DesCartes (Combined)

# Subject: General Science Goal: Physical Science

# Subject: General Science Goal Strand: Physical Science RIT Score Range: Below 181

Skills and Concepts to Develop Below 181	Skills and Concepts to Introduce 181 - 190
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Sorts natural and manufactured materials by weight*</li> <li>Classifies objects as liquids*</li> </ul>	<ul> <li>Classifies materials according to their magnetism*</li> <li>Recognizes that physical properties can be measured using tools*</li> <li>Identifies tools used to measure length</li> <li>Recognizes that temperature is measured in degrees*</li> <li>Gives examples of gases*</li> <li>Classifies objects as liquids*</li> <li>Classifies objects as gases</li> <li>Gives examples of water in each state of matter</li> <li>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*</li> <li>Interprets data related to freezing*</li> </ul>
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
<ul> <li>Recognizes that pushing or pulling an object can cause a change in the object's position and motion*</li> </ul>	<ul> <li>Relates movement of objects to the application of force*</li> <li>Describes everyday situations in terms of forces*</li> <li>Infers how the size and structure of a wheel determines its usefulness*</li> <li>Recognizes that wheels make it easier to push heavy objects*</li> <li>Describes how sound is transmitted*</li> </ul>
Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
<ul> <li>Recognizes that things that give off light often also give off heat*</li> <li>Identifies objects that produce color from white light*</li> </ul>	<ul> <li>Gives examples of forms of energy*</li> <li>Explains that energy is needed to do work*</li> <li>Identifies uses of energy*</li> <li>Infers that shiny objects reflect light*</li> <li>Recognizes that magnets can move some things without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> </ul>

	<ul> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without touching, pulling all objects toward Earth*</li> <li>Explains that gravity pulls on all objects on or near Earth towards Earth's center*</li> </ul>
<i>New Vocabulary:</i> cloud, fog, gas, hail, ice, sleet, smog, snow	<i>New Vocabulary:</i> attract, balance (scale), calorie, cohesion, conservation, Coriolis force, degree, efficiency, electrical force, friction, load, magnet, magnetic field, magnetism, magnifying glass, measuring cup, metal, polarization, sand, spring scale, surface, tool, unit of measure, work
New Signs and Symbols: none	New Signs and Symbols: none

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# Subject: General Science Goal Strand: Physical Science RIT Score Range: 181 - 190

Skills and Concepts to Enhance Below 181	Skills and Concepts to Develop 181 - 190	Skills and Concepts to Introduce 191 - 200
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Sorts natural and manufactured materials by weight*</li> <li>Classifies objects as liquids*</li> </ul>	<ul> <li>Classifies materials according to their magnetism*</li> <li>Recognizes that physical properties can be measured using tools*</li> <li>Identifies tools used to measure length</li> <li>Recognizes that temperature is measured in degrees*</li> <li>Gives examples of gases*</li> <li>Classifies objects as liquids*</li> <li>Classifies objects as gases</li> <li>Gives examples of water in each state of matter</li> <li>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*</li> <li>Interprets data related to freezing*</li> </ul>	<ul> <li>Generalizes that all physical objects are made of matter</li> <li>Infers that the more matter in an object, the greater the mass of that object*</li> <li>Classifies materials according to their magnetism*</li> <li>Determines the volume of an object using the displacement method*</li> <li>Recognizes that adding an object to a container of water will raise the water level within the container*</li> <li>Relates density to the ability to sink or float*</li> <li>Infers the mass of objects with identical volume, based on their buoyancy*</li> <li>Distinguishes between chemical and physical changes*</li> <li>Describes ways to separate mixtures*</li> <li>Names the three different states of matter</li> <li>Describes basic properties of solids, liquids, and gases</li> <li>Gives examples of solids*</li> <li>Classifies objects as solids, liquids, or gases*</li> <li>Recognizes that ice is the solid form of water*</li> <li>Describes the process of melting</li> <li>Makes inferences about phase changes in matter</li> <li>Gives examples of forms of matter which have undergone a change from liquid to solid form*</li> <li>Explains that all matter is made of tiny particles called atoms*</li> </ul>
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
• Recognizes that pushing or pulling an object can cause a change in the object's position and motion*	<ul> <li>Relates movement of objects to the application of force*</li> <li>Describes everyday situations in terms of forces*</li> <li>Infers how the size and structure of a wheel determines its usefulness*</li> <li>Recognizes that wheels make it easier to push heavy</li> </ul>	<ul> <li>Interprets graphs of motion*</li> <li>Defines a force as a push or pull on an object</li> <li>Applies Newton's second law (the interrelationship between force, mass, and acceleration) to everyday objects, such as teeter-totters/see-saws*</li> <li>Gives examples of simple machines*</li> </ul>

	objects*	<ul> <li>Describes parts of a first class lever*</li> </ul>
	<ul> <li>Describes how sound is transmitted*</li> </ul>	<ul> <li>Classifies machines as simple or complex*</li> </ul>
	· Describes now sound is transmitted	<ul> <li>Dradicts how a lower will act in a given situation*</li> </ul>
		• Fredicis now a lever will act in a given situation
		• Calculates work
		• Understands that work is dependent on force and
		distance
		• Explains how sound is produced
		• Makes inferences about echoes*
		• Understands that longer tubes and strings produce
		"lower" sounds than shorter tubes and strings (term "pitch" not used)*
		• Explains that sound moves through objects by causing particles to vibrate*
		Defines volume*
		Defines vibration*
		<ul> <li>Explains that the observed speed at which an object is</li> </ul>
		moving can vary, depending on how fast the observer
		is moving; however, for light this is not true*
Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
Recognizes that things that give off light often also give	<ul> <li>Gives examples of forms of energy*</li> </ul>	Compares electrical insulating ability of different
off heat*	• Explains that energy is needed to do work*	materials*
• Identifies objects that produce color from white light*	• Identifies uses of energy*	<ul> <li>Gives examples of electrical conductors*</li> </ul>
	• Infers that shiny objects reflect light*	<ul> <li>Analyzes parallel circuits*</li> </ul>
	• Recognizes that magnets can move some things	• Makes inferences about the working of circuits
	without touching them*	<ul> <li>Recognizes a simple circuit*</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without tenching multiple in the force of gravity acts at a distance, without tenching multiple in the force of gravity acts at a distance, and the force of gravity acts at a distance.</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> <li>Explains why light-colored objects feel cooler than dark colored chiester</li> </ul>
	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without touching, pulling all objects toward Earth*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> <li>Explains why light-colored objects feel cooler than dark colored objects*</li> </ul>
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	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without touching, pulling all objects toward Earth*</li> <li>Explains that gravity pulls on all objects on or near Earth towards Earth's center*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> <li>Explains why light-colored objects feel cooler than dark colored objects*</li> <li>Recognizes that an electrically charged substance will attract or repel other charged materials*</li> <li>Gives examples of static electricity*</li> </ul>
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	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without touching, pulling all objects toward Earth*</li> <li>Explains that gravity pulls on all objects on or near Earth towards Earth's center*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> <li>Explains why light-colored objects feel cooler than dark colored objects*</li> <li>Recognizes that an electrically charged substance will attract or repel other charged materials*</li> <li>Gives examples of static electricity*</li> <li>Analyzes the charging of objects due to transfer of electrons by friction*</li> </ul>
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	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without touching, pulling all objects toward Earth*</li> <li>Explains that gravity pulls on all objects on or near Earth towards Earth's center*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> <li>Explains why light-colored objects feel cooler than dark colored objects*</li> <li>Recognizes that an electrically charged substance will attract or repel other charged materials*</li> <li>Gives examples of static electricity*</li> <li>Analyzes the charging of objects due to transfer of electrons by friction*</li> <li>Recognizes that magnets' forces can pass through paper, glass, and water*</li> </ul>
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	<ul> <li>without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that magnets attract certain other types of materials*</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without touching, pulling all objects toward Earth*</li> <li>Explains that gravity pulls on all objects on or near Earth towards Earth's center*</li> </ul>	<ul> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that we can see objects that do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> <li>Explains why light-colored objects feel cooler than dark colored objects*</li> <li>Recognizes that an electrically charged substance will attract or repel other charged materials*</li> <li>Gives examples of static electricity*</li> <li>Analyzes the charging of objects due to transfer of electrons by friction*</li> <li>Recognizes that magnets' forces can pass through paper, glass, and water*</li> <li>Selects evidence that supports the idea that magnets attract only some kinds of metal*</li> </ul>

		<ul> <li>Defines gravity*</li> <li>Infers that there is a force that keeps us connected to Earth*</li> <li>Explains that gravity pulls on all objects on or near Earth towards Earth's center*</li> </ul>
<i>New Vocabulary:</i> cloud, fog, gas, hail, ice, sleet, smog, snow	<i>New Vocabulary:</i> attract, balance (scale), calorie, cohesion, conservation, Coriolis force, degree, efficiency, electrical force, friction, load, magnet, magnetic field, magnetism, magnifying glass, measuring cup, metal, polarization, sand, spring scale, surface, tool, unit of measure, work	<i>New Vocabulary:</i> attraction, bar magnet, boil, broken (circuit), circuit, circuit breaker, circuit overload, complete (circuit), compound, condense, container, cubic, diffuse, direct (sunlight), discharge, dissolve, echo, electrical conductor, electrical energy, electrical outlet, electromagnetism, element, equilibrium, evaporate, field, fulcrum, fuse, fused (circuit), ground, ground wire, heat energy, high-pitched, hydrogen, insulate, lever, light switch, lightning, loud, low-pitched, lubricant, melt, mix, nitrogen, nonmetal, particle, penetrate, phase, physical universe, pitch, polar attraction, polarize, pulley, reflect, refract, repel, screw, simple circuit, simple machine, solute, solvent, speed of light, speed of sound, state, states of matter, static electricity, substance, thaw, thunder, turning point, vapor, vibrate, vibration, volcanic eruption, waterwheel, wave, wedge, wheel and axle
New Signs and Symbols: none	New Signs and Symbols: none	<i>New Signs and Symbols:</i> N north, S south

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# Subject: General Science Goal Strand: Physical Science RIT Score Range: 191 - 200

