define and explain earth forming and changing processes:
    - gravity and magnetic forces
    - earth cycles and processes:
        - plate theory and movements
        - natural processes
        - oceanic interactions.

- The student will explain the interactions of planets and the sun within the solar system.

- The student will explain and identify examples of the Mendelian concept of genetics.

- The student will explain the basic concepts of motion and forces and will apply formulas to lab situations.

SCIENCE EXIT SKILLS
NINTH GRADE SCIENCE

- The student will accurately use the Scientific Method and the metric system:
  - demonstrate understanding in using tools; identify and define units
  - demonstrate understanding of the Scientific Method by simple problem solving set-ups
  - explain and differentiate observation and inference.

- The student will demonstrate understanding of the basic principles of matter:
  - identify and define matter, element, atom, compound, pure substance, mixture, and molecule as they relate to homogeneous and heterogueous matter
  - explain the kinetic theory of matter
  - identify and define physical/chemical properties versus physical/chemical changes
  - explain the changes of states of matter in relation to temperature and energy.

- The student will demonstrate understanding of basic atomic structure:
  - will identify and define parts of atoms
  - reading PTOE
  - identify and define valence electrons, ionic charges, and isotopes
  - explain and define types of bonding: inoic, covalent, metallic
  - demonstrate understanding in balancing chemical equations, naming and writing formulas and compounds.

- The student will define and explain concepts of energy and Newton's Laws of Motion:
  - will apply this to everyday examples
  - basic formulas: s= d/t; v= s+dir; p= mXv; a= $\frac{fv - ov}{t}$; w= fXd ; p=$\frac{w}{t}$; KE= 1/2mv ; PE = mgh
  - conseration of energy: explain that energy may change formand be redistributed but total E is conserved
  - waves have energy and can transfer E in interactions

- The student will identify and apply knowledge of basic earth processes to include:
  - cycles
  - earth changing processes:
  - weathering and erosion; weather and weather phenomenon.
  - stars and celestial objects: formations and composition
  - fossil record/geologic record: timeline of Earth's history and history of life on Earth.

SCIENCE EXIT SKILLS
GENERAL BIOLOGY

- The student will define and explain environmental interactions to include:
    - matter, energy, and organization in living systems
    - behavior of organisms
    - natural resources
    - environmental quality.
    -
- The student will explain cellular functions including:
    - main ideas of cell theory
    - structure and function of cells
    - energy in cells
    - reproduction

- The student will explain genetic concepts related to simple Mendelian genetics and human genetics to include:
    - meiosis
    - DNA and genes
    - patterns of heredity
    - human genetics
    - genetic technology.

- The student will classify organisms based upon a set of characteristics to include:
    - taxonomy and phylogeny
    - cladistics

- The student will identify and explain the characteristics of plants to include:
    - vocabulary
    - vascular and nonvascular plants structure and function
    - reproduction cycles.

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SCIENCE EXIT SKILLS
GENERAL BIOLOGY

- The student will identify and explain the characteristics of animals, both simple and complex, to include:
    - structure
    - function
    - vocabulary
    - relationships to other organisms.

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- The student will identify and draw molecular configurations of life process to include:
    - Kreb cycle
    - Calvin cycle
    - Biochemistry.

- The student will design and implement an experiment to include:
    - Proper safety rules
    - Scienctific method.

SCIENCE EXIT SKILLS
HONORS BIOLOGY

- The student will define and explain environmental interactions to include:
    - how organisms interact
    - homoestasis in communities
    - biomes and their characteristics
    - population dynamics
    - effects of human activity on our resources.

- The student will explain cellular functions with emphasis on eukaryotic cell structure and function.

- The student will explain genetic concepts related to simple Mendelian genetics and human genetics with emphasis on:
    - mitosis and meiosis
    - protein synthesis
    - patterns of heredity
    - DNA technology.

- The student will classify organisms based upon a set of characteristics to include Binomial nomenclature and use of an everyday classification system.

- The student will identify and explain the characteristics of plants to include:
    - classification
    - reproduction.

- The student will identify and explain the characteristics of animals, both simple and complex, to include:
    - classification and hierarchy
    - reproductive characteristics.

- The student will identify and draw molecular configurations of life process to include:
    - elements and atoms
    - interactions of matter
    - organic structures.

- The student will categorize the different kinds of viruses and bacteria to include:
    - the different reproductive cycles of viruses and bacteria
    - cause and effect of diseases caused by these agents.

- The student will construct and implement a scientific investigation.

SCIENCE EXIT SKILLS
EARTH SCIENCE

- The student will design, implement and extend laboratory investigations while implementing proper laboratory safety practices and proper laboratory procedures.

- The student will identify and define atmospheric conditions and explain how the conditions affect weather and weather patterns:
    - humidity
    - cloud patterns
    - pressure systems.

- The student will identify forces that change the earth and deform the crust by define the following terms and explaining the processes involved:
    - crust
    - erosion
    - plate tectonics
    - volcanoes
    - earthquakes.

    - key vocabulary
    - main concepts and diagrams
    - affects on populations

- The student will identify and explain the composition of the earth; will identify and define material formed in the earth to include:
    - rocks
    - minerals
    - natural resources
    - rock cycle
    - resource uses
    - mineral uses.

- The student will explain earth's history based on evidence provided by rock and fossil records.

- The student will identify, characterize, and explain structures in space and explain the relationships among the various structures to include planets, stars, and universes.

SCIENCE EXIT SKILLS
HUMAN ANATOMY

- The student will identify and define the characteristics of the anatomical surface of the human body.

- The student will identify and explain the functioning of the following body systems:
- Integumentory
    - Skeletal (including articulations)
    - Muscular
    - Nervous
    - Circulatory
    - Digestive
    - Urinary
    - Respiratory
    - Endocrine
    - Reproductive (embryology)

- The student will explain the physiology of all the systems to include cellular functions and balance of homeostasis .

- The student will explain the relationship between the systems and how they work together with focus on:
    - maintaining homeostasis
    - carrying out life's functions.

- The student will identify different pathologies of all systems.

- The student will list and define occupational positions in the allied health field.

SCIENCE EXIT SKILLS
PHYSICS

- The student will use both quantitative and qualitative properties to describe one- and two-dimensional motion of simple and complex situations.

- The student will use Newton's Laws to describe the forces related to motion.

- The student will describe the theories and properties of waves, light, and sound.

- The student will describe both simple and complex DC circuits and simple electric field concepts.

- The student will relate the phenomenon of magnetism to electricity and moving charge.

SCIENCE EXIT SKILLS
CHEMISTRY

- The student will convert metric and SI units of measurement.

- The student will identify and explain atomic structure and will assign electron configurations.

- The student will use periodic trends to predict properties of elements.

- The student will write chemical formulas, name chemical compounds, and predict types of bonds.

- The student will use stoichiometry to mathematically describe reactions.

- The student will use physical properties of gases to predict their behavior.

- The student will use solution concentration concepts to predict both quantitative and qualitative properties of solutions.

- The student will use acid base theories to examine both the mathematical and qualitative properties of Ionization Constants.

- The student will apply chemical equilibrium concepts to predict products of reactions and solubility of compounds.

- The student will use energy concepts to explain and predict why reactions occur.

SCIENCE EXIT SKILLS
CHEM COM

- The student will apply the following chemistry concepts to real world situations:
    - Mass and matter
    - Convert units of measurement
    - Atomic structure and electron configuration
    - Periodic trends
    - Chemical bonding, formulas, and equations
    - Gas laws
    - Acids and bases and ph.

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