



# ICP (Integrated Chemistry-Physics)

## Essential Learnings

### Quarter View

Our district is committed to providing a guaranteed and viable curriculum for all students. A guaranteed curriculum ensures all students have the opportunity to learn the same essential learnings. A viable curriculum ensures it is possible for all students to learn in the allotted time. The quarter view below lists the essential learnings (EL's) students will be taught and assessed during each nine (9) week quarter. The goal is for every student to become proficient in every essential learning by the end of the school year.

#### 1st Quarter

- **EL #1 Describing Motion**
  - Describe an object's velocity given a graphical representation.
  - Illustrate position/time graphs.
  - Describe an object's velocity given a graphical representation.
  - Define the terms distance, displacement, speed, velocity, average speed, and average velocity.
  - Describe distance and displacement given a graphical representation.
  - Analyze position/time graphs.
  - Define the terms distance, displacement, speed, velocity, average speed, and average velocity.
  - Distinguish between speed and velocity.
  - Calculate speed, velocity, distance, or time.
  - Illustrate position/time graphs.
  - Define the terms distance, displacement, speed, velocity, average speed, and average velocity.
- **EL #2 Newton's First Law of Motion**
  - Illustrate forces acting on an object
  - Define the terms inertia, equilibrium, static equilibrium, and dynamic equilibrium.
  - Explain Newton's First Law.
  - Distinguish between static and dynamic equilibrium.
  - Predict the motion of an object based on its net force.
  - Identify the meaning of  $\Sigma F=0$ .
  - Identify forces at work in a system that's in equilibrium.
  - Define the terms force, net force, friction, support force, contact force, and field force.
  - Calculate net force.
  - Illustrate forces acting on an object
  - Define the terms force, net force, friction, support force, contact force, and field force.
  - Categorize forces as contact or field forces.
- **EL #3 Newton's Second Law of Motion**
  - Illustrate velocity/time graphs.

- Analyze velocity/time graphs.
- Define the terms gravity and free fall.
- Describe how objects in free fall accelerate at the same rate.
- Determine the velocity and acceleration at various positions of a vertically-thrown object.
- Define the term acceleration.
- Identify the cause of acceleration. (unbalanced forces)
- Explain Newton's second law of motion.
- Calculate net force given mass and acceleration.
- Calculate acceleration using  $a = F/m$ .

- **EL #4 Newton's Third Law of Motion**

- Define the term interaction.
- Describe the forces in an interaction.
- Explain Newton's third law of motion.
- Given an interaction, identify the action and reaction.
- Identify whether or not forces are paired.
- Describe the accelerations of objects in an interaction.
- Explain how objects in an interaction experience different accelerations.
- Combine Newton's Third Law with Newton's Second Law and apply them to various situations.

- **EL #5 Energy**

- Define the terms energy, potential energy, and kinetic energy.
- Define the terms energy, potential energy, and kinetic energy.
- Distinguish between potential energy and kinetic energy.
- Calculate potential energy.
- Calculate kinetic energy.
- Identify various forms of energy.
- Analyze systems for transformation or transfer of energy.

- **EL #6 Thermal Energy, Temperature, and Heat**

- Define the term heat, conduction, convection, and radiation.
- Distinguish among the ways that heat moves.
- Define the terms temperature and thermal energy.
- Describe the concept of temperature.
- Define the terms temperature and thermal energy.
- Convert temperatures between Fahrenheit, Celsius, and Kelvin.

- EL #7 Solids, Liquids, and Gases

- Explain the Kinetic-Molecular Theory of Matter.
- Develop pictorial representations which show that matter is made of particles.
- Explain the Kinetic-Molecular Theory of Matter.
- Explain the behaviors of gases, liquids, and solids using kinetic theory.
- Define the terms pressure and gas pressure.
- Identify factors that affect gas pressure.
- Predict changes in gas pressure due to changes in temperature, volume, and number of particles.
- Explain the Kinetic-Molecular Theory of Matter.
- Explain the behaviors of gases, liquids, and solids using kinetic theory.
- Describe attractive forces present in solids and liquids
- Define the term *density*, *mass*, and *volume*.
- Calculate the density of an object.
- Illustrate density graphs.
- Analyze density graphs.
- Develop pictorial representations which show that matter is made of particles.
- Define the term *density*, *mass*, and *volume*.

