

Curriculum Guidebook: Science
PreK - 5th Grade - 2018-2019

Guide ID	Description	Gr PK	Gr K	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5
Scientific Processes								
001	Observe, compare, classify, measure, predict, hypothesize, and infer.	X						
002	Participates in a variety of science experiences utilizing age appropriate scientific equipment and collections of materials.	X						
012	Collects specimens		X	X				
017	Uses common materials appropriately for laboratory experiments or demonstrations		X	X		X		
018	Identifies, describes, and classifies the properties of objects		X	X		X		
019	Sequences objects and events in an experiment		X	X		X		
020	Predicts outcomes		X	X		X		
028	Interprets data, graphs, tables, etc		X		X			X
029	Draws conclusions		X	X		X		
054	Becomes aware of personal space during active exploration of physical environment	X						
055	Begins to develop foundation for linking concepts and procedures with active experiences	X						
056	<i>Uses senses to gather, explore, and interpret information</i>	X						
057	<i>Make predictions based on background knowledge, previous scientific exploration, and observations of objects and events in the world</i>	X						
058	<i>Record and organize data using graphs, charts, science journals, etc. to communicate conclusions regarding experiments and explorations</i>	X						
059	<i>Use simple tools for investigation of the home, classroom and other familiar places</i>	X						
105	Records data			X		X		
106	Reports data graphically			X				X
108	Recognizes and uses proper science vocabulary			X				
119	Recognizes cause-and-effect relationships			X	X	X		
129	Recognizes and controls for variables			X		X		
131	Makes deductions			X				
132	Makes generalizations from obtained data			X				
140	Compares weights of objects by weighing them in his or her hands			X	X			
141	Compares weights of objects by weighing them on a scale			X	X	X		
142	Compares masses with a balance			X				
327	Makes inferences					X		
328	Forms hypotheses					X		

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330	Determines procedures					X		
332	Follows procedures independently					X		
398	Construct and interpret different types of graphs.					X		
399	Compare and contrast solutions and mixture.					X		
424	Uses ocular equipment properly						X	X
500	Measures the size mass and volume of objects							X
506	Organizes information through notetaking and modified outline (fill in the blank).							X
547	Acquires information concerning science related careers							X
552	Observes objects and phenomena							X
557	Uses the metric system							X
Earth Science								
005	Participates in activities related to preserving their environment.	X						
009	Participates in activities to explore the earth (rocks, soil, air) and sky (clouds, sun, moon, stars).	X						
032	Identifies and practices recycling		X	X				
033	Identifies the causes, problems, and issues related to air pollution		X					
034	Identifies problems and issues related to water pollution, water conservation or allocation of water resources.		X					
035	Identifies some species which are in danger of extinction, and the human activities which may have contributed to this condition		X		X		X	
036	Identifies recyclable materials.		X	X			X	
048	Recognizes that time and temperature can be measured with a clock and thermometer	X						
060	<i>Investigate and identify a variety of earth materials by their observable properties (e.g., soil, rocks, minerals)</i>	X						
061	<i>Make simple observations of the characteristics and movements of the sun, moon, stars, and clouds</i>	X						
110	Knows the approximate proportion of land to water on the earth's surface			X				
111	Identifies various kinds of land and water formations (e.g. hills, mountains, valleys, plains, rivers, bays, islands, etc.).			X				
113	Defines earthquake.			X		X		
114	Defines weathering.			X	X			
115	Describes the causes and effects of erosion.			X		X		
116	Defines sediment			X		X		

