



GRADE 5 SCIENCE LEARNING OUTCOMES AND UNIT GUIDE

Unit	Learning Outcomes	Performance Indicators		
Who We Are	<input checked="" type="checkbox"/>	Physical Science: Properties and Changes of Materials/Matter (MC)		
			Investigate the characteristics and physical properties of materials in solid, liquid, and gaseous states of matter.	Recognize that matter is anything that has mass and takes up space.
				Classify materials in their environment as solids, liquids, or gases based on personal observation.
				Discuss the importance of water, in all states of matter, as a sacred substance within communities and traditional knowledge keepers.
				Observe and record characteristics and physical properties (e.g., color, texture, mass, volume, hardness, flexibility, absorbency, strength, buoyancy, melting point, malleability, magnetism, and solubility) of different solids, liquids, and gases in their environment.
				Measure the temperature, volume, and mass of materials using appropriate instruments (e.g., digital thermometer, ruler, tape measure, graduated cylinder, measuring cup, single-pan balance, and electronic scale) and standard units (e.g., °C, cm ³ , ml, and kg).
				Critique personal and scientific classification systems of matter by identifying substances that are not easily classified as solids, liquids, or gases (e.g., butter, fat scraped off hides, fog, Jell-O, and wax).
				Pose and refine questions for investigation related to changes in materials.
				Demonstrate changes (e.g., cutting aluminium foil, forming clay, breaking wood, and crumpling paper) that can be made to an object without changing the properties of the material making up the object.
				Predict whether changes to a material will be reversible or non-reversible.
				Observe and classify changes to materials as reversible (e.g., melting ice cube, dissolving salt in water, blowing up a balloon, and folding paper) and non-reversible (e.g., paper burning, egg cooking, bicycle rusting, balloon popping, and apple turning brown).
				Differentiate between changes to materials that occur rapidly (e.g., wood burning, explosives detonating, balloon popping, and glass breaking) and those that occur over extended periods (e.g., bicycle rusting, paint fading, and newspaper yellowing).
				Provide evidence of the six changes of state (i.e., evaporation, condensation, freezing, melting) of matter in the environment (e.g., water evaporating from wet clothes, steam condensing on the wall of a shower, lake freezing, butter melting, ice cube in the freezer).
	Demonstrate that changes of state of matter are reversible when heat is applied or removed.			
	Compare the characteristics and physical properties of a material in its solid and liquid states (e.g., compare the mass of ice cubes with the mass of liquid that results when they melt).			
	Design and carry out a procedure to determine whether the mass of materials changes during reversible and non-reversible changes.			
	Develop conclusions about the effects of reversible and non-reversible changes on the characteristics and physical properties of materials.			



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Where We Are in Place and Time	Earth & Space Science: Environmental Science: Water and Air (WA)			
	Identify the properties of air, its properties and uses.			Discuss and recognize the function of air. Air is a natural resource that you cannot see or touch and humans and animals need it to breathe.
				Discuss wind being the movement of air and there are different types of wind (breeze, gale and hurricane).
				Recognize that uneven heating of the Earth causes air movements (convection currents).
				Investigate the influence the ocean has on the weather and the role water cycle plays in weather patterns.
				Investigate the cause and effects of different types of severe weather.
				Investigate how to use weather maps and data to predict local weather and know that weather forecasts depend on many variables.
				Understand that the Earth's atmosphere exerts a pressure that decreases with distance above Earth's surface and that at any point it exerts this pressure equally in all directions.
				Inquire into different uses of wind throughout history including its use to move sail boats, windmills and wind energy.
				Inquire into properties of air (invisible, occupies space and has weight. (use a balloon to show air is invisible when deflating, occupies space when filled and tie a full balloon and empty balloon on a teeter totter to represent air's weight.
			Discuss and understand that global warming is in part the result of human actions and causing changes in weather systems. Students can talk to community members about traditional weather patterns and what has changes.	
	Analyze the water on earth, how it moves between ocean and land through the processes of evaporation and condensation.			Discuss and recognize the function of water. Water is a natural resource, covers over 70% of the earth's surface, has no fixed place, can change states and is needed to live. Most of the earth's water is salt water.
				Identify solid, liquid and gas properties of water(ice, water, stream) through demonstration.
				Represent the hydrologic cycle through written, drawn, dance, acting or a method of student choice.
				Water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.
				Identify sources of freshwater (Pond, glaciers, ground water, springs, etc..) is limited and it can be extended by recycling and decreasing the use of water.
				Investigate uses for water in our daily life. (drinking, cooking, agriculture, transportation, recreation.)
			Investigate properties of water (Colorless, odorless, shapeless) through questioning. (Does water have a shape, color or odor?).	
			Inquire into the origin of the water used by their local community.	



