

## Licensure Process Questions and Answers

Background on the current process for teacher licensure in Va.:

References: **Application for a License –**

- <http://doe.virginia.gov/teaching/licensure/application-license.pdf>

**Renewal Manual –**

- [http://doe.virginia.gov/teaching/licensure/licensure\\_renewal\\_manual.pdf](http://doe.virginia.gov/teaching/licensure/licensure_renewal_manual.pdf)

*Please note that the Licensure Office receives hundreds of calls daily from school divisions, institutions of higher education, the public, teachers and other instructional personnel, other state agencies, etc.*

- o School divisions submit requests on behalf of their instructional personnel.
- o Other requests are submitted by higher education, prospective teachers, instructional personnel from other states, and the general public.

The licensure office processes, assigns, and responds to the following types of requests and processes payments (and transmittals) for applicable fees:

- 1) Initial Licenses;
- 2) Evaluations for Initial Licensure
- 3) Added Endorsements;
- 4) Evaluations for Added Endorsements;
- 5) Designations on Licenses
- 6) Coursework approval;
- 7) Change License Types (example—change from a Provisional to a renewable license);
- 8) Renewal;
- 9) Name Changes;
- 10) Duplicate Licenses; and
- 11) Other Requests.

An application for an initial license requires the following types of documents:

- 1) Application;
- 2) Fee;
- 3) Verification of Ancillary Requirements (statutory requirements)
  - a. Dyslexia Awareness Training
  - b. Technology Standards for School Personnel Verification
  - c. Certification of Child Abuse and Neglect Recognition and Intervention Training
  - d. Emergency First Aid, CPR including hands-on practice, and AED Training or Certification
  - e. Applicable to Individuals Seeking an Initial License with Endorsement(s) in an Area of Career and Technical Education: Industry Certification Credential (**Career and Technical Educators Only**)
  - f. Applicable to Individuals Seeking an Initial License with an Endorsement as a School Counselor: Training in Recognition of Mental Health Disorder & Behavioral Distress (**School Counselors Only**)
    - College Verification Form (if completed an approved teacher preparation program);
    - Transcripts;
    - Assessment Scores;
    - Experience Form(s); and
    - Copy(ies) of Out-of-State Licenses.

**What are the fee costs and who pays fees?**

The fee schedule is on our website: [http://doe.virginia.gov/teaching/licensure/licensure\\_fees.pdf](http://doe.virginia.gov/teaching/licensure/licensure_fees.pdf).

**INITIAL LICENSE**

In-state \$ 50                      Out-of-state \$ 75

**SUPERINTENDENT LICENSE**

In-state \$100                      Out-of-state \$150

**LICENSE RENEWAL\***      \$25

**ADD/EVALUATE FOR AN ADDITIONAL ENDORSEMENT\***      \$25

**OTHER ACTIONS ON LICENSES (such as a duplicate license)\***      \$25

*\*A CAP OF \$50 WILL BE ASSESSED FOR A REQUEST FOR MULTIPLE ACTIONS ON A LICENSE.*

**Licensure Staff at the Department of Education:**

Director of Licensure and School Leadership-1  
Secretary-1  
Specialists-6 full time  
Specialists-2 part time  
Support Technicians-3 full time and 1 part time