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117	Describes the common characteristics which distinguish seawater from fresh water.			X				
118	Describes the effect of ocean pollution on marine life			X				
134	Identifies substances which humans consider air pollutants			X				
203	Describes how fossils were formed				X	X	X	
207	Defines recycling				X			
216	Identifies the ratio of water to land on the earth's surface.				X			
217	Describes ways the earth changes through erosion and weathering.				X			
218	Identifies sources of fresh water (pond, lake, river, stream) and salt water.				X			
310	Describes the main characteristics of the earth's layers.					X	X	
311	Interprets diagrams representing the earth's interior structure					X		
313	Defines minerals.					X	X	
314	Describes characteristics and properties common to minerals.					X	X	
315	Defines igneous, sedimentary, and metamorphic rocks					X	X	
316	Identifies the main characteristics of igneous, sedimentary, and metamorphic rocks					X	X	
317	Describes how igneous, sedimentary, and metamorphic rocks are formed					X	X	
318	Describes the physical properties common to soil					X		
319	Knows how soils may be classified.					X		
320	Defines faults.					X	X	
321	Describes the different types of weathering.					X	X	
322	Describes the ways in which climatic conditions influence weathering.					X		
323	Defines erosion					X		
324	Describe methods used to prevent erosion.					X		
341	Defines conservation						X	
342	Identifies the chief causes of water pollution						X	
343	Describes the chief methods used to prevent water pollution					X	X	
344	Describes the chief methods used to prevent air pollution						X	
380	Defines shadow					X		
399.1	Describe the parts of the ecosystem (population, community, habitat).					X		
399.2	Identifies ways in which the ecosystem is affected by cutting and laying roads, logging mountainsides, etc.					X		
399.3	Describe the main causes of water pollution.					X		
399.4	Describe the methods used to prevent water pollution.					X		
399.5	Describe the main causes of air pollution.					X		
399.6	Describe the methods used to prevent air pollution.					X		
403	Describes the Greenhouse Effect						X	
405	Knows that land and water absorb and retain heat at different rates						X	

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414	Defines geology as the science of the earth, its processes, its forms, and its relationships to other physical sciences.						X	X
415	Knows structural characteristics by which minerals are classified and named.						X	
416	Uses conventional scientific names for common minerals						X	
417	Identifies minerals by testing their chemical and physical properties						X	
418	Identifies rocks						X	
419	Knows the rock cycle.						X	
420	Knows the processes by which fossil fuels such as coal, petroleum, and natural gas are formed.						X	X
422	Lists the characteristics of volcanic materials (e.g. magma, lava, cinders, ash etc.).						X	
423	Describes the main causes of earthquakes						X	
425	Defines epicenter.						X	
426	Describes how earthquakes cause tidal waves and tsunamis.						X	
427	Knows that the Richter Scale measures intensities of earthquakes						X	
428	Describes how the study of earthquakes provides information about the structure of the earth's interior.						X	
429	Describes how mountains are formed.						X	
433	Describes how caves are formed.						X	
434	Identifies stalagmites and stalactites						X	
435	Describes how glaciers are formed						X	
436	Describes glacial movement						X	
438	Describes the effect of glacial action on the earth's surface						X	
441	Defines oceanography						X	
442	Defines ocean basin.						X	
443	Identifies topographical features on the ocean floor that are similar to those on land.						X	
445	Describes the main topographic features of continental margins (e.g. shore, continental shelf, continental slope, submarine canyons, etc.)						X	
446	Identifies the major layers of ocean water (e.g. bottom water, deep water etc.).						X	
447	Defines ocean currents.						X	
448	Describes the influence that oceans have on the temperature and climate of the earth						X	
449	Identifies the forces which are responsible for tides on the earth						X	
450	Identifies the main causes of ocean waves						X	
451	Describes the factors which affect wave height and speed.						X	

