Bangor School Department
Grades 3-5 Science Parameters for Essential Instruction

A. Unifying Themes: Students apply the principles of systems, models, constancy and change, and scale in science and technology.

A1 Systems

		Grade 3	Grade 4	Grade 5
	Students explain interactions between parts that make up whole man-made and natural things.			
a.	Give examples that show how individual parts of organisms, ecosystems, or man-made structures can influence one another.	Human Body Earth Materials	Ecology Motion and Design	Oceans Magnetism and Electricity
b.	Explain ways that things including organisms, ecosystems, or man-made structures may not work as well (or not at all) if a part is missing, broken, worn out, mismatched, or misconnected.	Human Body Physics of Sound Earth Materials	Ecology Motion and Design	Oceans Magnetism and Electricity

A2 Models

		Grade 3	Grade 4	Grade 5
	Students use models to represent objects, processes, and events from the physical setting, the living environment, and the technological world.			
a.	Represent the features of a real object, event, or process using models including geometric figures, number sequences, graphs, diagrams, sketches, maps, or three-dimensional figures and note ways in which those representations do (and do not) match features of the originals.	Human Body Physics of Sound Earth Materials	Motion and Design Solar System	Oceans Magnetism and Electricity

A3 Constancy and Change

		Grade 3	Grade 4	Grade 5
	Students identify and represent basic patterns of change in the physical setting, the living environment, and the technological world.			
a.	Recognize patterns of change including steady, repetitive, irregular, or apparently unpredictable change.	Physics of Sound Earth Materials	Ecology Unit Motion and Design Solar System	Mixtures and Solutions
b.	Make tables or graphs to represent changes.	Earth Materials	Motion and Design	Mixtures and Solutions Oceans

A4 Scale

		Grade 3	Grade 4	Grade 5
	Students use mathematics to describe scale for man-made and natural things.			
a.	Measure things to compare sizes, speeds, times, distances, and weights.	Earth Materials	Solar System Motion and Design	
b.	Use fractions and multiples to make comparisons of scale.		Solar System	

B. The Skills and Traits of Scientific Inquiry and Technological Design: Students plan, conduct, analyze data from and communicate results of in-depth scientific investigations; and they use a systematic process, tools, equipment, and variety of materials to create technological design and produce a solution or product to meet a specified need.

B1 Skills and Traits of Scientific Inquiry

		Grade 3	Grade 4	Grade 5
	Students plan, conduct, analyze data from, and communicate results of investigations, including fair tests.			
a.	Pose investigable questions and seek answers from reliable sources of scientific information and from their own	Human Body Physics of Sound Earth Materials	Motion and Design Ecology	Oceans Magnetism and Electricity

	investigations.			
b.	Plan and safely conduct investigations including simple experiments that involve a fair test.	Human Body Physics of Sound Earth Materials	Motion and Design Ecology	Magnetism and Electricity
c.	Use simple equipment, tools, and appropriate metric units of measurement to gather data and extend the senses.	Earth Materials	Motion and Design	Oceans Magnetism and Electricity Mixtures and Solutions
d.	Use data to construct and support a reasonable explanation.	Physics of Sound Earth Materials	Motion and Design	Oceans Magnetism and Electricity Mixtures and Solutions
e.	Communicate scientific procedures and explanations.	Human Body Physics of Sound Earth Materials	Motion and Design	Mixtures and Solutions Oceans

B2 Skills and Traits of Technological Design

		Grade 3	Grade 4	Grade 5
	Students use a design process, simple tools, and a variety of materials to solve a problem or create a product, recognizing the constraints that need to be considered.			
a.	Identify and explain a simple design problem and a solution related to the problem.	Physics of Sound	Motion and Design	Magnetism and Electricity
b.	Propose a solution to a design problem that recognizes constraints including cost, materials, time, space, or safety.		Motion and Design	
c.	Use appropriate tools, materials, safe techniques, and quantitative measurements to implement a proposed solution to a design problem.		Motion and Design	Magnetism and Electricity
d.	Balance simple constraints in carrying out a proposed solution to a design problem.		Motion and Design	Magnetism and Electricity
e.	Evaluate their own design results, as well as those of others, using established criteria.		Motion and Design	Magnetism and Electricity

f.	Modify designs based on results of evaluations.		Motion and Design	Magnetism and Electricity
g.	Present the design problem, process, and design or solution using oral, written, and/or pictorial means of communication.		Motion and Design	Magnetism and Electricity

C. The Scientific and Technological Enterprise: Students understand the history and nature of scientific knowledge and technology, the processes of inquiry and technological design, and the impacts science and technology have on society and the environment.

C1 Understandings of Inquiry

		Grade 3	Grade 4	Grade 5
	Students describe how scientific investigations result in explanations that are communicated to other scientists.			
a.	Describe how scientists answer questions by developing explanations based on observations, evidence, and knowledge of the natural world.	Earth Materials	Ecology Motion and Design	Magnetism and Electricity Mixtures and Solutions Oceans
b.	Describe how scientists make their explanations public.			Magnetism and Electricity Mixtures and Solutions

C2 Understandings About Science and Technology

		Grade 3	Grade 4	Grade 5
	Students describe why people use science and technology and how scientists and engineers work.			
a.	Describe how scientists seek to answer questions and explain the natural world.	Earth Materials		Magnetism and Electricity Mixtures and Solutions
b.	Describe how engineers seek solutions to problems through the design and production of products.		Motion and Design	Mixtures and Solutions

C3 Science, Technology and Society

		Grade 3	Grade 4	Grade 5
	Students identify and describe the influences of science and technology on people and the environment.			
a.	Explain how scientific and technological information can help people make safe and healthy decisions.		Ecology Guidance Program	Oceans
b.	Give examples of changes in the environment caused by natural or man-made influences.	Earth Materials	Ecology	Oceans
c.	Explain that natural resources are limited, and that reusing, recycling, and reducing materials and using renewable resources is important.		Ecology	Magnetism and Electricity

C4 History and Nature of Science

		Grade 3	Grade 4	Grade 5
	No performance indicator.			
	Although no performance indicators are stated, students are expected to have instructional experiences that describe how science helps people understand the natural world.			