NOTE: Also, the Division does employ one Professional Practices Coordinator

## Virginia Kindergarten Readiness Program (VKRP) Participation

Division (See Note)	Total Schools	2016-2017 VKRP		2017-2018 VKRP	
		Schools	Students	Schools	Students
Accomack County Public Schools	6			6	357
<b>Albemarle County Public Schools</b>	16				
Alexandria City Public Schools	13	13	1435	13	1479
Alleghany County Public Schools	3			3	137
Amelia County Public Schools	1	1	100	1	126
Amherst County Public Schools	7	7	285	6	309
<b>Appomattox County Public Schools</b>	1				
<b>Arlington County Public Schools</b>	23				
Augusta County Public Schools	11			2 <sup>a</sup>	155
Bath County Public Schools	2	2	39	2	37
Bedford County Public Schools	12			5 <sup>a</sup>	327
Bland County Public Schools	1			1	48
<b>Botetourt County Public Schools</b>	7				
<b>Bristol City Public Schools</b>	4	4	141		
Brunswick County Public Schools	3			3	115
Buchanan County Public Schools	5			5	198
<b>Buckingham County Public Schools</b>	1	1	146		
Buena Vista City Public Schools	1			1	79
Campbell County Public Schools	7				
Caroline County Public Schools	3	3	347	3	336
Carroll County Public Schools	7	7	260	7	285
<b>Charles City County Public Schools</b>	1	1	43		
Charlotte County Public Schools	3			3	124
<b>Charlottesville City Public Schools</b>	6				
Chesapeake City Public Schools	20				
<b>Chesterfield County Public Schools</b>	38				
<b>Clarke County Public Schools</b>	2				
Colonial Beach Public Schools	1	1	51	1	43
<b>Colonial Heights City Public Schools</b>	3	3	211		
Covington City Public Schools	1	1	86	1	95
<b>Craig County Public Schools</b>	1				
Culpeper County Public Schools	6	6	536		
Cumberland County Public Schools	1	1	80	1	82
<b>Danville City Public Schools</b>	6				
Dickenson County Public Schools	3			3	137
<b>Dinwiddie County Public Schools</b>	5				
Essex County Public Schools	1	1	91	1	90
<b>Fairfax County Public Schools</b>	140				
Falls Church City Public Schools	1				
<b>Fauquier County Public Schools</b>	11				
<b>Floyd County Public Schools</b>	4				
<b>Fluvanna County Public Schools</b>	1				

Division (See Note)	Total Schools	2016-2017 VKRP		2017-2018 VKRP	
		Schools	Students	Schools	Students
Franklin City Public Schools	1	1	84	1	87
<b>Franklin County Public Schools</b>	12				
Frederick County Public Schools	11	11	909	11	927
Fredericksburg City Public Schools	1	1	295	1	289
Galax City Public Schools	1	1	99	1	104
<b>Giles County Public Schools</b>	3				
<b>Gloucester County Public Schools</b>	5				
<b>Goochland County Public Schools</b>	3				
Grayson County Public Schools	5	5	122	5	111
<b>Greene County Public Schools</b>	2	2	203		
Greensville County Public Schools	1	1	184	1	144
Halifax County Public Schools	7	7	323	7	330
<b>Hampton City Public Schools</b>	20				
<b>Hanover County Public Schools</b>	14				
<b>Harrisonburg City Public Schools</b>	5				
<b>Henrico County Public Schools</b>	45				
<b>Henry County Public Schools</b>	9				
Highland County Public Schools	1			1	22
Hopewell City Public Schools	3	3	316	3	337
<b>Isle of Wight County Public Schools</b>	4				
King and Queen County Public Schools	2			2	54
King George County Public Schools	3				
<b>King William County Public Schools</b>	1				
Lancaster County Public Schools	1	1	79	1	73
Lee County Public Schools	5			5	236
Lexington City Public Schools	1				
Loudoun County Public Schools	57			22	1980
<b>Louisa County Public Schools</b>	4				
<b>Lunenburg County Public Schools</b>	2	2	116		
Lynchburg City Public Schools	11			11	626
Madison County Public Schools	1	1	117	1	95
<b>Manassas City Public Schools</b>	5				
<b>Manassas Park City Public Schools</b>	1	1	234		
Martinsville City Public Schools	2	2	133		
<b>Mathews County Public Schools</b>	1				
<b>Mecklenburg County Public Schools</b>	4				
Middlesex County Public Schools	1			1	90
Montgomery County Public Schools	10			6 <sup>a</sup>	437
Nelson County Public Schools	2	1 <sup>a</sup>	55	2	122
<b>New Kent County Public Schools</b>	2				
Newport News City Public Schools	25	12 <sup>a</sup>	973	19 <sup>a</sup>	1786
Norfolk City Public Schools	31	4 <sup>a</sup>	77	5 <sup>a</sup>	489
Northampton County Public Schools	2	2	147	2	97
<b>Northumberland County Public Schools</b>	1				