Skills and Concepts to Enhance 181 - 190	Skills and Concepts to Develop 191 - 200	Skills and Concepts to Introduce 201 - 210
Structure, Properties and Changes of Matter St	Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Classifies materials according to their magnetism*</li> <li>Recognizes that physical properties can be measured using tools*</li> <li>Identifies tools used to measure length</li> <li>Recognizes that temperature is measured in degrees*</li> <li>Gives examples of gases*</li> <li>Classifies objects as liquids*</li> <li>Classifies objects as gases</li> <li>Gives examples of water in each state of matter</li> <li>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*</li> <li>Interprets data related to freezing*</li> </ul>	<ul> <li>Generalizes that all physical objects are made of matter</li> <li>Infers that the more matter in an object, the greater the mass of that object*</li> <li>Classifies materials according to their magnetism*</li> <li>Determines the volume of an object using the displacement method*</li> <li>Recognizes that adding an object to a container of water will raise the water level within the container*</li> <li>Relates density to the ability to sink or float*</li> <li>Infers the mass of objects with identical volume, based on their buoyancy*</li> <li>Distinguishes between chemical and physical changes*</li> <li>Describes ways to separate mixtures*</li> <li>Names the three different states of matter</li> <li>Describes basic properties of solids, liquids, and gases</li> <li>Gives examples of solids*</li> <li>Recognizes that vater can undergo changes in state (e.g., solid, liquid, gas)*</li> <li>Recognizes the process of evaporation*</li> <li>Describes the process of melting</li> <li>Makes inferences about phase changes in matter</li> <li>Gives examples of forms of matter which have undergone a change from liquid to solid form*</li> <li>Explains that all matter is made of tiny particles called atoms*</li> </ul>	<ul> <li>Defines matter as anything that takes up space and has mass*</li> <li>Recognizes that a magnifier allows one to see details that are not otherwise visible*</li> <li>Compares objects in terms of mass*</li> <li>Determines the volume of an object using the displacement method*</li> <li>Estimates length of common objects using metric units*</li> <li>Compares objects in terms of density*</li> <li>Predicts how changes in temperature will affect the density of an object*</li> <li>Defines density*</li> <li>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)</li> <li>Gives examples of changes in which new substances with new chemical properties are produced*</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> <li>Describes how litmus paper is used to determine whether a substance is an acid or a base*</li> <li>Recognizes which household substance will turn blue litmus paper red, contains one or more hydrogen atoms)*</li> <li>Predicts which household substance will turn blue litmus paper red*</li> <li>Defines mixture*</li> <li>Names the three different states of matter</li> <li>Describes how water exists in three states</li> <li>Recognizes that water expands as it freezes*</li> <li>Describes that a comparison of a sit freezes*</li> <li>Describes that evaporation changes a liquid to a gas*</li> </ul>

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		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
		<ul> <li>Describes applications of differential expansion of metals*</li> </ul>
		• Explains that heating or cooling materials can cause their state to change*
		• Explains that matter can change from one physical state to another*
		<ul> <li>Predicts, using real-life data, how changes in</li> </ul>
		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
		• Explains that the periodic table is organized into rows and columns*
		• Describes characteristics of each subatomic particle*
		• Explains that all matter is made of tiny particles called atoms*
		• Recognizes that atoms are composed of smaller particles (e.g., protons, neutrons, and electrons)*
		<ul> <li>Describes characteristics of elements*</li> </ul>
		<ul> <li>Identifies elements based on their physical</li> </ul>
		characteristics*
		• Recognizes symbols for elements and compounds*
		• Determines the number of atoms in a compound when given its formula*
		• Recognizes signs of a chemical reaction (e.g., formation
		of gas, color change, precipitate)
		• Infers that a chemical reaction has occurred*
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
Relates movement of objects to the application of	<ul> <li>Interprets graphs of motion*</li> </ul>	• Describes how forces may create equilibrium for an
force*	• Defines a force as a push or pull on an object	object*
• Describes everyday situations in terms of forces*	• Applies Newton's second law (the interrelationship	• Analyzes how air resistance influences the relative
• Inters how the size and structure of a wheel determines	between force, mass, and acceleration) to everyday	motion of objects <sup>a</sup>
Recognizes that wheels make it easier to puch because	• Cives examples of simple machines*	<ul> <li>Explains now inclinal forces affect motion<sup>2</sup></li> <li>Identifies types of simple machines<sup>*</sup></li> </ul>
• Accognizes that wheels make it easier to push neavy objects*	<ul> <li>Orves examples of simple machines</li> <li>Describes parts of a first class lever*</li> </ul>	<ul> <li>Gives examples of simple machines*</li> </ul>
<ul> <li>Describes how sound is transmitted*</li> </ul>	<ul> <li>Classifies machines as simple or complex*</li> </ul>	<ul> <li>Defines echo*</li> </ul>
	<ul> <li>Predicts how a lever will act in a given situation*</li> </ul>	<ul> <li>Recognizes that animals may be able to sense pitch</li> </ul>
	• Calculates work*	outside of human hearing ability*

	<ul> <li>Understands that work is dependent on force and distance</li> <li>Explains how sound is produced</li> <li>Makes inferences about echoes*</li> <li>Understands that longer tubes and strings produce "lower" sounds than shorter tubes and strings (term "pitch" not used)*</li> <li>Explains that sound moves through objects by causing particles to vibrate*</li> <li>Defines volume*</li> <li>Defines vibration*</li> <li>Explains that the observed speed at which an object is moving can vary, depending on how fast the observer is moving; however, for light this is not true*</li> </ul>	
<ul> <li>Gives examples of forms of energy*</li> <li>Explains that energy is needed to do work*</li> <li>Identifies uses of energy*</li> <li>Infers that shiny objects reflect light*</li> <li>Recognizes that magnets can move some things without touching them*</li> <li>Generalizes that magnets attract only certain types of metals (e.g., iron)</li> <li>Recognizes that electricity creates magnetic fields*</li> <li>Describes sources of magnetic fields*</li> <li>Recognizes that the force of gravity acts at a distance, without touching, pulling all objects toward Earth*</li> <li>Explains that gravity pulls on all objects on or near Earth towards Earth's center*</li> </ul>	<ul> <li>Compares electrical insulating ability of different materials*</li> <li>Gives examples of electrical conductors*</li> <li>Analyzes parallel circuits*</li> <li>Makes inferences about the working of circuits</li> <li>Recognizes a simple circuit*</li> <li>Gives examples of objects that use electrical energy*</li> <li>Explains that energy is needed to do work*</li> <li>Explains that energy is needed to do not give off light because these objects reflect light*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> <li>Explains why light-colored objects feel cooler than dark colored objects*</li> <li>Recognizes that an electrically charged substance will attract or repel other charged materials*</li> <li>Gives examples of static electricity*</li> <li>Analyzes the charging of objects due to transfer of electrons by friction*</li> <li>Recognizes that supports the idea that magnets attract only some kinds of metal*</li> <li>Makes predictions about the interaction of magnets</li> </ul>	<ul> <li>Analyzes direct current electrical circuits*</li> <li>Gives examples of electrical insulators*</li> <li>Analyzes the parts of a light bulb*</li> <li>Distinguishes between open and closed circuits*</li> <li>Explains how fuses are used in electrical circuits*</li> <li>Understands that sound is a form of energy*</li> <li>Relates kinetic energy to the speed of an object*</li> <li>Interprets diagrams showing conversions between potential and kinetic energy*</li> <li>Recognizes that heat can move from object to object by conduction*</li> <li>Compares ability of materials to conduct heat</li> <li>Predicts how well different volumes of liquid will retain heat*</li> <li>Defines an insulator as a material that blocks the transfer of heat*</li> <li>Makes predictions about the transformation between kinetic and potential energy*</li> <li>Describes the transformations of energy that may occur in electrical systems*</li> <li>Explains that a turbine is a machine that is used in the transformation of mechanical to electrical energy*</li> <li>Understands that black objects absorb more light than lighter colored objects</li> </ul>

	Earth towards Earth's center*	<ul> <li>Explains why magnets attract or repel other magnets*</li> <li>Recognizes that like poles of magnets will repel and that unlike poles will attract*</li> <li>Explains that a compass needle will align to Earth's magnetic north and south poles*</li> <li>Explains why a compass can be used to find north*</li> <li>Determines the relative gravitational attraction among planets based on mass and/or distance*</li> <li>Relates weight to gravity (e.g., if the gravity acting on an object increases, due to a change in distance or a change in mass of the other object, the weight of an object of constant mass will also increase)*</li> <li>Describes the effects of Earth's gravity on objects*</li> </ul>
<i>New Vocabulary:</i> attract, balance (scale), calorie, cohesion, conservation, Coriolis force, degree, efficiency, electrical force, friction, load, magnet, magnetic field, magnetism, magnifying glass, measuring cup, metal, polarization, sand, spring scale, surface, tool, unit of measure, work	<i>New Vocabulary:</i> attraction, bar magnet, boil, broken (circuit), circuit, circuit breaker, circuit overload, complete (circuit), compound, condense, container, cubic, diffuse, direct (sunlight), discharge, dissolve, echo, electrical conductor, electrical energy, electrical outlet, electromagnetism, element, equilibrium, evaporate, field, fulcrum, fuse, fused (circuit), ground, ground wire, heat energy, high-pitched, hydrogen, insulate, lever, light switch, lightning, loud, low-pitched, lubricant, melt, mix, nitrogen, nonmetal, particle, penetrate, phase, physical universe, pitch, polar attraction, polarize, pulley, reflect, refract, repel, screw, simple circuit, simple machine, solute, solvent, speed of light, speed of sound, state, states of matter, static electricity, substance, thaw, thunder, turning point, vapor, vibrate, vibration, volcanic eruption, waterwheel, wave, wedge, wheel and axle	<i>New Vocabulary:</i> air resistance, atomic structure, carbon, chemical property, collide, column, compass, compass needle, compound machine, conduct, conductor, contract, convect, convert, dense, distilled water, electric current, expand, filament, fluctuate, generator, glucose, gravitational attraction, hardness, inclined plane, insulation, insulator, kilowatt hour, kinetic, litmus paper, magnesium, material, mercury (element), minimize, mixture, molecular motion, natural gas, neutral, newton, parallel circuit, percolating, physical union, pole, positively charged, prism, radiate, react, reaction, room temperature, sea level, selenium, series circuit, silver, sound energy, spectrum, stationary, sugar, sulfur/sulphur, texture, thermos jug, tin, transfer, turbine, vaporize, vertical row, vocal cords
New Signs and Symbols: none	<i>New Signs and Symbols:</i> N north, S south	<i>New Signs and Symbols:</i> $C_6H_{12}O_6$ (glucose), Ca (Calcium), C carbon, CO (carbon monoxide), . decimal point, H <sub>2</sub> O, H hydrogen, O oxygen, S sulfur

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# Subject: General Science Goal Strand: Physical Science RIT Score Range: 201 - 210

