

# Science ISAT: General Science – Physical Science

## Skills: Understand the Structure and Function of Matter and Molecules and their Interactions

**Students:**

**RIT Above 250:**

- Analyzes data about phase changes in matter

**Students:**

**RIT 241-250:**

- Describes ductility
- Gives examples of solutions
- Evaluates strategies for the qualitative analysis of a given mixture
- Utilizes classification systems for elements

**Students:**

**RIT 231-240:**

- Selects the appropriate relationship to convert units using dimensional analysis strategies
- Describes constancy of mass during a physical or chemical change in a system
- Defines chemical property
- Distinguishes among examples of physical and chemical properties
- Classifies mixtures based on their properties
- Defines solute
- Recognizes characteristics of compounds

**Students:**

**RIT 221-230:**

- Understands that air and other gases have mass
- Evaluates to determine the best substance for a given application based on data describing physical properties of substances
- Makes inferences about appropriate uses of materials from results of tests of properties (e.g., hardness, tensile strength, conductivity)
- Describes objects in terms of mass
- Recognizes that mass is measured in grams
- Identifies the tools needed to determine the volume of an irregularly shaped object
- Identifies tools needed to calculate the density of an irregularly-shaped object
- Calculates density of objects, using supplied data
- Recognizes that conductivity of a substance depends on the freedom of electrons to move from ion to ion of the substance
- Performs metric conversions (e.g., milliliters to microliters)
- Describes physical changes in matter (e.g., changes in size, shape, freezing, melting, dissolving)
- Explains how the addition or loss of heat changes matter (e.g., physical change)
- Describes examples of physical change
- Gives examples of chemical change
- Infers that a chemical change has occurred
- Describes chemical properties of substances
- Explains that removing heat will cause a substance to change from gas to liquid or from liquid to solid form
- Generalizes how changes in temperature affect the behavior of gas
- Describes the relative spacing of particles in solids, liquids, and gases
- Describes physical properties of metals

**Students:**

**RIT 211-220:**

- Identifies the tools and units used to measure weight
- Makes inferences about the relative mass of objects based on data
- Recognizes that on a given planet, objects with the same weight will also have the same mass
- Recognizes that volume is measured in milliliters or liters
- Measures the volume of liquid in a graduated cylinder
- Understands that in the SI system, length is measured in meters, kilometers, centimeters
- Estimates length of common objects using metric units
- Recognizes that base unit for length in the SI system is the meter
- Predicts how changes in temperature will affect the density of an object
- Predicts how objects of differing density will behave when combined
- Explains that objects of differing density will layer when combined
- Defines melting point
- Defines boiling point
- Describes characteristics of physical change
- Describes characteristics of a chemical change

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- Gives examples of chemical change
- Describes properties of solutions
- Describes properties of mixtures
- Gives examples of mixtures
- Understands that evaporation can be used to separate solutions
- Describes properties of gases
- Classifies unknown substances as liquids, based on their properties
- Recognizes properties of gases
- Describes the process of condensation
- Describes the process of freezing in terms of phase changes
- Explains that removing heat will cause a substance to change from gas to liquid or from liquid to solid form
- Gives examples of substances which have undergone a change of state
- Describes how changes in temperature affect the pressure of a gas in a container where volume is held constant
- Describes the relative freedom of motion of particles in solids, liquids, and gases
- Explains that as heat is applied to a substance, the particles making up the substance move farther apart
- Recognizes that as heat is applied to a solid, its molecules move farther and farther apart
- Interprets diagrams showing the relative spacing and movement of matter in different phases
- Recognizes that elements do not break down under normal lab conditions
- Describes characteristics of elements
- Gives an example of an element
- Recognizes symbols for elements and compounds
- Understands the rules of scientific nomenclature of elements and compounds
- Determines the number of atoms in a compound when given its formula
- Describes characteristics of compounds

### Students:

#### RIT 201-210:

- Defines matter as anything that takes up space and has mass
- Recognizes that a magnifier allows one to see details that are not otherwise visible
- Compares objects in terms of mass
- Determines the volume of an object using the displacement method
- Estimates length of common objects using metric units
- Compares objects in terms of density
- Predicts how changes in temperature will affect the density of an object
- Defines density
- Recognizes that when one divides mass by volume, one is calculating density
- Infers that an object is more dense than an object with the same volume, based on differences in mass (as measured by a double-pan balance)
- Gives examples of changes in which new substances with new chemical properties are produced
- Defines mixture
- Names the three different states of matter
- Describes how water exists in three states
- Recognizes that water expands as it freezes
- Describes the process of evaporation
- Recognizes that evaporation changes a liquid to a gas
- Gives examples of evaporation
- Relates surface area to evaporation
- Describes the process of evaporation in terms of the changes to the molecules involved
- Describes the process of freezing
- Describes applications of differential expansion of metals
- Explains that heating or cooling materials can cause their state to change
- Explains that matter can change from one physical state to another
- Predicts, using real-life data, how changes in temperature will affect the volume of a gas
- Explains that as heat is applied to a substance, the particles making up the substance increase their motion
- Describes characteristics of elements
- Identifies elements based on their physical characteristics
- Recognizes symbols for elements and compounds
- Determines the number of atoms in a compound when given its formula

### Students:

#### RIT 191-200:

- Generalizes that all physical objects are made of matter
- Infers that the more matter in an object, the greater the mass of that object
- Determines the volume of an object using the displacement method
- Recognizes that adding an object to a container of water will raise the water level within the container
- Relates density to the ability to sink or float
- Infers the mass of objects with identical volume, based on their buoyancy

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- Distinguishes between chemical and physical changes
- Describes ways to separate mixtures
- Names the three different states of matter
- Describes basic properties of solids, liquids, and gases
- Gives examples of solids
- Classifies objects as solids, liquids, or gases
- Recognizes that water can undergo changes in state (e.g., solid, liquid, gas)
- Recognizes that ice is the solid form of water
- Describes the process of evaporation
- Describes the process of melting
- Makes inferences about phase changes in matter
- Gives examples of forms of matter which have undergone a change from liquid to solid form
- Describes the shape of crystals

### Students:

#### RIT 181-190:

- Recognizes that physical properties can be measured using tools
- Identifies tools used to measure length
- Recognizes that temperature is measured in degrees
- Gives examples of gases
- Classifies objects as liquids
- Classifies objects as gases
- Gives examples of water in each state of matter
- Explains that the amount of water in an open container will decrease because it goes into the air, but the amount of water in a closed container will remain the same
- Interprets data related to freezing

### Students:

#### RIT Below 181:

- Sorts natural and manufactured materials by weight
- Classifies objects as liquids