Division (See Note)	Total Schools	2016-2017 VKRP		2017-2018 VKRP	
		Schools	Students	Schools	Students
Norton City Public Schools	1			1	47
Nottoway County Public Schools	2			2	149
<b>Orange County Public Schools</b>	4				
Page County Public Schools	4	4	214	4	218
Patrick County Public Schools	5			5	152
<b>Petersburg City Public Schools</b>	4				
<b>Pittsylvania County Public Schools</b>	10				
Poquoson City Public Schools	1	1	127	1	144
Portsmouth City Public Schools	13			13	1160
<b>Powhatan County Public Schools</b>	3				
Prince Edward County Public Schools	1	1	161	1	151
Prince George County Public Schools	5	5	475	5	451
<b>Prince William County Public Schools</b>	60				
<b>Pulaski County Public Schools</b>	5				
Radford City Public Schools	1	1	111	1	118
<b>Rappahannock County Public Schools</b>	1				
<b>Richmond City Public Schools</b>	27				
<b>Richmond County Public Schools</b>	1				
Roanoke City Public Schools	17			3 <sup>a</sup>	192
<b>Roanoke County Public Schools</b>	16				
Rockbridge County Public Schools	4			4	179
<b>Rockingham County Public Schools</b>	15				
Russell County Public Schools	5			5	279
Salem City Public Schools	4	4	276	4	260
<b>Scott County Public Schools</b>	7				
Shenandoah County Public Schools	3	3	408	3	438
<b>Smyth County Public Schools</b>	7				
Southampton County Public Schools	4			4	173
<b>Spotsylvania County Public Schools</b>	17				
Stafford County Public Schools	17	13 <sup>a</sup>	1155	17	1868
Staunton City Public Schools	3	3	225	3	208
<b>Suffolk City Public Schools</b>	11				
Surry County Public Schools	1			1	60
<b>Sussex County Public Schools</b>	1				
<b>Tazewell County Public Schools</b>	8				
Virginia Beach City Public Schools	53			1 <sup>a</sup>	106
<b>Warren County Public Schools</b>	5				
<b>Washington County Public Schools</b>	7				
<b>Waynesboro City Public Schools</b>	5				
West Point Public Schools	1	1	56		
Westmoreland County Public Schools	2			2	126
<b>Williamsburg-James City County Public Schools</b>	9				
Winchester City Public Schools	4	4	309	4	310
Wise County Public Schools	6	4 <sup>a</sup>	65	3 <sup>a</sup>	255

Division (See Note)	Total Schools	2016-2017 VKRP		2017-2018 VKRP	
		Schools	Students	Schools	Students
<b>Wythe County Public Schools</b>	6				
<b>York County Public Schools</b>	10				
Total	1,113	154	11,899	263	20,039

**Note.** A total of 63 divisions participated in VKRP in 2017-2018. Sixty-one additional divisions (**boldface**) are considering VKRP participation in 2018- 19.

<sup>a</sup>Partial participation

## Foundational Concepts for Environmental Literacy, Responsible Citizenship, and Career Readiness

### 2010 Science Standards of Learning

The *Science Standards of Learning* provide a focused treatment of key physical, biological, and planetary science concepts from kindergarten through the high-school grades. **These concepts build sequentially and create a comprehensive foundation for the post-secondary world students will enter upon graduation.**

Understanding *sustainability* requires the application of many facets of science, including a) **energy**, b) **natural resources**, c) **ecological and physical science principles**, d) **time**, and e) **management**. All of this must be further integrated with an understanding of **complex systems interactions**. For this reason, virtually every standard in the *Science Standards of Learning* document has some direct or indirect connection to *sustainability*. *Sustainability* also has social and economic dimensions, and certain science standards incorporate these ideas where they are key to the application of the standard (e.g., 6.9). These dimensions generally focus on the areas of a) management and b) economics.