Skills and Concepts to Enhance	Skills and Concepts to Develop	Skills and Concepts to Introduce
191 - 200	201 - 210	211 - 220
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Generalizes that all physical objects are made of matter</li> <li>Infers that the more matter in an object, the greater the mass of that object*</li> <li>Classifies materials according to their magnetism*</li> <li>Determines the volume of an object using the displacement method*</li> <li>Recognizes that adding an object to a container of water will raise the water level within the container*</li> <li>Relates density to the ability to sink or float*</li> <li>Infers the mass of objects with identical volume, based on their buoyancy*</li> <li>Distinguishes between chemical and physical changes*</li> <li>Describes ways to separate mixtures*</li> <li>Names the three different states of matter</li> <li>Describes basic properties of solids, liquids, and gases</li> <li>Gives examples of solids*</li> <li>Classifies objects as solids, liquids, or gases*</li> <li>Recognizes that vater can undergo changes in state (e.g., solid, liquid, gas)*</li> <li>Recognizes the process of evaporation*</li> <li>Describes the process of melting</li> <li>Makes inferences about phase changes in matter</li> <li>Gives examples of forms of matter which have undergone a change from liquid to solid form*</li> <li>Explains that all matter is made of tiny particles called atoms*</li> </ul>	<ul> <li>Defines matter as anything that takes up space and has mass*</li> <li>Recognizes that a magnifier allows one to see details that are not otherwise visible*</li> <li>Compares objects in terms of mass*</li> <li>Determines the volume of an object using the displacement method*</li> <li>Estimates length of common objects using metric units*</li> <li>Compares objects in terms of density*</li> <li>Predicts how changes in temperature will affect the density of an object*</li> <li>Defines density*</li> <li>Recognizes that when one divides mass by volume, one is calculating density*</li> <li>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)</li> <li>Gives examples of changes in which new substances with new chemical properties are produced*</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> <li>Describes how litmus paper is used to determine whether a substance is an acid or a base*</li> <li>Recognizes which household substance will turn blue litmus paper red, contains one or more hydrogen atoms)*</li> <li>Predicts which household substance will turn blue litmus paper red*</li> <li>Defines mixture*</li> <li>Names the three different states of matter</li> <li>Describes how water exists in three states</li> <li>Recognizes that water expands as it freezes*</li> <li>Describes the process of evaporation*</li> </ul>	<ul> <li>Identifies the tools and units used to measure weight*</li> <li>Makes inferences about the relative mass of objects based on data*</li> <li>Recognizes that on a given planet, objects with the same weight will also have the same mass*</li> <li>Recognizes that volume is measured in milliliters or liters*</li> <li>Measures the volume of liquid in a graduated cylinder*</li> <li>Understands that in the SI system, length is measured in meters, kilometers, centimeters*</li> <li>Estimates length of common objects using metric units*</li> <li>Recognizes that base unit for length in the SI system is the meter*</li> <li>Predicts how changes in temperature will affect the density of an objects of differing density will behave when combined*</li> <li>Explains that objects of differing density will layer when combined*</li> <li>Defines melting point*</li> <li>Describes characteristics of a chemical change*</li> <li>Gives examples of chemical change</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> <li>Describes properties of bases (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus paper blue)*</li> <li>Describes properties of solutions*</li> <li>Defines pH as a measurement of acidity*</li> </ul>

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<ul> <li>Gives examples of evaporation*</li> <li>Relates surface area to evaporation</li> <li>Describes the process of evaporation in terms of the changes to the molecules involved*</li> <li>Describes the process of freezing</li> <li>Describes applications of differential expansion of metals*</li> <li>Explains that heating or cooling materials can cause their state to change*</li> <li>Explains that matter can change from one physical state to another*</li> <li>Predicts, using real-life data, how changes in temperature will affect the volume of a gas*</li> <li>Explains that as heat is applied to a substance, the particles making up the substance increase their motion</li> <li>Explains that the periodic table is organized into rows and columns*</li> <li>Describes characteristics of each subatomic particle*</li> <li>Explains that all matter is made of tiny particles called atoms*</li> <li>Recognizes that atoms are composed of smaller particles (e.g., protons, neutrons, and electrons)*</li> <li>Describes characteristics of elements*</li> <li>Identifies elements based on their physical characteristics*</li> <li>Recognizes symbols for elements and compounds*</li> <li>Determines the number of atoms in a compound when given its formula*</li> <li>Recognizes dat a chemical reaction (e.g., formation of gas, color change, precipitate)</li> <li>Infers that a chemical reaction has occurred*</li> </ul>	<ul> <li>Gives examples of mixtures*</li> <li>Understands that evaporation can be used to separate solutions*</li> <li>Describes properties of gases*</li> <li>Classifies unknown substances as liquids, based on their properties*</li> <li>Recognizes properties of gases*</li> <li>Describes the process of condensation*</li> <li>Describes the process of freezing in terms of phase changes*</li> <li>Explains that removing heat will cause a substance to change from gas to liquid or from liquid to solid form*</li> <li>Gives examples of substances which have undergone a change of state*</li> <li>Describes the relative freedom of motion of particles in solids, liquids, and gases</li> <li>Explains that as heat is applied to a substance, the particles making up the substance move farther apart</li> <li>Recognizes that as heat is applied to a solid, its molecules move farther and farther apart*</li> <li>Interprets diagrams showing the relative spacing and movement of matter in different phases*</li> <li>Describes how elements are ordered by atomic number in the periodic table*</li> <li>Determines the substomic structure of the atom</li> <li>Describes the locations where each atomic particle may be found</li> <li>Understands that the nucleus consists of protons and neutrons</li> <li>Explains that all matter is made of tiny particles called atoms*</li> <li>Describes the locations where each atomic particle may be found</li> <li>Understands that the nucleus consists of protons and neutrons</li> <li>Explains that all matter is made of tiny particles called atoms*</li> <li>Describes characteristics of elements*</li> <li>Gives an example of an element</li> <li>Recognizes symbols for elements and compounds*</li> </ul>

		<ul> <li>Understands the rules of scientific nomenclature of elements and compounds</li> <li>Determines the number of atoms in a compound when given its formula*</li> <li>Describes characteristics of compounds</li> <li>Describes how intermolecular forces affect the chemical properties of covalently bonded compounds</li> <li>Recognizes that products formed by chemical reactions have different properties from the reactants*</li> <li>Recognizes that atoms interact by transferring or sharing valence electrons*</li> <li>Defines reactant*</li> </ul>
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
<ul> <li>Interprets graphs of motion"</li> <li>Defines a force as a push or pull on an object</li> <li>Applies Newton's second law (the interrelationship between force, mass, and acceleration) to everyday objects, such as teeter-totters/see-saws*</li> <li>Gives examples of simple machines*</li> <li>Describes parts of a first class lever*</li> <li>Classifies machines as simple or complex*</li> <li>Predicts how a lever will act in a given situation*</li> <li>Calculates work*</li> <li>Understands that work is dependent on force and distance</li> <li>Explains how sound is produced</li> <li>Makes inferences about echoes*</li> <li>Understands that longer tubes and strings produce "lower" sounds than shorter tubes and strings (term "pitch" not used)*</li> <li>Explains that sound moves through objects by causing particles to vibrate*</li> <li>Defines vibration*</li> <li>Explains that the observed speed at which an object is moving can vary, depending on how fast the observer is moving; however, for light this is not true*</li> </ul>	<ul> <li>Describes now forces may create equilibrium for an object*</li> <li>Analyzes how air resistance influences the relative motion of objects*</li> <li>Explains how frictional forces affect motion*</li> <li>Identifies types of simple machines*</li> <li>Gives examples of simple machines*</li> <li>Defines echo*</li> <li>Recognizes that animals may be able to sense pitch outside of human hearing ability*</li> </ul>	<ul> <li>Calculates the distance an object has traveled, using geometry*</li> <li>Compares the acceleration of falling objects*</li> <li>Recognizes that for two interacting objects, the force that the first object applies to the second object is equal to the force the second object applies to the first (equal and opposite force)*</li> <li>Explains how frictional forces affect motion*</li> <li>Classifies forces as caused by friction*</li> <li>Explains that simple machines make work easier*</li> <li>Makes inferences about the type of simple machine that will be most useful in a given situation*</li> <li>Locates simple machines and their components in applied settings</li> <li>Relates distance of a load from the fulcrum to mechanical advantage*</li> <li>Explains that work is not dependent on time, but on force and distance only*</li> <li>Infers that work is dependent on mass and velocity (momentum)*</li> <li>Understands that longer tubes and strings produce lower pitched sounds than shorter tubes and strings*</li> <li>Relates amplitude, frequency, wavelength, speed, and period of waves*</li> </ul>
Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
<ul> <li>Compares electrical insulating ability of different materials*</li> <li>Gives examples of electrical conductors*</li> <li>Analyzes parallel circuits*</li> </ul>	<ul> <li>Analyzes direct current electrical circuits*</li> <li>Gives examples of electrical insulators*</li> <li>Analyzes the parts of a light bulb*</li> <li>Distinguishes between open and closed circuits*</li> </ul>	<ul> <li>Explains that energy cannot be created or destroyed, only changed from one form to another*</li> <li>Compares electrical conducting ability of various materials</li> <li>Analyzes series circuits*</li> </ul>

Makes inferences about the working of circuits	<ul> <li>Explains how fuses are used in electrical circuits*</li> </ul>	• Uses analogies to explain the flow of current in an
<ul> <li>Recognizes a simple circuit*</li> </ul>	<ul> <li>Understands that sound is a form of energy*</li> </ul>	electrical wire*
• Gives examples of objects that use electrical energy*	<ul> <li>Relates kinetic energy to the speed of an object*</li> </ul>	• Explains that batteries change chemical energy into
<ul> <li>Explains that energy is needed to do work*</li> </ul>	• Interprets diagrams showing conversions between	electrical energy*
• Explains that we can see objects that do not give off	potential and kinetic energy*	<ul> <li>Relates the wattage of appliances to the cost of</li> </ul>
light because these objects reflect light*	• Recognizes that heat can move from object to object by	electricity*
• Understands that black objects absorb more light than	conduction*	<ul> <li>Defines kinetic energy*</li> </ul>
lighter colored objects	<ul> <li>Compares ability of materials to conduct heat</li> </ul>	<ul> <li>Relates kinetic energy to the speed of an object*</li> </ul>
• Explains why light-colored objects feel cooler than dark colored objects*	<ul> <li>Predicts how well different volumes of liquid will retain heat*</li> </ul>	<ul> <li>Calculates calories given mass and temperature change*</li> </ul>
• Recognizes that an electrically charged substance will	• Defines an insulator as a material that blocks the	<ul> <li>Describes hazards of radioactivity</li> </ul>
attract or repel other charged materials*	transfer of heat*	• Explains that the Sun's energy travels to Earth in a
<ul> <li>Gives examples of static electricity*</li> </ul>	<ul> <li>Makes predictions about the transformation between</li> </ul>	variety of wavelengths (e.g., visible light, radio,
• Analyzes the charging of objects due to transfer of	kinetic and potential energy*	infrared, UV, microwaves)*
electrons by friction*	• Describes the transformations of energy that may occur	• Recognizes that heat can move from object to object by
Recognizes that magnets' forces can pass through	in electrical systems*	conduction <sup>*</sup>
paper, glass, and water*	• Explains that a turbine is a machine that is used in the	• Classifies examples of heat transfer as conduction*
• Selects evidence that supports the idea that magnets	transformation of mechanical to electrical energy	• Understands that heat flows from warmer to cooler
attract only some kinds of metal	• Understands that black objects absorb more light than	Objects until both reach equilibrium
• Makes predictions about the interaction of magnets	lighter colored objects	• Gives examples of energy transfer through radiation
• Defines gravity*	• Explains why light-colored objects feel cooler than dark	• Defines an insulator as a material that blocks the transfer of heat*
• Infers that there is a force that keeps us connected to Earth*	• Describes the order of colors produced as white light	<ul> <li>Analyzes applications of thermal conductors and</li> </ul>
• Explains that gravity pulls on all objects on or near	passes through a prism*	insulators*
Earth towards Earth's center*	• Explains why magnets attract or repel other magnets*	• Describes ways that energy may be changed as a result
	• Recognizes that like poles of magnets will repel and	of a chemical reaction*
	that unlike poles will attract*	• Explains that when energy is converted from one form
	• Explains that a compass needle will align to Earth's	to another, heat is often produced as a by-product*
	magnetic north and south poles*	<ul> <li>Recognizes that mechanical machines produce heat*</li> </ul>
	<ul> <li>Explains why a compass can be used to find north*</li> </ul>	• Understands that humans perceive differences in the
	• Determines the relative gravitational attraction among	wavelength of visible light as differences in color*
	planets based on mass and/or distance*	• Describes ways that light interacts with matter (e.g.,
	• Relates weight to gravity (e.g., if the gravity acting on an object increases, due to a change in distance or a	transmission, refraction, absorption, scattering, and reflection)*
	change in mass of the other object, the weight of an object of constant mass will also increase)*	• Recognizes that a prism can be used to separate light into its component colors*
	• Describes the effects of Earth's gravity on objects*	<ul> <li>Makes comparisons related to static electricity*</li> </ul>
		• Describes the usefulness of a compass to detect
		magnetic fields*
		<ul> <li>Describes magnetic fields*</li> </ul>
		• Explains that gravitational force is hard to detect unless
		at least one of the objects has a lot of mass*
		<ul> <li>Explains how changes in mass and distance affect gravitational force*</li> </ul>