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Unit	Learning Outcomes	✓	Performance Indicators	
Physical Science: Properties and Changes of Materials/Matter (MC)				
How We Express Ourselves	Assess how the production, use, and disposal of raw materials and manufactured products affects self, society, and the environment.		Differentiate between raw materials and manufactured products.	
			Assess the benefits and drawbacks of manufactured materials (e.g., plastic, steel, aluminium, glass, nylon, and other fabric) that have been developed to improve human living conditions.	
			Research a product to determine the raw materials from which it is made and the process required to turn the raw materials into a manufactured product.	
			Conduct a fair test to determine the effectiveness of different types or brands of a material (e.g., glue, coffee mug, paper towel, battery, bubble gum, paper, soap, and balloon).	
			Develop and apply criteria (e.g., function, cost, reliability, and aesthetics) for evaluating the effectiveness of a consumer product.	
		*	Assess the societal and environmental impacts of industrial and agricultural processes that change raw materials into manufactured products, considering different perspectives such as consumer, manufacturer, salesperson, and community leader.	
		*	Recognize the need for developing a sense of responsibility towards other people, other living things, and the environment when choosing how to use and dispose of manufactured products.	
	Elements and their combinations account for all the varied types of matter in the world. (Periodic Table)			During chemical reactions the atoms in the reactants rearrange to form products with different properties.
				Represent how matter is made (diagram, mind maps, 3D molecules). Matter is made of atoms, which may combine to form molecules.
				Metals have properties in common, such as high electrical and thermal conductivity. Some metals, such as aluminum (Al), iron (Fe), nickel (Ni), copper (Cu), silver (Ag), and gold (Au), are pure elements; others, such as steel and brass, are composed of a combination of elemental metals.
				Recognize that each element is made of one kind of atom and that the elements are organized in the periodic table by their chemical properties.
				Represent the properties of solid, liquid, and gaseous substances, such as sugar (C ₆ H ₁₂ O ₆), water (H ₂ O), helium (He), oxygen (O ₂), nitrogen (N ₂), and carbon dioxide (CO ₂). (Posters, present, drama)
			Living organisms and most materials are composed of just a few elements.	