Program Goals Six, Eight, and Nine of the science standards, stated in the preliminary pages of science document, clearly expresses the **application** of science learning, the **social and economic dimensions** related to *sustainability*, the emphasis on **interrelationships** among the technical disciplines, and a focus on how this applies to **careers**.

The purposes of scientific investigation and discovery are to satisfy humankind's quest for knowledge and understanding and to preserve and enhance the quality of the human experience. Therefore, as a result of science instruction, students will be able to achieve the following objectives:

6. Make informed decisions regarding contemporary issues, taking into account the following:
  - public policy and legislation;
  - economic costs/benefits;
  - validation from scientific data and the use of scientific reasoning and logic;
  - respect for living things;
  - personal responsibility; and
  - history of scientific discovery.
8. Develop an understanding of the interrelationship of science with technology, engineering and mathematics.
9. Explore science-related careers and interests.

### ***Sustainability Standards K-12***

The particular science standards that are organized in the following charts are **directly** related to learning about *sustainability*. Bolded text indicates the particular part of the standard most pertinent to the concept of *sustainability*, though the entire standard is necessary for contextual understanding. To see the complete science standards document, please go to:

[http://www.doe.virginia.gov/testing/sol/standards\\_docs/science/index.shtml](http://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml).

**Foundational Concepts for Environmental Literacy, Responsible Citizenship, and Career Readiness**  
**2010 Science Standards of Learning**

<b>Elementary School Standards (K-5)</b>							
<i>Energy</i>	<i>Water</i>	<i>Air</i>	<i>Living Resources</i>	<i>Mineral Resources</i>	<i>Ecological Principles</i>	<i>Physical Principles</i>	<i>Management</i>
<b>Kindergarten</b>	K.11 The student will investigate and understand that materials can be reused, recycled, and conserved. Key concepts include a) <b>materials and objects can be used over and over again;</b> b) <b>everyday materials can be recycled; and</b> c) <b>water and energy conservation at home and in school helps ensure resources are available for future use.</b>						
<b>Grade One</b>	1.8 The student will investigate and understand that natural resources are limited. Key concepts include a) <b>identification of natural resources;</b> b) <b>factors that affect air and water quality; and</b> c) <b>recycling, reusing, and reducing consumption of natural resources.</b>						
<b>Grade Two</b>	2.5 The student will investigate and understand that living things are part of a system. Key concepts include a) living organisms are interdependent with their living and nonliving surroundings; b) an animal's habitat includes adequate food, water, shelter or cover, and space; c) <b>habitats change over time due to many influences; and</b> d) fossils provide information about living systems that were on Earth years ago.						
<b>Grade Three</b>	2.8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include a) important plant products are identified and classified; b) the availability of plant products affects the development of a geographic area; c) plants provide oxygen, homes, and food for many animals; and d) <b>plants can help reduce erosion.</b>						
<b>Grade Three</b>	3.6 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. Key concepts include a) aquatic ecosystems; b) terrestrial ecosystems; c) populations and communities; and d) <b>the human role in conserving limited resources.</b>						
<b>Grade Three</b>	3.9 The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include a) there are many sources of water on Earth; b) the energy from the sun drives the water cycle; c) the water cycle involves several processes; d) water is essential for living things; and e) <b>water on Earth is limited and needs to be conserved.</b>						