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497	Identifies human activities that modify soils (e.g. tilling, planting, fertilizing, mining, burying wastes, etc.) and identifies problems and issues related to human use or pollution of soils.						X	
498	Describes techniques developed by farmers to prevent soil erosion, flooding, drought, etc.						X	
499	Describes the ways in which irrigation systems affect land use.						X	
514	Identifies and recognizes ways to recycle							X
516	Distinguishes between renewable and non-renewable resources							X
553	Knows that nuclear reactions (fusion) within the sun are the sun's primary energy source							X
561	Explain the various methods of capturing the sun's energy for use of the earth.							X
Space								
042	Knows ways of casting shadows		X	X				
043	Knows the relationship between the position of a shadow and the position of the sun		X			X		
138	Knows that our solar system is located in the Milky Way galaxy			X	X			
139	Defines gravity			X				
144	Defines shadow			X				
145	Recognizes the sun as a star			X				
146	Knows the ways in which the movements and tilt of the earth (in relationship to the sun) affect the seasons; length of day; night and year; temperatures and climate etc			X	X	X		
147	Demonstrates that the sun can be used to determine direction and the time of day			X		X		
148	Knows that the earth revolves and rotates simultaneously			X		X		
149	Lists the names of the planets in the solar system			X	X	X		
150	Describes the physical features of the Moon			X	X	X		
211	Knows that the sun is a star				X			
214	Knows that the moon is the earth's only natural satellite				X	X		
215	Names the phases of the moon				X	X		
385	Knows that the sun is an average star in size, mass, and temperature					X		
391	Knows the sun is in constant motion					X		
395	Describe various methods of capturing the sun's energy for use on earth.					X		
397	Lists the main characteristics of the planets in the solar system (e.g. length of day and year, composition of atmosphere, size, number of moons, distance from sun, etc.)					X		

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400.35	Demonstrates the relative positions of the earth moon and sun during a solar eclipse							X
400.38	Describes phenomena which illustrate the moon's gravitational interaction with the earth (e.g. moon's orbit earth's tides etc.)							X
515	Defines astronomy as the study of solid and gaseous bodies in space and their interrelationships							X
518	Relates astronomical discoveries and concepts generated in various ancient civilizations							X
524	Knows the contributions of famous and current astronomers							X
525	Realizes that the study of astronomy is continuing and changing							X
528	Defines Galaxy							X
530	Knows that galactic systems are held together by gravity							X
531	Defines the phenomenon known as black holes							X
534	Identifies and locates selected Constellation							X
541	Knows that some constellations were named for mythological figures							X
543	Defines nebulae							X
544	Knows how to locate the north star (Polaris) by using the Big Dipper							X
545	Lists and locates significant stars							X
546	Lists causes of twinkling of stars							X
548	Identifies various theories concerning the origin of the solar system							X
549	Defines equinox							X
550	Defines sunspots							X
551	Knows effects of solar flares on the earth							X
554	Defines astronomical unit (a.u.)							X
555	Knows current developments in the technology of manned and unmanned satellites							X
556	Describes the conditions that affect manned space flight (temperature, weightlessness, radiation, food, and water etc.)							X
563	Describe the main characteristics of natural objects in the solar system such as comets, meteoroids, meteors, meteorites and asteroids.							X

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Weather								
008	Recognizes characteristics of different seasons.	X						
011	Recognizes and discusses different types of weather conditions.	X						
013	Names the main types of precipitation		X					
014	Describes the main characteristics of the various types of precipitation.		X			X		
015	Describes safety precautions to take in various storm situations.		X	X	X	X		
016	Defines lightning and thunder		X			X		
030	Knows how seasonal and weather changes affect living organisms.		X	X	X			
038	Defines temperature		X		X	X		
039	Demonstrates ways to measure temperature		X			X		
046	Names the seasons of the year		X					
047	Lists the characteristics of the seasons of the year		X	X				
062	<i>Observe and discuss changes in weather and seasons using common weather</i>	X						
100	Describes the progression of the water cycle			X		X		X
101	Describes how clouds are formed			X		X		X
102	Defines dew and frost					X		
103	Describes the causes of lightning and thunder			X				
104	Defines winds			X		X		
107	Charts weather conditions at specified times			X				
143	Defines temperature			X				
152	Describes various types of precipitation including dew, frost, rain, snow, sleet and hail.			X				
200	Understands the water cycle.				X			
201	Identifies different types of weather such as thunder storms, hurricanes, tornado, flood, blizzard and drought.				X			
300	Defines humidity as the amount of moisture present in the air					X	X	X
302	Name and describe the main characteristics of various types of clouds.					X		
304	Describes the conditions needed to produce fog, dew, and frost					X	X	X
305	Distinguishes between weather and climate					X	X	
306	Lists the characteristics of the various climatic conditions on the earth.					X		
307	Demonstrates how to record daily weather conditions at specified times					X		X
308	Reads a weather map					X		
400	Demonstrates how to measure air pressure.						X	X
400.42	Defines meteorology						X	X
400.43	Defines atmosphere.						X	
400.45	Defines air pressure.						X	X
401	Identifies the various gases that comprise the atmosphere						X	
404	Knows that warm air rises and cold air sinks						X	X