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Unit	Learning Outcomes	Performance Indicators	
How the World Works	Analyze the effects of gravitational, magnetic, and mechanical forces, including friction, on the movement of objects.	Physical Science: Forces and Simple Machines (FM)	
		Differentiate between examples of contact (e.g., wind, push, and pull) and non-contact (e.g., magnetic and gravitational) forces in their daily lives.	
		Describe how forces can act directly or from a distance to cause objects to start to move, speed up, slow down, change direction, or stop moving.	
		Explain and diagram, using force arrows to represent the relative strength and direction of a force, how contact and non-contact forces affect the movement of objects.	
		Collaboratively design and carry out an experiment to determine the effects of changing the amount of force applied to an object on the movement of the object.	
		Measure, using non-standard units (e.g., number of elastic bands, and the length that an elastic band stretches), the force required to cause an object to move a specified distance, and estimate the force required to move a different object the same distance or the same object a different distance.	
		Record qualitative observations and quantitative measurements about the effects of non-contact (i.e., gravitational and magnetic) forces which act from a distance to cause objects to move, change direction, or stay in place.	
		Pose questions to investigate the effects of friction on stationary and moving objects, and identify variables (e.g., surface material, texture, mass, angle of ramp, and orientation of object) that may be relevant to the investigation.	
		Conduct a fair test to compare the effects of friction on the movement of objects over a variety of surfaces (e.g., wood, cloth, floor tile, carpet, tabletop, sidewalk, and grass).	
		Collect and display quantitative data related to forces and motion using tables, charts, diagrams, and line graphs.	
	Draw conclusions about the relationship between contact and non-contact forces on the movement of objects.		
	Investigate characteristics of simple machines, including levers, wheels and axles, pulleys, inclined planes, screws, and wedges, for moving and lifting loads.	Pose and refine testable questions about the operation of simple machines.	
		Demonstrate how simple machines (e.g., hammer, screwdriver, pliers, bottle opener, ramp, splitting wedges, and scissors) act to reduce effort, increase the distance a load moves, and/or change the direction of an applied force.	
		Select and safely use tools and materials in a manner that ensures personal safety and the safety of others when investigating the characteristics of simple machines.	
		Design and carry out an experiment to compare the force needed to lift a load manually with that required to lift it using various simple machines. (dolly)	
		Determine the relationship between the applied force and the distance the load is moved for each class of lever.	
		Compare the operation of wheel and axle mechanisms (e.g., Ferris wheel, bicycle wheel, rolling pin, in-line skate, windmill, and door knob) with the operation of levers.	
		Determine the effectiveness of wheel and axle mechanisms (e.g., screwdrivers, wheels, doorknobs, and gear systems) of various diameters, rotational speeds, and rotational directions for accomplishing specific tasks.	
		Investigate the relationship between the amount of applied force and the distance that the load is moved in single and multiple pulley systems, including determining the mechanical advantage of the system.	
		Design and construct a prototype of a simple machine which is meant to accomplish a student-identified task.	
		Evaluate the efficiency and effectiveness of a prototype of a simple machine.	
	Assess how natural and man-made forces and simple machines affect individuals, society, and the environment.	Create a representation of the characteristics and operating principles of each type of simple machine.	
		Recognize that scientific processes and ideas help explain how and why simple machines operate.	
		Provide examples of simple and complex machines used at home, in school, and throughout their community.	
		Compare technologies developed and/or used by various cultures, past and present, which represent applications of simple machines.	
		Analyze the effects of forces from natural phenomena (e.g., earthquake, tornado, hurricane, and tsunami) on the natural and constructed environment.	
		Assess, using student-identified criteria, the function and effectiveness of products designed to enhance or reduce friction (e.g., grease, oil, ski wax, skate blade, fishing lure, canoe paddle, Velcro, and winter tires) between two surfaces.	
		Suggest how the function of common simple mechanisms, such as a crowbar, wheelbarrow, elbow joint, fork, rake, baseball bat, can opener, stapler, or scissors, might be different had they been based on a different class of lever.	
		Identify the benefits and disadvantages of practical examples of levers (e.g., pliers, teeter-totter, bottle opener, wheelbarrow, and fishing rod) on their lives and in their community.	
		Assess the impacts of machines, such as carts, boats, airplanes, logging equipment, and tractors, on traditional lifestyles.	
Examine how agricultural, industrial, automotive, marine, and household applications of pulleys (e.g., crane, fan belt, block and tackle, clothesline, and flagpole) have changed the lives of individuals and affected society and the environment.			
Examine the types of tasks in the community that have been and are being currently accomplished using wedges (e.g., shim, splitting maul, knife, axe, and chisel).			
Imagine machines that could be developed to simplify tasks within their lives.			