		• Applies Newton's laws of motion to explain movement
<i>New Vocabulary:</i> attraction, bar magnet, boil, broken (circuit), circuit, circuit breaker, circuit overload, complete (circuit), compound, condense, container, cubic, diffuse, direct (sunlight), discharge, dissolve, echo, electrical conductor, electrical energy, electrical outlet, electromagnetism, element, equilibrium, evaporate, field, fulcrum, fuse, fused (circuit), ground, ground wire, heat energy, high-pitched, hydrogen, insulate, lever, light switch, lightning, loud, low-pitched, lubricant, melt, mix, nitrogen, nonmetal, particle, penetrate, phase, physical universe, pitch, polar attraction, polarize, pulley, reflect, refract, repel, screw, simple circuit, simple machine, solute, solvent, speed of light, speed of sound, state, states of matter, static electricity, substance, thaw, thunder, turning point, vapor, vibrate, vibration, volcanic eruption, waterwheel, wave, wedge, wheel and axle	<i>New Vocabulary:</i> air resistance, atomic structure, carbon, chemical property, collide, column, compass, compass needle, compound machine, conduct, conductor, contract, convect, convert, dense, distilled water, electric current, expand, filament, fluctuate, generator, glucose, gravitational attraction, hardness, inclined plane, insulation, insulator, kilowatt hour, kinetic, litmus paper, magnesium, material, mercury (element), minimize, mixture, molecular motion, natural gas, neutral, newton, parallel circuit, percolating, physical union, pole, positively charged, prism, radiate, react, reaction, room temperature, sea level, selenium, series circuit, silver, sound energy, spectrum, stationary, sugar, sulfur/sulphur, texture, thermos jug, tin, transfer, turbine, vaporize, vertical row, vocal cords	due to gravity* New Vocabulary: acid rain, alpha particle, amplitude, area of influence, arm (parts of balance), atomic mass, atomic number, average atomic mass, balance, base (parts of balance), battery, beta particle, boiling point, brake, catalyst, centi-, change of phase, change of state, chemical bond, chemical change, chemical reaction, chlorine, circuit tester, closed container, corrosion, current, dimmer (electrical), Dmitri Mendeleev, dry cell battery, dry ice, effort, electrical shock, electrical wire, electron affinity, explosion, first class lever, focal length, focal point, gear, helium, illumination, infrared, intensity, isotope, lithium, long-range effect, mass number, measurable, melting point, milli-, negatively charged, nuclear explosion, nuclear power, nuclear reactor, pan (parts of balance), phase change, phenolphthalein, physical change, radiation, radioactive waste, reactant, reactor site, S.I. system, satellite, saturation point, solubility point, sublimate, transmission, ultraviolet, valence, visible spectrum, watt, wavelength
New Signs and Symbols: N north, S south	<i>New Signs and Symbols:</i> C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> (glucose), Ca (Calcium), C carbon, CO (carbon monoxide), . decimal point, H,O, H hydrogen, O oxygen, S sulfur	New Signs and Symbols: Co (Cobalt), Cr (chromium), Cs (Cesium), kg kilogram, mL milliliter/millilitre

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# Subject: General Science Goal Strand: Physical Science RIT Score Range: 211 - 220

Skills and Concepts to Enhance	Skills and Concepts to Develop	Skills and Concepts to Introduce
201 - 210	211 - 220	221 - 230
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Structure, Properties and Changes of Matter</li> <li>Defines matter as anything that takes up space and has mass*</li> <li>Recognizes that a magnifier allows one to see details that are not otherwise visible*</li> <li>Compares objects in terms of mass*</li> <li>Determines the volume of an object using the displacement method*</li> <li>Estimates length of common objects using metric units*</li> <li>Compares objects in terms of density*</li> <li>Predicts how changes in temperature will affect the density of an object*</li> <li>Defines density*</li> <li>Recognizes that when one divides mass by volume, one is calculating density*</li> <li>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)</li> <li>Gives examples of changes in which new substances with new chemical properties are produced*</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> <li>Describes properties of acids (e.g., sour taste, turns blue litmus paper red, contains one or more hydrogen atoms, turns blue litmus paper red, contains one or more hydrogen atoms, the same volume is an acid or a base*</li> </ul>	<ul> <li>Structure, Properties and Changes of Matter</li> <li>Identifies the tools and units used to measure weight*</li> <li>Makes inferences about the relative mass of objects based on data*</li> <li>Recognizes that on a given planet, objects with the same weight will also have the same mass*</li> <li>Recognizes that volume is measured in milliliters or liters*</li> <li>Measures the volume of liquid in a graduated cylinder*</li> <li>Understands that in the SI system, length is measured in meters, kilometers, centimeters*</li> <li>Estimates length of common objects using metric units*</li> <li>Recognizes that base unit for length in the SI system is the meter*</li> <li>Predicts how changes in temperature will affect the density of an objects</li> <li>Predicts how objects of differing density will behave when combined*</li> <li>Explains that objects of differing density will layer when combined*</li> <li>Defines melting point*</li> <li>Defines characteristics of physical change*</li> <li>Gives examples of chemical change</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> </ul>	<ul> <li>Structure, Properties and Changes of Matter</li> <li>Understands that air and other gases have mass*</li> <li>Evaluates to determine the best substance for a given application based on data describing physical properties of substances*</li> <li>Makes inferences about appropriate uses of materials from results of tests of properties (e.g., hardness, tensile strength, conductivity)*</li> <li>Describes objects in terms of mass*</li> <li>Recognizes that mass is measured in grams*</li> <li>Identifies the tools needed to determine the volume of an irregularly shaped object*</li> <li>Identifies tools needed to calculate the density of an irregularly-shaped object*</li> <li>Calculates density of objects, using supplied data*</li> <li>Recognizes that conductivity of a substance depends on the freedom of electrons to move from ion to ion of the substance*</li> <li>Performs metric conversions (e.g., milliliters to microliters)*</li> <li>Describes physical changes in matter (e.g., changes in size, shape, freezing, melting, dissolving)*</li> <li>Explains how the addition or loss of heat changes matter (e.g., physical change</li> <li>Gives examples of physical change</li> <li>Infers that a chemical change</li> <li>Infers that a chemical change</li> </ul>
Predicts which household substance will turn blue litmus paper red*	• Describes properties of bases (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus	<ul> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> </ul>
• Defines mixture*	paper blue)*	• Describes properties of bases (e.g., slippery, bitter
• Names the three different states of matter	• Describes how litmus paper is used to determine	tasting, contain oxygen and hydrogen, turn litmus
• Describes how water exists in three states	whether a substance is an acid or a base*	paper blue)*
• Recognizes that water expands as it freezes*	• Defines pH as a measurement of acidity*	• Gives examples of acids and bases, using household
• Describes the process of evaporation	<ul> <li>Describes properties of solutions*</li> </ul>	• Compares pH of strong and week acids and bases
• Recognizes that evaporation changes a liquid to a gas <sup>*</sup>	<ul> <li>Describes properties of mixtures</li> </ul>	<ul> <li>Compares pH of strong and weak acids and bases</li> </ul>