D. The Physical Setting: Students understand the universal nature of matter, energy, force, and motion and identify how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe.

D1 Universe and Solar System

		Grade 3	Grade 4	Grade 5
	Students describe the positions and apparent motions of different objects in and beyond our solar system and how these objects can be viewed from Earth.			
a.	Show the locations of the sun, Earth, moon, and planets and their orbits.		Solar System	
b.	Observe and report on observations that the sun appears to move across the sky in the same way every day, but its path changes slowly over the seasons.		Solar System	
c.	Recognize that the sun is a star and is similar to other stars in the universe.		Solar System	

D2 Earth

		Grade 3	Grade 4	Grade 5
	Students describe the properties of Earth's surface materials, the processes that change them, and cycles that affect the Earth.			
a.	Explain the effects of the rotation of the earth on the day/night cycle, and how that cycle affects local temperature.		Solar System	Oceans
b.	Describe the various forms water takes in the air and how that relates to weather.			Oceans
c.	Explain how wind, waves, water, and ice reshape the surface of Earth.	Earth Materials		Oceans
d.	Describe the kinds of materials that form rocks and soil.	Earth Materials		

e.	Recognize that the sun is the source of Earth's surface heat and light energy.		Ecology Solar System	Oceans
f.	Explain how the substance called air surrounds things, takes up space, and its movement can be felt as wind.		Motion and Design	

D3 Matter and Energy

		Grade 3	Grade 4	Grade 5
	Students describe properties of objects and materials before and after they undergo a change or interaction.			
a.	Describe how the weight of an object compares to the sum of the weight of its parts.		Motion and Design	
b.	Illustrate how many different substances can be made from a small number of basic ingredients.	Earth Materials		Mixtures and Solutions
c.	Describe properties of original materials, and the new material(s) formed to demonstrate that a change has occurred.	Earth Materials		Mixtures and Solutions
d.	Describe what happens to the temperatures of objects when a warmer object is near a cooler object.		Ecology	
e.	Describe how the heating and cooling of water and other materials can change the properties of the materials.		Ecology	Oceans
f.	Explain that the properties of a material may change but the total amount of material remains the same.			Mixtures and Solutions
g.	Explain that materials can be composed of parts too small to be seen without magnification.	Earth Materials		

D4 Force and Motion

		Grade 3	Grade 4	Grade 5
	Students summarize how various forces affect the motion of objects.			
a.	Predict the effect of a given force on the motion of an object.		Motion and Design	
b.	Describe how fast things move by how long it takes them to go a certain distance.		Motion and Design	
c.	Describe the path of an object.		Solar System Motion and Design	
d.	Give examples of how gravity, magnets, and electrically charged materials push and pull objects.		Solar System Motion and Design	Magnetism and Electricity

E. The Living Environment: Students understand that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Students understand similarities and differences between humans and other organisms and the interconnections of these interdependent webs.

E1 Biodiversity

		Grade 3	Grade 4	Grade 5
	Students compare living things based on their behaviors, external features, and environmental needs.			
a.	Describe how living things can be sorted in many ways, depending on which features or behaviors are used to sort them, and apply this understanding to sort living things.		Ecology	Oceans
b.	Describe the changes in external features and behaviors of an organism during its life cycle.		Ecology	Oceans

E2 Ecosystems

		Grade 3	Grade 4	Grade 5
	Students describe ways organisms depend upon, interact within, and change the living and non-living environment as well as ways the environment affects organisms.			
a.	Explain how changes in an organism's habitat can influence its survival.		Ecology	Oceans
b.	Describe that organisms all over the Earth are living, dying, and decaying and new organisms are being produced by the old ones.		Ecology	
c.	Describe some of the ways in which organisms depend on one another, including animals carrying pollen and dispersing seeds.		Ecology	
d.	Explain how the food of most animals can be traced back to plants and how animals use food for energy and repair.		Ecology	
e.	Explain how organisms can affect the environment in different ways.		Ecology	

E3 Cells

		Grade 3	Grade 4	Grade 5
	Students describe how living things are made up of one or more cells and the ways cells help organisms meet their basic needs.			
a.	Give examples of organisms that consist of a single cell and organisms that are made of a collection of cells.		Ecology	
b.	Compare how needs of living things are met in single-celled and multi-celled organisms.		Ecology	

E4 Heredity and Reproduction

		Grade 3	Grade 4	Grade 5
	Students describe characteristics of organisms, and the reasons why organisms differ from or are similar to their parents.			
a.	Name some likenesses between children and parents that are inherited, and some that are not.	Human Body		
b.	Explain that in order for offspring to look like their parents, information related to inherited likenesses must be handed from parents to offspring in a reliable manner.	Human Body		

E5 Evolution

		Grade 3	Grade 4	Grade 5
	Students describe the fossil evidence and present explanations that help us understand why there are differences among and between present and past organisms.			
a.	Explain advantages and disadvantages gained when some individuals of the same kind are different in their characteristics and behavior.		Ecology	
b.	Compare fossils to one another and to living organisms according to their similarities and differences.	Earth Materials		