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Unit	Learning Outcomes	Performance Indicators	
How We Organize Ourselves	Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.	✓	
		Life Systems: Structures of Living Things (SL)	
		Investigate how multicellular organisms have specialized structures to support the transport of materials.	
		Identify and represent how blood circulates through the heart chambers, lungs, and body and how carbon dioxide (CO ₂) and oxygen (O ₂) are exchanged in the lungs and tissues.	
	Analyze personal and societal requirements for, and the impact of, maintaining a healthy human body.	Identify how the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.	
		Understand the role of the kidney in removing cellular waste from blood and converting it into urine, which is stored in the bladder.	
		Identify local knowledge, including the effects of traditional lifestyles, that contributes to human understanding of maintaining a healthy body.	
		Analyze the role of the skin (e.g., protection, heat regulation, absorption, and evaporation) in maintaining a healthy body.	
		Research how the body's defenses, such as tears, saliva, skin, certain blood cells, and stomach secretions, work to fight against infections.	
		Describe the function of technologies (e.g., defibrillator, soap, exercise equipment, and safety equipment) that have been developed to support personal health.	
		Relate the effects of common diseases to the organs or body systems they affect or are related to (e.g., heart attacks affect the circulatory system, epilepsy affects the nervous system, hepatitis affects the liver, gallstones affect the gallbladder, and asthma affects the respiratory system).	
	Investigate the structure, function, and major organs of one or more human body systems such as the digestive, excretory, respiratory, circulatory, nervous, muscular, and skeletal systems.	Assess the benefits of lifestyle choices (e.g., daily physical activity, proper nutrition, adequate sleep, appropriate hygiene practices, regular medical check-ups, and using safety equipment) that contribute to maintaining a healthy body.	
		Propose actions that individuals can take to minimize the harmful effects and maximize the beneficial effects of natural- and human- caused environmental factors (e.g., West Nile Virus, mosquitoes, pesticides, air quality, noise pollution, food safety, and water and wastewater treatment) on human health.	
		Explain at least two functions of the human digestive, excretory, respiratory, circulatory, nervous, muscular, or skeletal systems.	
		Create a written and/or visual representation of the location of the major organs of at least two human body systems within the entire body.	
		Model the structure and/or function of one or more organs from the human digestive, excretory, respiratory, circulatory, nervous, muscular, or skeletal system.	
		Assess, in collaboration with other students, a model of an organ from a human body system to refine the model.	
		Suggest the processes that scientists might follow to investigate questions related to the structure and/or function of human body systems (e.g., Which factors affect breathing and heartbeat rate? How does the digestion process work? How much air do lungs hold? Why is blood red? Where does my food go?).	
	Assess how multiple human body systems function together to enable people to move, grow, and react to stimuli.	Design and carry out procedures, including identifying and controlling variables, to investigate the structure and/or function of one or more body systems (e.g., the influence of exercise on heart rate, the role of simulated saliva in starting the digestion process, and factors that influence a person's response time).	
		Compile and display data from investigations related to the structure and/or function of human body systems using appropriate formats such as frequency tallies, tables, and bar graphs.	
Relate body changes, such as acne on the skin and growth of body hair, to human growth and development from birth to puberty.			
Explain how humans reproduce, what to expect from puberty and the importance of safe sex.			
	Represent, physically, dramatically, or visually, the interactions among the skeletal, muscular, and nervous systems that produce movement of the body or parts of the body.		
	Investigate the interdependence between the nervous system and other body systems for reacting to stimuli and controlling body functions.		
	Explain how the digestive and excretory systems work together to ensure that the body makes use of food that is eaten and disposes of waste. The sequential steps of digestion and the roles of teeth and the mouth, oesophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.		



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Unit	Learning Outcomes	Performance Indicators
Sharing the Planet	✓	Performance Indicators
	Earth & Space Science: Conservation of Energy and Resources (ER)	
	Analyze the long-term impacts on society and the environment of human uses of energy and natural resources, and suggest ways to reduce these impacts.	Investigate ways to Reduce, reuse, recycle. (E.G. Turn off taps while brushing teeth, reuse, recycle, use less products. Conserves natural resources and energy).
		Use scientific Inquiry skills to investigate issues related to energy and resource conservation (e.g. interview elders, locals or experts) (Sample guiding questions: Why did you choose this issue to research? Where will you find information about it? How will you determine if the source of information is a good one (e.g., unbiased, current, knowledgeable)? Why might some of the sources be biased one way or another on the issue? What are some of the concerns that were raised in your research? How might this issue be relevant to our local community? Who can act on this issue? How might you as an individual influence the outcome of the issue?
	Identify the various forms of energy (e.g. electrical, chemical, mechanical, heat, light, kinetic.)	<p>Identify forms of energy and give examples from everyday life how that energy is used. (e.g. electrical energy cooking, chemical/electrical to run cars, mechanic energy to hit a ball, light energy to manage traffic, heat energy to warm stoves/fires.</p> <p>Identify renewable and non - renewable energy. (e.g. renewable: sun, wind, ocean waves, water, and tides, wood; non-renewable: fossil fuels such as oil, petroleum and natural gas) and classify them.</p> <p>Identify the natural origin of materials used to make common objects.</p> <p>Understand that the utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.</p>