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Gives examples of evaporation*	<ul> <li>Gives examples of mixtures*</li> </ul>	• Draws conclusion from data related to indicators and
Relates surface area to evaporation	• Understands that evaporation can be used to separate	pH of household acids, bases and neutral substances*
• Describes the process of evaporation in terms of the	solutions*	• Explains that removing heat will cause a substance to
changes to the molecules involved*	<ul> <li>Describes properties of gases*</li> </ul>	change from gas to liquid or from liquid to solid form*
<ul> <li>Describes the process of freezing</li> </ul>	Classifies unknown substances as liquids, based on	• Generalizes how changes in temperature affect the
• Describes applications of differential expansion of	their properties*	behavior of gas
metals*	<ul> <li>Recognizes properties of gases*</li> </ul>	• Describes changes in the pressure of gas in terms of
• Explains that heating or cooling materials can cause	<ul> <li>Describes the process of condensation*</li> </ul>	particle behavior
their state to change*	• Describes the process of freezing in terms of phase	• Describes the relative spacing of particles in solids,
• Explains that matter can change from one physical	changes*	nquids, and gases
state to another?	• Explains that removing heat will cause a substance to	• Recognizes that atomic number represents the number
• Predicts, using real-life data, how changes in	change from gas to liquid or from liquid to solid form	element*
Emperature will affect the volume of a gas.	• Gives examples of substances which have undergone a	<ul> <li>Describes the relationship between atomic number and</li> </ul>
• Explains that as near is applied to a substance, the	Describes have able to the terror offset the	atomic mass*
motion	• Describes now changes in temperature affect the	<ul> <li>Determines the number of protons in an atom of an</li> </ul>
<ul> <li>Explains that the periodic table is organized into rows</li> </ul>	constant*	element when given that atom's atomic number*
and columns*	<ul> <li>Describes the relative freedom of motion of particles in</li> </ul>	• Determines the number of neutrons in an atom of an
<ul> <li>Describes characteristics of each subatomic particle*</li> </ul>	solids, liquids, and gases	element given the atomic mass of the element*
• Explains that all matter is made of tiny particles called	• Explains that as heat is applied to a substance, the	• Determines the atomic mass of an atom, given the
atoms*	particles making up the substance move farther apart	number of protons, electrons and neutrons for this
• Recognizes that atoms are composed of smaller	• Recognizes that as heat is applied to a solid, its	atom*
particles (e.g., protons, neutrons, and electrons)*	molecules move farther and farther apart*	• Predicts properties of elements using information
<ul> <li>Describes characteristics of elements*</li> </ul>	• Interprets diagrams showing the relative spacing and	about their classification (e.g., metals, non-metals)*
<ul> <li>Identifies elements based on their physical</li> </ul>	movement of matter in different phases*	• Understands that elements are grouped according to
characteristics*	• Describes how elements are ordered by atomic number	similarities in their properties
<ul> <li>Recognizes symbols for elements and compounds*</li> </ul>	in the periodic table*	• Describes the properties shared by specific families or groups of algoments*
• Determines the number of atoms in a compound when	• Determines the number of neutrons in an atom of an	• Describes the electron cloud (quantum) model of
given its formula*	element given the atomic mass of the element	* Describes the electron cloud (quantum) model of
• Recognizes signs of a chemical reaction (e.g., formation	• Names contributions of scientists to the development	<ul> <li>Makes predictions of reactivity based on electron</li> </ul>
of gas, color change, precipitate)	• Pacagnizes the substamic structure of the stom	configuration*
• Infers that a chemical reaction has occurred	<ul> <li>Recognizes the subatomic structure of the atomic</li> <li>Describes the locations where each atomic particle may.</li> </ul>	<ul> <li>Determines the electrical charge of an atom or ion</li> </ul>
	• Describes the locations where each atomic particle may be found	• Describes physical properties of metals*
	<ul> <li>Understands that the nucleus consists of protons and</li> </ul>	• Recognizes that for an element, the number of protons
	neutrons	and electrons remains the same, but the number of
	• Explains that all matter is made of tiny particles called	neutrons may vary*
	atoms*	• Describes the forces which hold together the
	• Uses models to show the structure of the atom	components of an ionic substance*
	• Recognizes that elements do not break down under	• Recognizes that compounds contain two or more types
	normal lab conditions*	of atoms bonded together*
	<ul> <li>Describes characteristics of elements*</li> </ul>	• Explains that coefficients may be adjusted to balance
	Gives an example of an element	Defines inert chemical*
	Recognizes symbols for elements and compounds*	

	<ul> <li>Understands the rules of scientific nomenclature of elements and compounds</li> <li>Determines the number of atoms in a compound when given its formula*</li> <li>Describes characteristics of compounds</li> <li>Describes how intermolecular forces affect the chemical properties of covalently bonded compounds</li> <li>Recognizes that products formed by chemical reactions have different properties from the reactants*</li> <li>Recognizes that atoms interact by transferring or sharing valence electrons*</li> <li>Defines reactant*</li> </ul>	<ul> <li>Infers that a new compound has been formed when new properties result after combining reagents*</li> </ul>
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
<ul> <li>Describes how forces may create equilibrium for an object*</li> <li>Analyzes how air resistance influences the relative motion of objects*</li> <li>Explains how frictional forces affect motion*</li> <li>Identifies types of simple machines*</li> <li>Gives examples of simple machines*</li> <li>Defines echo*</li> <li>Recognizes that animals may be able to sense pitch outside of human hearing ability*</li> </ul>	<ul> <li>Calculates the distance an object has traveled, using geometry*</li> <li>Compares the acceleration of falling objects*</li> <li>Recognizes that for two interacting objects, the force that the first object applies to the second object is equal to the force the second object applies to the first (equal and opposite force)*</li> <li>Explains how frictional forces affect motion*</li> <li>Classifies forces as caused by friction*</li> <li>Explains that simple machines make work easier*</li> <li>Makes inferences about the type of simple machine that will be most useful in a given situation*</li> <li>Locates simple machines and their components in applied settings</li> <li>Relates distance of a load from the fulcrum to mechanical advantage*</li> <li>Explains that work is not dependent on time, but on force and distance only*</li> <li>Infers that work is dependent on mass and velocity (momentum)*</li> <li>Understands that longer tubes and strings produce lower pitched sounds than shorter tubes and strings*</li> <li>Relates amplitude, frequency, wavelength, speed, and period of waves*</li> </ul>	<ul> <li>Applies F=ma to calculate the magnitude of a change in motion*</li> <li>Analyzes examples of accelerated motion using Newton's laws*</li> <li>Explains how frictional forces affect motion*</li> <li>Gives examples to support the idea that an object will remain at rest or move in a straight line at constant speed if it is not subjected to an unbalanced force*</li> <li>Explains how an object that is not being subjected to an outside force will move with constant velocity in a straight line*</li> <li>Applies Newton's first law (inertia) to real world objects*</li> <li>Defines inertia*</li> <li>Determines whether a simple machine is used to multiply force or change the direction of an applied force*</li> <li>Describes the relationship between a screw and an inclined plane*</li> <li>Recognizes that a screw is an inclined plane wrapped around a center post*</li> <li>Compares the movement of sound through air, water, and/or solids*</li> <li>Understands that pitch of a sound is dependent on the frequency of the vibration producing the sound*</li> <li>Recognizes that loudness of sound is measured in decibels*</li> </ul>
Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
<ul> <li>Analyzes direct current electrical circuits*</li> </ul>	• Explains that energy cannot be created or destroyed,	• Describes the law of conservation of mass*

• Gives examples of electrical insulators*	only changed from one form to another	• Recognizes that the mass of a material remains the
<ul> <li>Analyzes the parts of a light bulb*</li> </ul>	<ul> <li>Compares electrical conducting ability of various</li> </ul>	same when the material is divided or changes shape*
<ul> <li>Distinguishes between open and closed circuits*</li> </ul>	materials	<ul> <li>Understands how conservation of mass is expressed in</li> </ul>
• Explains how fuses are used in electrical circuits*	<ul> <li>Analyzes series circuits*</li> </ul>	chemical formulas and equations*
• Understands that sound is a form of energy*	• Uses analogies to explain the flow of current in an	<ul> <li>Balances equations to reflect conservation of mass*</li> </ul>
• Relates kinetic energy to the speed of an object*	electrical wire*	<ul> <li>Differentiates between parallel and series circuits*</li> </ul>
• Interprets diagrams showing conversions between	• Explains that batteries change chemical energy into	• Recognizes the major forms of energy*
potential and kinetic energy*	electrical energy*	• Defines kinetic energy*
• Recognizes that heat can move from object to object by	• Relates the wattage of appliances to the cost of	• Gives examples of kinetic energy*
conduction*	electricity*	• Gives examples of potential energy*
<ul> <li>Compares ability of materials to conduct heat</li> </ul>	<ul> <li>Defines kinetic energy*</li> </ul>	• Defines a calorie as heat needed to increase the
<ul> <li>Predicts how well different volumes of liquid will retain</li> </ul>	• Relates kinetic energy to the speed of an object*	temperature of one gram of water one degree Celsius*
<ul> <li>Fredetis now wen different volumes of inquid win retain heat*</li> </ul>	• Calculates calories given mass and temperature	<ul> <li>Recognizes that the Sun's energy from millions of years</li> </ul>
<ul> <li>Defines an insulator as a material that blocks the</li> </ul>	change*	ago is trapped in fossil fuels*
transfer of heat*	<ul> <li>Describes hazards of radioactivity</li> </ul>	• Defines an insulator as a material that blocks the
<ul> <li>Makes predictions about the transformation between</li> </ul>	• Explains that the Sun's energy travels to Earth in a	transfer of heat*
vinetic and notential energy*	variety of wavelengths (e.g., visible light, radio,	<ul> <li>Analyzes applications of thermal conductors and</li> </ul>
<ul> <li>Describes the transformations of energy that may occur.</li> </ul>	infrared, UV, microwaves)*	insulators*
• Describes the transformations of energy that may been in electrical systems*	• Recognizes that heat can move from object to object by	<ul> <li>Classifies examples of chemical changes that show</li> </ul>
• Explains that a turbing is a maching that is used in the	conduction*	release or absorption of energy*
• Explains that a turbine is a machine that is used in the transformation of mechanical to electrical energy*	<ul> <li>Classifies examples of heat transfer as conduction*</li> </ul>	• Gives examples that show that some chemical reactions
• Understands that black objects absorb more light than	• Understands that heat flows from warmer to cooler	release energy while others require input of energy*
lighter colored objects	objects until both reach equilibrium*	<ul> <li>Recognizes that light is produced by vibrations of</li> </ul>
• Explains why light colored objects feel cooler than dark	• Gives examples of energy transfer through radiation*	electrons*
• Explains why light-colored objects leef cooler than dark	<ul> <li>Defines an insulator as a material that blocks the</li> </ul>	<ul> <li>Describes properties of ultraviolet light*</li> </ul>
<ul> <li>Describes the order of colors produced as white light</li> </ul>	transfer of heat*	<ul> <li>Explains that when light shines on a colored filter light</li> </ul>
<ul> <li>Describes the order of colors produced as write light passes through a prism*</li> </ul>	<ul> <li>Analyzes applications of thermal conductors and</li> </ul>	• Explains that when light sinnes on a colored lifter, light of the color of the filter passes through while the other
• Explains why magnets attract or repel other magnets*	insulators*	portions are absorbed*
<ul> <li>Explains will magnets attract of reper other magnets</li> <li>Decognizes that like poles of magnets will repel and</li> </ul>	<ul> <li>Describes ways that energy may be changed as a result</li> </ul>	• Explains that oncours items may absorb come colors of
• Recognizes that like poles of magnets will reper and that uplike poles will attract*	of a chemical reaction*	light and reflect others, so that the color seen is the
Explains that a compass needle will align to Earth's	• Explains that when energy is converted from one form	color reflected by the object*
• Explains that a compass needle will align to Earth's	to another heat is often produced as a by-product*	• Explains that negatively charged materials have an
Explains why a compass can be used to find north*	<ul> <li>Recognizes that mechanical machines produce heat*</li> </ul>	excess of negative charges*
• Explains why a compass can be used to find north	• Understands that humans perceive differences in the	<ul> <li>Describes properties of magnets*</li> </ul>
• Determines the relative gravitational attraction among	wavelength of visible light as differences in color*	<ul> <li>Determines the polarity of a magnet based on its</li> </ul>
planets based on mass and/or distance	<ul> <li>Describes wave that light interacts with matter (e.g.</li> </ul>	• Determines the polarity of a magnet based on its
• Relates weight to gravity (e.g., if the gravity acting on	transmission refraction absorption scattering and	<ul> <li>Explains how to build a simple compass*</li> </ul>
an object increases, due to a change in distance of a	reflection)*	<ul> <li>Explains now to build a simple compass</li> <li>Describes the usefulness of a compass to detect</li> </ul>
change in mass of the other object, the weight of an object of constant mass will also increase.)*	Recognizes that a prism can be used to separate light	Describes the userumess of a compass to detect     magnetic fields*
Describes the effects of Earth's gravity on chiests"	into its component colors*	Describes magnetic fields*
• Describes the effects of Earth's gravity on objects"	<ul> <li>Makes comparisons related to static electricity*</li> </ul>	<ul> <li>Describes magnetic fields</li> <li>Describes ways to increase the strength of an</li> </ul>
	<ul> <li>Describes the usefulness of a compass to detect</li> </ul>	<ul> <li>Describes ways to increase the strength of an electromegnet*</li> </ul>
	magnetic fields*	Circuitomagnet
	<ul> <li>Describes magnetic fields*</li> </ul>	• Understands that weight of an object may change due to a change in gravity, but the mass of this object will
<ul> <li>• Describes the effects of Earth's gravity on objects*</li> </ul>	<ul> <li>Recognizes that a prism can be used to separate light into its component colors*</li> <li>Makes comparisons related to static electricity*</li> <li>Describes the usefulness of a compass to detect magnetic fields*</li> <li>Describes magnetic fields*</li> </ul>	<ul> <li>magnetic fields*</li> <li>Describes magnetic fields*</li> <li>Describes ways to increase the strength of an electromagnet*</li> <li>Understands that weight of an object may change due to a change in gravity, but the mass of this object will</li> </ul>