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406	Defines radiation, conduction, and convection in terms of heat energy transfer							X
407	Describes the effect that temperatures and pressure have on the amount of moisture in the atmosphere							X
408	Defines air masses.						X	
410	Lists the main characteristics of the major air masses (e.g. temperature, humidity etc.).						X	
411	Lists the major characteristics and causes of hurricanes, cyclones, tornadoes, and thunderstorms.						X	X
413	Describes the function and use of the major weather measurement instruments.						X	
499.1	Distinguish between erosion and weathering.						X	
499.2	List characteristics of different types of clouds.						X	
501	Describes the differences in air pressure brought about by changes in altitude or moisture content of the air							X
502	Describes the main characteristics of the various layers and temperature zones of the atmosphere							X
503	Describe characteristics of various cloud types and how they are formed.							X
505	Describe the main characteristics of the major air masses, such as temperature, humidity, etc. and identify them using a weather map.							X
558	Understands that air is matter							X
Life Science								
004	Observe, explore and describe a wide variety of live animals, plants, and scientific tools.	X						
010	Acquire scientific knowledge related to health science, personal hygiene, nutrition, and health of the human body	X						
021	Lists the characteristic functions that distinguishes living from nonliving matter		X	X		X		
022	Groups organisms on the basis of observed similarities and differences		X					
023	Identifies the five senses and how they are used.		X					
024	Identifies the parts of common plants (e.g. leaves, roots, and stems)		X					
025	Grows plants from seeds and observes, measures, and records plant growth		X	X	X			
026	Matches young animals with the appropriate parent		X	X				
027	Identifies ways in which animals take care of their young.		X	X				
031	Identifies materials used by animals to construct homes in various biomes or habitats.		X		X			
044	Distinguishes between healthy foods to help the body grow and non-healthy foods		X					
045	Name healthy habits (exercise, rest, cleanliness)		X					

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049	Recognizes that people use their 5 senses to explore their environment	X						
063	<i>Describe and identify the similarities, categories, and different structures of familiar plants and animals (Plants have roots, stems, leaves; animals have eyes, mouths, ears)</i>	X						
064	<i>Observe, describe and compare the habitats of plants and animals</i>	X						
120	Defines pollination and knows the ways in which pollen is carried to the stigma for pollination (e.g. wind, insects, etc.)			X		X	X	
121	Identifies the parts of a plant and describes their function (root, trunk, stem, leaf, flower).			X				
122	Describes the larva, pupa, and adult stages of those organisms which undergo metamorphosis			X				
123	Identifies the characteristics and habitat of fish.			X	X	X		
124	Identifies the characteristics and habitat of amphibians.			X	X	X		
125	Identifies the characteristics and habitat of reptiles.			X	X	X		
126	Identifies the characteristics and habitat of birds.			X	X	X		
127	Identifies the characteristics and habitat of mammals.			X	X	X		
128	Describes some of the ways in which animals communicate.			X		X		
130	Describes the structure and function of each of the five special sensory organs.			X				
133	Defines terms used conventionally in the study of natural environments (e.g. habitat, climate, location, region, biome, community, etc.)						X	
151	Identify that plants need sun, soil and water to grow			X				
153	Understands that all living things are made up of cells.			X				
204	Defines vertebrates and invertebrates				X	X	X	
219	Identifies characteristics of an insect.				X			
220	Explains the functions of leaves, roots, stems, flowers and fruit.				X			
221	Explains ways plants and animals meet their needs in their habitat.				X			
222	Defines metamorphosis and understands the life cycles of a variety of animals.				X			
329	Identifies the major parts of a seed and describes their function.					X	X	
331	Identifies the structure and function of the vascular system in plants					X	X	
333	Knows that each organism has its own process of growth and development.					X	X	
334	Knows that population refers to a group of organisms of the same species living and reproducing in the same area.						X	
335	Knows that a living thing is a product of its heredity and environment					X	X	
337	Describes the relationship between producers and consumers in a community					X	X	
339	Describes food chain and food webs and represents both with diagrams.					X	X	

