Science in ESD's Lower School

 The goal of ESD's Lower School science program is for students to become astute observers of the world around them, who learn to recognize the formal and informal opportunities to experiment and question as they build, take apart, sort, name, observe, compare, and try out new ideas. Our students develop the mindset of "taking things apart," observing carefully and keeping accurate records as they do so. Our teachers create an environment that draws out a student's natural curiosity about how things work and why things are as they appear. We are educating students to take the hypothetical seriously and to recognize patterns and use abstractions to make them logically consistent. The science program teaches students to frame careful questions based on their observations, postulate hypotheses to explain why and how, and to create verifiable experiments that test their ideas. In our classrooms students regularly notice technical opportunities to make the world or classroom a better place and are able to formulate these opportunities into a design challenge with numerous possible solutions.

	Science Skills and Behaviors	A Sampling of Topics Include
Beginners	**To observe:** Students will use the five senses to gather both qualitative and quantitative information and data about an object, event or phenomenon; *Make observations to provide evidence	Chapel Garden – colors and shapes The Properties of Water Solid, liquid and gas Non-standard measurements
PK4	**To predict**: Students will suggest the most likely outcome of a future event based upon patterns of evidence *Ask answerable questions about changes in the natural world and ideate causation *Link cause and effect to make predictions *Generate and compare multiple possible solutions to a problem or challenge and evaluate how well each meets the criteria and constraints of the problem.	Growing crystals Color mixing Non-standard and standard measurements Fall leaf colors Marble run constraints and challenges
K/P	**To measure**: Students will use standard measures or non-standard unit estimates to describe specific dimensions of an object, event or phenomenon and seek various interpretations of this data.	Action-Reaction – balloon rockets Aerodynamics: Wings and lift Dam construction and failure Measurement devices and errors
1	**To classify**: Students will group or sequence objects, events or phenomena into categories based upon characteristics or defined criteria *Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Owls Butterflies (migration) Ponds and prairies Adaptation

	*Develop a model to describe patterns		Sort and classify: Leaves, rocks, assorted familiar and unfamiliar objects, paint strip colors, animals, textures, sounds, scents, taste memories, landforms, clouds, mountains, sea shells
2	**To infer**: Students will formulate hypotheses and possible explanations based upon observations * Obtain and combine information to describe and interpret		Buoyancy and water Plant physiology Chemical reactions States of matter
3	**To communicate**: Students will use words, symbols, and graphics to describe an object, phenomenon or event *Use evidence to construct an explanation *Develop and use a model to describe scientific phenomena * Obtain and combine information to describe *Create lab reports that allow authentication of experiments		Landforms and geology Force and motion Simple machines and engineering
4	**To interpret/synthesize**: Students will apply scientific concepts to design, test, and reflect * Plan and carry out experiments in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. * Identify evidence from patterns * Analyze and interpret data * Use evidence to construct an explanation or an argument * Define a simple design problem reflecting a need or a want that includes specified success criteria and constraints on materials, time, or cost *Remain observant of opportunities for improvement		Inventions Electricity Magnetism Human physiology: the brain, the ear and sounds, the eye and vision Solar system