	• Explains that gravitational force is hard to detect unless	remain the same*
	at least one of the objects has a lot of mass*	• Applies Newton's laws of motion to explain movement
	• Explains how changes in mass and distance affect	due to gravity*
	gravitational force*	• Calculates gravitational forces of objects in space*
	• Applies Newton's laws of motion to explain movement	
	due to gravity*	
New Vocabulary: air resistance, atomic structure, carbon,	New Vocabulary: acid rain, alpha particle, amplitude, area	New Vocabulary: alternating circuit, basic, centrifugal
chemical property, collide, column, compass, compass	of influence, arm (parts of balance), atomic mass, atomic	force, charge, conservation of mass, decibel, electric,
needle, compound machine, conduct, conductor,	number, average atomic mass, balance, base (parts of	evacuate (container), grams, hertz, ionic, iron filings,
contract, convect, convert, dense, distilled water, electric	balance), battery, beta particle, boiling point, brake,	joule, loudness, metal plate, neutralize, nuclear fission,
current, expand, filament, fluctuate, generator, glucose,	catalyst, centi-, change of phase, change of state, chemical	overtone, pH, phosphorous, reaction force, sodium
gravitational attraction, hardness, inclined plane,	bond, chemical change, chemical reaction, chlorine,	chloride
insulation, insulator, kilowatt hour, kinetic, litmus paper,	circuit tester, closed container, corrosion, current,	
magnesium, material, mercury (element), minimize,	dimmer (electrical), Dmitri Mendeleev, dry cell battery,	
mixture, molecular motion, natural gas, neutral, newton,	dry ice, effort, electrical shock, electrical wire, electron	
parallel circuit, percolating, physical union, pole,	affinity, explosion, first class lever, focal length, focal	
positively charged, prism, radiate, react, reaction, room	point, gear, helium, illumination, infrared, intensity,	
temperature, sea level, selenium, series circuit, silver,	isotope, lithium, long-range effect, mass number,	
sound energy, spectrum, stationary, sugar, sulfur/sulphur,	measurable, melting point, milli-, negatively charged,	
texture, thermos jug, tin, transfer, turbine, vaporize,	nuclear explosion, nuclear power, nuclear reactor, pan	
vertical row, vocal cords	(parts of balance), phase change, phenolphthalein,	
	physical change, radiation, radioactive waste, reactant,	
	reactor site, S.I. system, satellite, saturation point,	
	solubility point, sublimate, transmission, ultraviolet,	
	valence, visible spectrum, watt, wavelength	
New Signs and Symbols: $C_6H_{12}O_6$ (glucose), Ca	New Signs and Symbols: Co (Cobalt), Cr (chromium), Cs	New Signs and Symbols: g gram, - negative, pH
(Calcium), C carbon, CO (carbon monoxide), . decimal	(Cesium), kg kilogram, mL milliliter/millilitre	
point, H,O, H hydrogen, O oxygen, S sulfur		

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# Subject: General Science Goal Strand: Physical Science RIT Score Range: 221 - 230

Skills and Concepts to Enhance	Skills and Concepts to Develop	Skills and Concepts to Introduce
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Identifies the tools and units used to measure weight*</li> <li>Makes inferences about the relative mass of objects based on data*</li> <li>Recognizes that on a given planet, objects with the same weight will also have the same mass*</li> <li>Recognizes that volume is measured in milliliters or liters*</li> <li>Measures the volume of liquid in a graduated cylinder*</li> <li>Understands that in the SI system, length is measured in meters, kilometers, centimeters*</li> <li>Estimates length of common objects using metric units*</li> <li>Recognizes that base unit for length in the SI system is the meter*</li> <li>Predicts how changes in temperature will affect the density of an objects of differing density will behave when combined*</li> <li>Explains that objects of differing density will layer when combined*</li> <li>Defines melting point*</li> <li>Describes characteristics of a chemical change*</li> <li>Gives examples of chemical change</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> <li>Describes properties of bases (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus paper blue)*</li> <li>Describes properties of solutions*</li> </ul>	<ul> <li>Understands that air and other gases have mass*</li> <li>Evaluates to determine the best substance for a given application based on data describing physical properties of substances*</li> <li>Makes inferences about appropriate uses of materials from results of tests of properties (e.g., hardness, tensile strength, conductivity)*</li> <li>Describes objects in terms of mass*</li> <li>Recognizes that mass is measured in grams*</li> <li>Identifies the tools needed to determine the volume of an irregularly shaped object*</li> <li>Identifies tools needed to calculate the density of an irregularly-shaped objects, using supplied data*</li> <li>Recognizes that conductivity of a substance depends on the freedom of electrons to move from ion to ion of the substance*</li> <li>Performs metric conversions (e.g., milliliters to microliters)*</li> <li>Describes examples of physical change</li> <li>Gives examples of chemical change</li> <li>Infers that a chemical change has occurred*</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> <li>Describes properties of acids (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus paper blue)*</li> <li>Compares pH of strong and weak acids and bases</li> </ul>	<ul> <li>Shocher, Properties and changes of Matter</li> <li>Selects the appropriate relationship to convert units using dimensional analysis strategies*</li> <li>Describes constancy of mass during a physical or chemical change in a system*</li> <li>Defines chemical property*</li> <li>Distinguishes among examples of physical and chemical properties*</li> <li>Compares strength of strong and weak acids and bases*</li> <li>Describes properties of bases (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus paper blue)*</li> <li>Draws conclusion from data related to indicators and pH of household acids, bases and neutral substances*</li> <li>Classifies mixtures based on their properties*</li> <li>Defines solute*</li> <li>Determines the number of neutrons in an atom of an element given the atomic mass of the element*</li> <li>Relates trends seen in the periodic table to bonding of elements*</li> <li>Describes how atoms with similar numbers of valence electrons are grouped together on the periodic chart*</li> <li>Interprets data related to electron configuration*</li> <li>Recognizes characteristics of compounds*</li> <li>Identifies reactants and products of a combustion reaction*</li> </ul>

Gives examples of mixtures*	• Draws conclusion from data related to indicators and
• Understands that evaporation can be used to separate	pH of household acids, bases and neutral substances*
solutions*	• Explains that removing heat will cause a substance to
<ul> <li>Describes properties of gases*</li> </ul>	change from gas to liquid or from liquid to solid form*
Classifies unknown substances as liquids, based on	• Generalizes how changes in temperature affect the
their properties*	behavior of gas
<ul> <li>Recognizes properties of gases*</li> </ul>	• Describes changes in the pressure of gas in terms of
• Describes the process of condensation*	particle behavior
• Describes the process of freezing in terms of phase	• Describes the relative spacing of particles in solids,
changes <sup>*</sup>	• Recognizes that atomic number represents the number
• Explains that removing neat will cause a substance to	of protons found in the nucleus of a particular type of
• Cives examples of substances which have undergoing a	element*
• Gives examples of substances which have undergone a change of state*	• Describes the relationship between atomic number and
<ul> <li>Describes how changes in temperature affect the</li> </ul>	atomic mass*
pressure of a gas in a container where volume is held	• Determines the number of protons in an atom of an
constant*	element when given that atom's atomic number*
• Describes the relative freedom of motion of particles in	• Determines the number of neutrons in an atom of an
solids, liquids, and gases	element given the atomic mass of the element*
• Explains that as heat is applied to a substance, the	• Determines the atomic mass of an atom, given the
particles making up the substance move farther apart	number of protons, electrons and neutrons for this
• Recognizes that as heat is applied to a solid, its	a Dradicta proportion of alamanta using information
molecules move farther and farther apart	• Fredicts properties of elements using information about their classification (e.g. metals non-metals)*
• Interprets diagrams showing the relative spacing and	<ul> <li>Understands that elements are grouped according to</li> </ul>
<ul> <li>Describes how elements are ordered by atomic number.</li> </ul>	similarities in their properties*
in the periodic table*	• Describes the properties shared by specific families or
<ul> <li>Determines the number of neutrons in an atom of an</li> </ul>	groups of elements*
element given the atomic mass of the element*	• Describes the electron cloud (quantum) model of
• Names contributions of scientists to the development	atomic structure*
of the periodic table of the elements*	<ul> <li>Makes predictions of reactivity based on electron</li> </ul>
• Recognizes the subatomic structure of the atom	configuration*
• Describes the locations where each atomic particle may	• Determines the electrical charge of an atom or ion
be found	<ul> <li>Describes physical properties of metals*</li> </ul>
• Understands that the nucleus consists of protons and	• Recognizes that for an element, the number of protons
neutrons	and electrons remains the same, but the number of
• Explains that all matter is made of tiny particles called	<ul> <li>Describes the forces which hold together the</li> </ul>
atoms*	• Describes the forces which hold together the components of an ionic substance*
• Uses models to show the structure of the atom	<ul> <li>Recognizes that compounds contain two or more types</li> </ul>
• Recognizes that elements do not break down under	of atoms bonded together*
<ul> <li>Describes characteristics of elements*</li> </ul>	• Explains that coefficients may be adjusted to balance
<ul> <li>Gives an example of an element</li> </ul>	chemical equations*
<ul> <li>Recognizes symbols for elements and compounds*</li> </ul>	<ul> <li>Defines inert chemical*</li> </ul>
• Recognizes symbols for clements and compounds	