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340	Describe the implications of disruptions in food chains or food webs.					X	X	
456	Defines cells as the basic units of living structures.						X	X
457	Distinguishes between unicellular and multicellular organisms.						X	X
458	Identifies the materials which cells require to maintain life.						X	
460	Defines organism						X	X
461	Groups organisms on the basis of observed similarities and differences in one characteristic						X	
465	Identifies and contrasts algae fungi, molds, and lichens.						X	
466	Defines invertebrates						X	
468	Defines instinct and contrasts instinct with learned behavior						X	
471	Defines sperm, egg, fertilization, zygote, embryo, and fetus.						X	
472	Recognizes specific structural and functional differences in specialized cells (e.g. nerve muscle etc.)						X	
473	Describes the main functions of the skeletal system.						X	X
475	Differentiates between bone and cartilage						X	X
476	Identifies the various types of joints.						X	X
478	Describes the main function of the muscle system.						X	X
479	Describes the major parts of the digestive system and knows their functions						X	X
480	Describes the main functions of the circulatory system.						X	X
481	Names the major parts of the circulatory system including blood						X	
482	Identifies the parts of the heart.						X	
483	Traces the flow of the blood through the circulatory system.						X	
484	Names the major parts of the respiratory system and knows their functions						X	X
485	Names the major parts of the excretory system and knows their functions.						X	X
486	Distinguishes between voluntary and involuntary responses						X	
487	Lists ways in which diseases are spread among plants and animals						X	
488	Constructs a model environment (e.g. aquarium, terrarium etc.).						X	
492	Defines decay						X	
507	Recognizes that most multicellular organisms are organized into tissues, organs, and systems							X
508	Identifies the parts of a generalized plant or animal cell.							X
509	Describes the functions of cell parts.							X
512	Contrasts voluntary involuntary and cardiac muscles.							X
513	Names the major parts of the nervous system and knows their functions.							X
Physical Science								
006	Investigates and describes the states of matter (solids and liquids).	X						
040	Describes magnets		X	X				
041	Distinguishes between magnetic and non-magnetic objects		X	X				

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041B	Recognizes that objects move by different forces (push/pull).			X				
050	Recognizes the basic concept that forces can move objects	X						
051	Recognizes that objects have observable properties that can change over time and under different conditions	X						
052	Recognizes that the sun gives us light	X						
053	Recognizes that sound is produced when two objects collide	X						
065	<i>Describe and categorize objects based on their observable properties</i>	X						
066	<i>Demonstrate an awareness of changes that occur in their environment (e.g. freezing/melting, color mixing)</i>	X						
067	<i>Observe, predict and describe how objects move and use common motion related vocabulary (e.g. straight, fast/slow, zigzag, up/down)</i>	X						
209	Predicts the effects of force upon an object.				X	X		
210	Defines gravity, force and friction				X			
211	Produces sound by vibrating a string				X		X	
212	Understands how sound is made and how it travels.				X			
213	Understands poles of a magnet and defines the term 'repel.'				X			
223	Identifies simple machines and discovers that simple machines change force to make work easier.				X			
353	Defines evaporation and condensation							X
357	Defines mass					X	X	X
358	Measures the mass of various objects.					X	X	
359	Defines motion					X	X	X
360	Recognizes that motion can be in many directions.					X		
362	Defines speed.					X		
363	Defines force					X	X	
364	Defines various types of forces (e.g. frictional, gravitational, electrical, etc.).					X	X	
366	Defines friction					X	X	
367	Lists the causes of friction.					X		
368	Describes ways to increase or decrease the frictional force					X		
370	Defines gravity					X	X	
371	Defines weight						X	
372	Defines energy: potential and kinetic.					X		
374	Defines work					X		X
375	Defines simple machines					X		
378	Defines visible light.				X	X	X	
379	Knows that an object is visible because of the light reflected from it.					X	X	
383	Defines sound					X	X	
384	Produces sound by causing objects to vibrate					X	X	