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<b>Elementary School Standards (K-5)</b>							
<i>Energy</i>	<i>Water</i>	<i>Air</i>	<i>Living Resources</i>	<i>Mineral Resources</i>	<i>Ecological Principles</i>	<i>Physical Principles</i>	<i>Management</i>
	3.10	The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include a) the interdependency of plants and animals; b) the effects of human activity on the quality of air, water, and habitat; c) the effects of fire, flood, disease, and erosion on organisms; and d) <b>conservation and resource renewal.</b>					
	3.11	The student will investigate and understand different sources of energy. Key concepts include a) energy from the sun; <b>b) sources of renewable energy; and</b> <b>c) sources of nonrenewable energy.</b>					
<b>Grade Four</b>	4.5	The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include a) plant and animal adaptations; b) organization of populations, communities, and ecosystems and how they interrelate; c) flow of energy through food webs; d) habitats and niches; e) changes in an organism's niche at various stages in its life cycle; and <b>f) influences of human activity on ecosystems.</b>					
	4.9	The student will investigate and understand important Virginia natural resources. Key concepts include <b>a) watersheds and water resources;</b> <b>b) animals and plants;</b> <b>c) minerals, rocks, ores, and energy sources; and</b> <b>d) forests, soil, and land.</b>					
<b>Grade Five</b>	5.6	The student will investigate and understand characteristics of the ocean environment. Key concepts include a) geological characteristics; b) physical characteristics; and c) <b>ecological characteristics.</b>					

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<b>Elementary School Standards (K-5)</b>							
<i>Energy</i>	<i>Water</i>	<i>Air</i>	<i>Living Resources</i>	<i>Mineral Resources</i>	<i>Ecological Principles</i>	<i>Physical Principles</i>	<i>Management</i>
	5.7	<p>The student will investigate and understand how Earth's surface is constantly changing. Key concepts include</p> <ul style="list-style-type: none"> <li>a) identification of rock types;</li> <li>b) the rock cycle and how transformations between rocks occur;</li> <li>c) Earth history and fossil evidence;</li> <li>d) the basic structure of Earth's interior;</li> <li>e) changes in Earth's crust due to plate tectonics;</li> <li>f) weathering, erosion, and deposition; and</li> <li>g) <b>human impact.</b></li> </ul>					

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<b>Middle School Standards (6-8)</b>							
<i>Energy</i>	<i>Water</i>	<i>Air</i>	<i>Living Resources</i>	<i>Mineral Resources</i>	<i>Ecological Principles</i>	<i>Physical Principles</i>	<i>Management</i>
<b>Grade Six</b>	6.2	The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include a) potential and kinetic energy; b) the role of the sun in the formation of most energy sources on Earth; <b>c) nonrenewable energy sources;</b> <b>d) renewable energy sources; and</b> e) energy transformations.					
	6.5	The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include a) the action of water in physical and chemical weathering; b) the ability of large bodies of water to store thermal energy and moderate climate; c) the importance of water for agriculture, power generation, and public health; and <b>d) the importance of protecting and maintaining water resources.</b>					
	6.6	The student will investigate and understand the properties of air and the structure and dynamics of Earth’s atmosphere. Key concepts include a) air as a mixture of gaseous elements and compounds; b) pressure, temperature, and humidity; c) atmospheric changes with altitude; <b>d) natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality;</b> e) the relationship of atmospheric measures and weather conditions; and f) basic information from weather maps, including fronts, systems, and basic measurements.					
	6.7	The student will investigate and understand the natural processes and <b>human interactions</b> that affect watershed systems. Key concepts include <b>a) the health of ecosystems and the abiotic factors of a watershed;</b> <b>b) the location and structure of Virginia’s regional watershed systems;</b> c) divides, tributaries, river systems, and river and stream processes; d) wetlands; e) estuaries; <b>f) major conservation, health, and safety issues associated with watersheds; and</b> <b>g) water monitoring and analysis using field equipment including hand-held technology.</b>					