<ul> <li>Understands the rules of scientific nomenclature of elements and compounds</li> <li>Determines the number of atoms in a compound when given its formula*</li> <li>Describes characteristics of compounds</li> <li>Describes how intermolecular forces affect the chemical properties of covalently bonded compounds</li> <li>Recognizes that products formed by chemical reactions have different properties from the reactants*</li> <li>Recognizes that atoms interact by transferring or sharing valence electrons*</li> <li>Defines reactant*</li> </ul>	<ul> <li>Infers that a new compound has been formed when new properties result after combining reagents*</li> </ul>	
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
<ul> <li>Calculates the distance an object has traveled, using geometry*</li> <li>Compares the acceleration of falling objects*</li> <li>Recognizes that for two interacting objects, the force that the first object applies to the second object is equal to the force the second object applies to the first (equal and opposite force)*</li> <li>Explains how frictional forces affect motion*</li> <li>Classifies forces as caused by friction*</li> <li>Explains that simple machines make work easier*</li> <li>Makes inferences about the type of simple machine that will be most useful in a given situation*</li> <li>Locates simple machines and their components in applied settings</li> <li>Relates distance of a load from the fulcrum to mechanical advantage*</li> <li>Explains that work is not dependent on time, but on force and distance only*</li> <li>Infers that work is dependent on mass and velocity (momentum)*</li> <li>Understands that longer tubes and strings produce lower pitched sounds than shorter tubes and strings*</li> <li>Relates amplitude, frequency, wavelength, speed, and period of waves*</li> </ul>	<ul> <li>Applies F=ma to calculate the magnitude of a change in motion*</li> <li>Analyzes examples of accelerated motion using Newton's laws*</li> <li>Explains how frictional forces affect motion*</li> <li>Gives examples to support the idea that an object will remain at rest or move in a straight line at constant speed if it is not subjected to an unbalanced force*</li> <li>Explains how an object that is not being subjected to an outside force will move with constant velocity in a straight line*</li> <li>Applies Newton's first law (inertia) to real world objects*</li> <li>Defines inertia*</li> <li>Determines whether a simple machine is used to multiply force or change the direction of an applied force*</li> <li>Describes the relationship between a screw and an inclined plane*</li> <li>Recognizes that a screw is an inclined plane wrapped around a center post*</li> <li>Understands that pitch of a sound is dependent on the frequency of the vibration producing the sound*</li> <li>Recognizes that loudness of sound is measured in decibels*</li> <li>Recognizes the types of waves which comprise the electromagnetic spectrum*</li> </ul>	Relates changes in speed or direction to unbalanced forces (2-D)*
Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
• Explains that energy cannot be created or destroyed,	<ul> <li>Describes the law of conservation of mass*</li> </ul>	Understands how conservation of mass is expressed in

only changed from one form to another*	• Recognizes that the mass of a material remains the	chemical formulas and equations*
Compares electrical conducting ability of various	same when the material is divided or changes shape*	<ul> <li>Gives examples of potential energy*</li> </ul>
materials	• Understands how conservation of mass is expressed in	Recognizes that only radiation can transfer heat
<ul> <li>Analyzes series circuits*</li> </ul>	chemical formulas and equations*	through empty space*
• Uses analogies to explain the flow of current in an	<ul> <li>Balances equations to reflect conservation of mass*</li> </ul>	<ul> <li>Applies Coulomb's law*</li> </ul>
electrical wire*	<ul> <li>Differentiates between parallel and series circuits*</li> </ul>	• Explains how a magnet can be used to produce electric
• Explains that batteries change chemical energy into	<ul> <li>Recognizes the major forms of energy*</li> </ul>	current*
electrical energy*	<ul> <li>Defines kinetic energy*</li> </ul>	
• Relates the wattage of appliances to the cost of	<ul> <li>Gives examples of kinetic energy*</li> </ul>	
electricity*	<ul> <li>Gives examples of potential energy*</li> </ul>	
<ul> <li>Defines kinetic energy*</li> </ul>	• Defines a calorie as heat needed to increase the	
<ul> <li>Relates kinetic energy to the speed of an object*</li> </ul>	temperature of one gram of water one degree Celsius*	
<ul> <li>Calculates calories given mass and temperature</li> </ul>	• Recognizes that the Sun's energy from millions of years	
change*	ago is trapped in fossil fuels*	
Describes hazards of radioactivity	• Defines an insulator as a material that blocks the	
• Explains that the Sun's energy travels to Earth in a	transfer of heat*	
variety of wavelengths (e.g., visible light, radio,	<ul> <li>Analyzes applications of thermal conductors and</li> </ul>	
Infrared, UV, microwaves)*	insulators*	
• Recognizes that heat can move from object to object by	• Classifies examples of chemical changes that show	
• Classifies examples of heat transfer as conduction*	release or absorption of energy	
Understands that heat flows from warmer to cooler	• Gives examples that show that some chemical reactions	
• Oliderstands that heat hows from warmer to cooler objects until both reach equilibrium*	release energy while others require input of energy	
• Cives examples of energy transfer through radiation*	• Recognizes that light is produced by vibrations of	
<ul> <li>Defines an insulator as a material that blocks the</li> </ul>	<ul> <li>Describes properties of ultraviolat light*</li> </ul>	
transfer of heat*	<ul> <li>Describes properties of unraviolet light</li> <li>Explains that when light shines on a colored filter light</li> </ul>	
<ul> <li>Analyzes applications of thermal conductors and</li> </ul>	• Explains that when light shiftes on a colored lifter, light of the color of the filter passes through while the other	
insulators*	portions are absorbed*	
• Describes ways that energy may be changed as a result	• Explains that opaque items may absorb come colors of	
of a chemical reaction*	light and reflect others, so that the color seen is the	
• Explains that when energy is converted from one form	color reflected by the object*	
to another, heat is often produced as a by-product*	• Explains that negatively charged materials have an	
<ul> <li>Recognizes that mechanical machines produce heat*</li> </ul>	excess of negative charges*	
• Understands that humans perceive differences in the	<ul> <li>Describes properties of magnets*</li> </ul>	
wavelength of visible light as differences in color*	• Determines the polarity of a magnet based on its	
• Describes ways that light interacts with matter (e.g.,	interaction with other magnets*	
transmission, refraction, absorption, scattering, and	<ul> <li>Explains how to build a simple compass*</li> </ul>	
reflection)*	<ul> <li>Describes the usefulness of a compass to detect</li> </ul>	
• Recognizes that a prism can be used to separate light	magnetic fields*	
into its component colors	<ul> <li>Describes magnetic fields*</li> </ul>	
• Makes comparisons related to static electricity	• Describes ways to increase the strength of an	
• Describes the usefulness of a compass to detect	electromagnet*	
magnetic fields"	• Understands that weight of an object may change due	
• Describes magnetic fields	to a change in gravity, but the mass of this object will	

<ul> <li>Explains that gravitational force is hard to detect unless at least one of the objects has a lot of mass*</li> <li>Explains how changes in mass and distance affect gravitational force*</li> <li>Applies Newton's laws of motion to explain movement due to gravity*</li> </ul>	<ul> <li>remain the same*</li> <li>Applies Newton's laws of motion to explain movement due to gravity*</li> <li>Calculates gravitational forces of objects in space*</li> </ul>	
<i>New Vocabulary:</i> acid rain, alpha particle, amplitude, area of influence, arm (parts of balance), atomic mass, atomic number, average atomic mass, balance, base (parts of balance), battery, beta particle, boiling point, brake, catalyst, centi-, change of phase, change of state, chemical bond, chemical change, chemical reaction, chlorine, circuit tester, closed container, corrosion, current, dimmer (electrical), Dmitri Mendeleev, dry cell battery, dry ice, effort, electrical shock, electrical wire, electron affinity, explosion, first class lever, focal length, focal point, gear, helium, illumination, infrared, intensity, isotope, lithium, long-range effect, mass number, measurable, melting point, milli-, negatively charged, nuclear explosion, nuclear power, nuclear reactor, pan (parts of balance), phase change, phenolphthalein, physical change, radiation, radioactive waste, reactant, reactor site, S.I. system, satellite, saturation point, solubility point, sublimate, transmission, ultraviolet, valence, visible spectrum, watt, wavelength	<i>New Vocabulary:</i> alternating circuit, basic, centrifugal force, charge, conservation of mass, decibel, electric, evacuate (container), grams, hertz, ionic, iron filings, joule, loudness, metal plate, neutralize, nuclear fission, overtone, pH, phosphorous, reaction force, sodium chloride	New Vocabulary: none
<i>New Signs and Symbols:</i> Co (Cobalt), Cr (chromium), Cs (Cesium), kg kilogram, mL milliliter/millilitre	New Signs and Symbols: g gram, - negative, pH	New Signs and Symbols: none

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# Subject: General Science Goal Strand: Physical Science RIT Score Range: 231 - 240

Skills and Concepts to Enhance 221 - 230	Skills and Concepts to Develop 231 - 240	Skills and Concepts to Introduce 241 - 250
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Understands that air and other gases have mass*</li> <li>Evaluates to determine the best substance for a given application based on data describing physical properties of substances*</li> <li>Makes inferences about appropriate uses of materials from results of tests of properties (e.g., hardness, tensile strength, conductivity)*</li> <li>Describes objects in terms of mass*</li> <li>Recognizes that mass is measured in grams*</li> <li>Identifies the tools needed to determine the volume of an irregularly shaped object*</li> <li>Identifies tools needed to calculate the density of an irregularly-shaped objects, using supplied data*</li> <li>Recognizes that conductivity of a substance depends on the freedom of electrons to move from ion to ion of the substance*</li> <li>Performs metric conversions (e.g., milliliters to microliters)*</li> <li>Describes physical changes in matter (e.g., changes in size, shape, freezing, melting, dissolving)*</li> <li>Explains how the addition or loss of heat changes matter (e.g., physical change</li> <li>Gives examples of chemical change</li> <li>Infers that a chemical change has occurred*</li> <li>Describes properties of acids (e.g., sour taste, one or more hydrogen atoms, turns blue litmus red)*</li> <li>Describes properties of bases (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus paper blue)*</li> <li>Gives examples of acids and bases, using household liquids (e.g., bleach, vinegar)*</li> </ul>	<ul> <li>Selects the appropriate relationship to convert units using dimensional analysis strategies*</li> <li>Describes constancy of mass during a physical or chemical change in a system*</li> <li>Defines chemical property*</li> <li>Distinguishes among examples of physical and chemical properties*</li> <li>Compares strength of strong and weak acids and bases*</li> <li>Describes properties of bases (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus paper blue)*</li> <li>Draws conclusion from data related to indicators and pH of household acids, bases and neutral substances*</li> <li>Classifies mixtures based on their properties*</li> <li>Defines solute*</li> <li>Determines the number of neutrons in an atom of an element given the atomic mass of the element*</li> <li>Relates trends seen in the periodic table to bonding of elements*</li> <li>Describes he properties shared by specific families or groups of elements*</li> <li>Describes how atoms with similar numbers of valence electrons are grouped together on the periodic chart*</li> <li>Interprets data related to electron configuration*</li> <li>Recognizes characteristics of compounds*</li> <li>Identifies reactants and products of a combustion reaction*</li> <li>Describes factors that can increase or decrease reaction rates*</li> </ul>	<ul> <li>Describes ductility*</li> <li>Distinguishes between acids and bases based on their molecular composition*</li> <li>Gives examples of acids and bases, using scientific names (e.g., sodium hydroxide)*</li> <li>Gives examples of solutions*</li> <li>Evaluates strategies for the qualitative analysis of a given mixture*</li> <li>Describes the properties shared by specific families or groups of elements*</li> <li>Utilizes classification systems for elements*</li> <li>Explains that when an acid is combined in equal molar quantities with a base, a neutral solution of salt in water in obtained*</li> </ul>