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386	Knows that sound can be reflected and absorbed						X	
387	Identifies materials which reflect and absorb sound					X	X	
388	Distinguishes between loudness and pitch					X		
389	Changes the pitch by changing the tension on the string					X		
390	Defines electricity					X	X	
392	Identifies natural magnets					X		
394	Explains that magnets have magnetic fields around them.					X	X	
400.10	Defines the forms of energy including work						X	
400.11	Lists examples of energy changing form						X	
400.13	Identifies the freezing and boiling point of water on Celsius and Fahrenheit scales						X	
400.14	Describes the processes of heat transfer (conduction, convection, and radiation)						X	
400.15	Defines spectrum						X	
400.16	Defines prisms and uses a prism to produce colors.						X	
400.18	Describes ways in which electrical energy is converted to other forms of energy						X	
400.19	Knows that like charges repel and unlike charges attract						X	
400.20	Distinguishes between conductors and insulators.						X	
400.21	Distinguishes static and current electricity.						X	
400.22	Lists examples of static electricity in the environment.						X	
400.23	Describes how current electricity moves through a conductor.						X	
400.24	Identifies the different processes used to produce electricity						X	
400.25	Defines electrical circuit						X	
400.26	Distinguishes between an open and a closed circuit						X	
400.27	Identifies parallel circuit and series circuit.						X	
400.28	Constructs a series circuit and a parallel circuit						X	
400.29	Identify safety in relation to a short circuit						X	
400.30	Understands that electrical energy is measured in units of kilowatts.						X	
400.32	Knows that there is a magnetic field around an electrical current						X	
400.33	Knows that moving a wire through a magnetic field produces an electric current						X	
400.44	Demonstrates that air is matter						X	
499.3	Knows how to change the pitch by changing the sound.						X	
520	Defines proton, electron, and neutron							X
523	Knows that a chemical symbol is one or two letters used to represent a particular element							X
526	Defines matter and understands that any change in matter involves energy.							X

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526.1	Understands that matter can be identified by physical and chemical properties.							X
526.2	Describe and give examples of the four phases of matter.							X
529	Describes boiling and freezing in terms of the average velocity of molecules in a liquid.							X
532	Defines and lists the causes of friction							X
533	Defines and knows the forms of energy							X
535	Defines kinetic energy.							X
536	Identifies various examples of kinetic energy							X
537	Defines potential energy.							X
538	Identifies various examples of potential energy							X
539	Describes the relationship between potential and kinetic energy							X
540	Defines simple and compound machines							X
542	Identifies the six classes of simple machines							X
562	Define work as it relates to simple and compound machines.							X

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Chemistry								
037	Knows that matter exists as a gas, liquid, or solid, depending on the temperature		X	X				
135	Identifies properties of gases			X		X		
136	Identifies properties of liquids			X		X		
137	Identifies properties of solids			X		X		
208	Defines matter				X	X	X	
224	Explains the properties of solids, liquids and gases.				X			
346	Defines physical change					X	X	
347	Defines chemical change					X	X	
348	Lists the characteristics of matter involved in a physical change					X	X	
349	Lists the characteristics of matter involved in a chemical change.					X	X	
350	Knows that matter can be identified by physical and chemical properties						X	
351	Demonstrates various chemical reactions					X	X	X
354	Defines solution						X	
355	Identifies common materials as mixture						X	
356	Separates mixtures						X	
377	Knows that most materials expand when heated and contract when cooled.						X	X
400.3	Defines atom						X	X
400.4	Defines elements						X	
400.5	Defines molecules						X	X
400.6	Distinguishes between an element and a compound						X	X
517	Defines physical and chemical change.							X
519	Identify and describe the characteristics of matter involved in a physical and chemical change and describe the process involved.							X
527	Identifies properties of gases, liquids, and solids							X
559	Reads and understands the periodic table of elements.							X

Italicized standards are TN Developmental Standards 2012.