## 2nd Quarter

- EL #8 Elements, Compounds, and Mixtures

- Define the terms atom, element, mixture, and compound.
- Distinguish among elements, mixtures, and compounds.
- Model elements, mixtures, and compounds.
- Identify symbols used to represent elements.
- Distinguish among elements, mixtures, and compounds.
- Model elements, mixtures, and compounds.
- Identify a sample as an element, compound, or a mixture.
- Identify whether or not samples are pure substances.
- Distinguish among elements, mixtures, and compounds.
- Model elements, mixtures, and compounds.

- EL #9 Atoms and the Periodic Table

- Define the terms *nucleus*, *atom*, *proton*, *electron*, and *neutron*.
- Identify the three subatomic particles.
- Compare the properties of the three subatomic particles
- Model neutral atoms.
- Define the terms *atomic number*, *mass number*, *atomic mass*, *period*, and *group*.
- Use the Periodic Table to determine atomic number, and atomic mass.
- Given sufficient information, identify the number of protons, neutrons, and electrons or mass number for any given atom.
- Distinguish mass number from atomic mass.
- Identify the significance of elements in the same group or the same period on the Periodic Table.

- Describe the structure of an atom.
- Model neutral atoms.

- **EL #10 Balancing Equations**

- Define the terms chemical reaction, chemical equation, reactant, and product.
- Identify the reactants and products in a chemical equation.
- Define the terms chemical reaction, chemical equation, reactant, and product.
- Given the reactants and products, balance chemical equations.
- Describe the Law of Conservation of Matter.
- Define the terms synthesis, decomposition, combustion, single replacement, and double replacement.
- Identify various types of chemical changes as synthesis, decomposition, combustion, single replacement, or double replacement.

- **EL #12 Electricity**

- Define the terms current, voltage, and resistance.
- Using Ohm's Law, calculate current, voltage, and resistance.
- Define the term circuit
- Describe the functions and use symbols for the following parts of a circuit: wire, battery, light bulb, resistor, and switch.
- Distinguish between series and parallel circuits.
- Calculate current, resistance, and voltage in series and parallel circuits and their various parts.

- **EL #13 Magnetism**

- Explain that opposites attract and likes repel.
- Define the terms magnetic field and magnetic domain.
- Explain what happens to the poles of a bar magnet if it is broken.
- Describe how magnetism is created.
- Describe how magnetic domains determine the strength of a magnet.
- Draw the magnetic fields created around stationary bar magnets and current-carrying wires.

- **EL #14 Waves**

- Define the terms transverse wave and longitudinal wave.
- Model transverse and longitudinal waves.
- Identify various ways that waves appear in nature. (light, water in tsunamis, sound, earthquakes)
- Define the terms frequency, wavelength, and amplitude.
- Calculate the speed, frequency, or wavelength of a wave.
- Define the terms reflection, refraction, and diffraction.
- Explain what happens to a wave when it encounters a free or fixed boundary.
- Define the terms constructive interference, destructive interference, standing wave, node, and antinode.
- Model constructive and destructive interference.
- Give examples and describe how modern technology uses waves to transmit information.

- EL #15 Nuclear Energy

- Define the terms isotope, fission, fusion, and radioactivity.
- Define the terms isotope, fission, fusion, and radioactivity.
- Model fission, fusion, and radioactive decay.
- Distinguish among fission, fusion, and radioactivity in terms of energy released.
- Define the terms isotope, fission, fusion, and radioactivity.
- Explain the risks and reward to using nuclear processes for practical applications.