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	Draws conclusion from data related to indicators and	
	pH of household acids bases and neutral substances*	
	Explains that removing heat will cause a substances	
•	change from gas to liquid or from liquid to solid form*	
	Constalizes how changes in temperature effect the	
•	behavior of gas	
	Describes changes in the pressure of gas in terms of	
•	particle behavior*	
•	Describes the relative spacing of particles in solids,	
	liquids, and gases*	
•	Recognizes that atomic number represents the number	
	of protons found in the nucleus of a particular type of	
	element*	
•	Describes the relationship between atomic number and	
	atomic mass*	
•	Determines the number of protons in an atom of an	
	element when given that atom's atomic number*	
•	Determines the number of neutrons in an atom of an	
	element given the atomic mass of the element*	
•	Determines the atomic mass of an atom, given the	
	number of protons, electrons and neutrons for this	
	atom*	
•	Predicts properties of elements using information	
	about their classification (e.g., metals, non-metals)*	
•	Understands that elements are grouped according to	
	Similarities in their properties.	
•	groups of elements*	
•	Describes the electron cloud (quantum) model of	
	atomic structure*	
•	Makes predictions of reactivity based on electron	
	configuration*	
•	Determines the electrical charge of an atom or ion	
•	Describes physical properties of metals*	
•	Recognizes that for an element, the number of protons	
	and electrons remains the same, but the number of	
	neutrons may vary*	
•	Describes the forces which hold together the	
	components of an ionic substance*	
•	Recognizes that compounds contain two or more types of atoms bonded together*	
-	Explains that coefficients may be adjusted to balance	
	chemical equations*	
	Defines inert chemical*	
_		

• Infers that a new compound has been formed when		
new properties result after combining reagents*		
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
• Applies F=ma to calculate the magnitude of a change	Relates changes in speed or direction to unbalanced	• Applies Newton's laws to examine action and reaction*
in motion*	forces (2-D)*	Calculates frequency of waves when given wavelength
<ul> <li>Analyzes examples of accelerated motion using</li> </ul>		and speed*
Newton's laws*		
• Explains how frictional forces affect motion*		
• Gives examples to support the idea that an object will		
remain at rest or move in a straight line at constant		
speed if it is not subjected to an unbalanced force.		
• Explains now an object that is not being subjected to an outside force will move with constant velocity in a		
straight line*		
• Applies Newton's first law (inertia) to real world		
objects*		
• Defines inertia*		
• Determines whether a simple machine is used to		
multiply force or change the direction of an applied		
force*		
• Describes the relationship between a screw and an		
inclined plane*		
• Recognizes that a screw is an inclined plane wrapped		
around a center post*		
• Compares the movement of sound through air, water,		
and/or solids^		
• Understands that pitch of a sound is dependent on the fraction producing the sound*		
• Recognizes that loudness of sound is measured in		
• Recognizes that fourness of sound is measured in decibels*		
<ul> <li>Recognizes the types of waves which comprise the</li> </ul>		
electromagnetic spectrum*		
Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
• Describes the law of conservation of mass*	• Understands how conservation of mass is expressed in	• Recognizes that in a closed system, the total number of
• Recognizes that the mass of a material remains the	chemical formulas and equations*	atoms always remains the same, regardless of how the
same when the material is divided or changes shape*	• Gives examples of potential energy*	atoms are arranged into molecules*
• Understands how conservation of mass is expressed in	• Recognizes that only radiation can transfer heat	C
chemical formulas and equations*	through empty space*	
• Balances equations to reflect conservation of mass*	<ul> <li>Applies Coulomb's law*</li> </ul>	
<ul> <li>Differentiates between parallel and series circuits*</li> </ul>	• Explains how a magnet can be used to produce electric	
• Recognizes the major forms of energy*	current*	
<ul> <li>Defines kinetic energy*</li> </ul>		
<ul> <li>Gives examples of kinetic energy*</li> </ul>		
<ul> <li>Gives examples of potential energy*</li> </ul>		
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Defines a calorie as heat needed to increase the		
temperature of one gram of water one degree Celsius*		
• Recognizes that the Sun's energy from millions of years		
ago is trapped in fossil fuels*		
• Defines an insulator as a material that blocks the		
transfer of heat*		
<ul> <li>Analyzes applications of thermal conductors and insulators*</li> </ul>		
Classifies examples of chemical changes that show		
release or absorption of energy*		
• Gives examples that show that some chemical reactions		
release energy while others require input of energy*		
• Recognizes that light is produced by vibrations of		
electrons*		
• Describes properties of ultraviolet light*		
• Explains that when light shines on a colored filter, light of the color of the filter passes through, while the other		
portions are absorbed*		
• Explains that opaque items may absorb come colors of		
light and reflect others, so that the color seen is the		
color reflected by the object*		
• Explains that negatively charged materials have an excess of negative charges*		
<ul> <li>Describes properties of magnets*</li> </ul>		
• Determines the polarity of a magnet based on its		
interaction with other magnets*		
<ul> <li>Explains how to build a simple compass*</li> </ul>		
• Describes the usefulness of a compass to detect		
magnetic fields*		
<ul> <li>Describes magnetic fields*</li> </ul>		
<ul> <li>Describes ways to increase the strength of an electromagnet*</li> </ul>		
• Understands that weight of an object may change due		
to a change in gravity, but the mass of this object will		
remain the same*		
• Applies Newton's laws of motion to explain movement		
due to gravity		
Calculates gravitational forces of objects in space*		
<i>INEW VOCADULARY:</i> alternating circuit, basic, centrifugal	<i>INEW VOCADULARY:</i> none	<i>New vocabulary:</i> none
avacuate (container) grams hertz ionic iron filinge		
ioule loudness metal plate neutralize nuclear fission		
overtone, pH, phosphorous, reaction force, sodium		
chloride		
		1

New Signs and Symbols: g gram, – negative, pH N	New Signs and Symbols: none	New Signs and Symbols: none
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# Subject: General Science Goal Strand: Physical Science RIT Score Range: 241 - 250

Skills and Concepts to Enhance 231 - 240	Skills and Concepts to Develop 241 - 250	Skills and Concepts to Introduce Above 250
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Selects the appropriate relationship to convert units using dimensional analysis strategies*</li> <li>Describes constancy of mass during a physical or chemical change in a system*</li> <li>Defines chemical property*</li> <li>Distinguishes among examples of physical and chemical properties*</li> <li>Compares strength of strong and weak acids and bases*</li> <li>Describes properties of bases (e.g., slippery, bitter tasting, contain oxygen and hydrogen, turn litmus paper blue)*</li> <li>Draws conclusion from data related to indicators and pH of household acids, bases and neutral substances*</li> <li>Classifies mixtures based on their properties*</li> <li>Defines solute*</li> <li>Determines the number of neutrons in an atom of an element given the atomic mass of the element*</li> <li>Relates trends seen in the periodic table to bonding of elements*</li> <li>Describes how atoms with similar numbers of valence electrons are grouped together on the periodic chart*</li> <li>Interprets data related to electron configuration*</li> <li>Recognizes characteristics of compounds*</li> <li>Identifies reactants and products of a combustion reaction*</li> <li>Describes factors that can increase or decrease reaction rates*</li> </ul>	<ul> <li>Describes ductility*</li> <li>Distinguishes between acids and bases based on their molecular composition*</li> <li>Gives examples of acids and bases, using scientific names (e.g., sodium hydroxide)*</li> <li>Gives examples of solutions*</li> <li>Evaluates strategies for the qualitative analysis of a given mixture*</li> <li>Describes the properties shared by specific families or groups of elements*</li> <li>Utilizes classification systems for elements*</li> <li>Explains that when an acid is combined in equal molar quantities with a base, a neutral solution of salt in water in obtained*</li> </ul>	Analyzes data about phase changes in matter*
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
• Relates changes in speed or direction to unbalanced forces (2-D)*	<ul> <li>Applies Newton's laws to examine action and reaction*</li> <li>Calculates frequency of waves when given wavelength and speed*</li> </ul>	

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Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
• Understands how conservation of mass is expressed in	• Recognizes that in a closed system, the total number of	
chemical formulas and equations*	atoms always remains the same, regardless of how the	
<ul> <li>Gives examples of potential energy*</li> </ul>	atoms are arranged into molecules*	
• Recognizes that only radiation can transfer heat		
through empty space*		
<ul> <li>Applies Coulomb's law*</li> </ul>		
• Explains how a magnet can be used to produce electric		
current*		
New Vocabulary: none	New Vocabulary: none	New Vocabulary: none
New Signs and Symbols: none	New Signs and Symbols: none	New Signs and Symbols: none

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## Subject: General Science Goal Strand: Physical Science RIT Score Range: Above 250

Skills and Concepts to Enhance	Skills and Concepts to Develop
241 - 250	Above 250
Structure, Properties and Changes of Matter	Structure, Properties and Changes of Matter
<ul> <li>Describes ductility*</li> </ul>	<ul> <li>Analyzes data about phase changes in matter*</li> </ul>
<ul> <li>Distinguishes between acids and bases based on their molecular composition*</li> </ul>	
<ul> <li>Gives examples of acids and bases, using scientific names (e.g., sodium hydroxide)*</li> </ul>	
<ul> <li>Gives examples of solutions*</li> </ul>	
<ul> <li>Evaluates strategies for the qualitative analysis of a given mixture*</li> </ul>	
<ul> <li>Describes the properties shared by specific families or groups of elements*</li> </ul>	
<ul> <li>Utilizes classification systems for elements*</li> </ul>	
• Explains that when an acid is combined in equal molar quantities with a base, a neutral solution of salt in water in obtained*	
Position, Motion of Objects, Motion and Forces	Position, Motion of Objects, Motion and Forces
• Applies Newton's laws to examine action and reaction*	
<ul> <li>Calculates frequency of waves when given wavelength and speed*</li> </ul>	
Energy Forms, Transfer, Conservation, Interact	Energy Forms, Transfer, Conservation, Interact
• Recognizes that in a closed system, the total number of atoms always remains the same, regardless of how the atoms are arranged into molecules*	
New Vocabulary: none	New Vocabulary: none
New Signs and Symbols: none	New Signs and Symbols: none

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