**Foundational Concepts for Environmental Literacy, Responsible Citizenship, and Career Readiness**  
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	<p>6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include</p> <ul style="list-style-type: none"> <li>a) <b>management of renewable resources;</b></li> <li>b) <b>management of nonrenewable resources;</b></li> <li>c) <b>the mitigation of land-use and environmental hazards through preventive measures; and</b></li> <li>d) <b>cost/benefit tradeoffs in conservation policies.</b></li> </ul>
Life Science	<p>LS.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include</p> <ul style="list-style-type: none"> <li>a) phototropism, hibernation, and dormancy;</li> <li>b) factors that increase or decrease population size; and</li> <li>c) <b>eutrophication, climate changes, and catastrophic disturbances.</b></li> </ul>
	<p>LS.11 The student will investigate and understand the relationships between ecosystem dynamics and <b>human activity</b>. Key concepts include</p> <ul style="list-style-type: none"> <li>a) food production and harvest;</li> <li>b) change in habitat size, quality, or structure;</li> <li>c) change in species competition;</li> <li>d) <b>population disturbances and factors that threaten or enhance species survival; and</b></li> <li>e) <b>environmental issues.</b></li> </ul>
Physical Science	<p>PS.6 The student will investigate and understand forms of energy and how energy is transferred and transformed. Key concepts include</p> <ul style="list-style-type: none"> <li>a) potential and kinetic energy; and</li> <li>b) mechanical, chemical, electrical, thermal, radiant, and nuclear energy.</li> </ul>
	<p>PS.7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. Key concepts include</p> <ul style="list-style-type: none"> <li>a) Celsius and Kelvin temperature scales and absolute zero;</li> <li>b) phase change, freezing point, melting point, boiling point, vaporization, and condensation;</li> <li>c) conduction, convection, and radiation; and</li> <li>d) applications of thermal energy transfer.</li> </ul>
	<p>PS.11 The student will investigate and understand basic principles of electricity and magnetism. Key concepts include</p> <ul style="list-style-type: none"> <li>a) static electricity, current electricity, and circuits;</li> <li>b) relationship between a magnetic field and an electric current;</li> <li>c) electromagnets, motors, and generators and their uses; and</li> <li>d) conductors, semiconductors, and insulators.</li> </ul>

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<b>High School Standards (9-12)</b>							
<i>Energy</i>	<i>Water</i>	<i>Air</i>	<i>Living Resources</i>	<i>Mineral Resources</i>	<i>Ecological Principles</i>	<i>Physical Principles</i>	<i>Management</i>
<b>Earth Science</b>	<p>ES.6 The student will investigate and understand the differences between <b>renewable and nonrenewable resources</b>. Key concepts include</p> <ul style="list-style-type: none"> <li>a) <b>fossil fuels, minerals, rocks, water, and vegetation;</b></li> <li>b) <b>advantages and disadvantages of various energy sources;</b></li> <li>c) <b>resources found in Virginia; and</b></li> <li>d) <b>environmental costs and benefits.</b></li> </ul>						
	<p>ES.8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include</p> <ul style="list-style-type: none"> <li>a) processes of soil development;</li> <li>b) development of karst topography;</li> <li>c) relationships between groundwater zones, including saturated and unsaturated zones, and the water table;</li> <li>d) identification of sources of fresh water including rivers, springs, and aquifers, with reference to the hydrologic cycle;</li> <li>e) <b>dependence on freshwater resources and the effects of human usage on water quality; and</b></li> <li>f) <b>identification of the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries.</b></li> </ul>						
	<p>ES.10 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include</p> <ul style="list-style-type: none"> <li>a) physical and chemical changes related to tides, waves, currents, sea level and ice cap variations, upwelling, and salinity variations;</li> <li>b) <b>importance of environmental and geologic implications;</b></li> <li>c) <b>systems interactions;</b></li> <li>d) features of the sea floor as reflections of tectonic processes; and</li> <li>e) <b>economic and public policy issues concerning the oceans and the coastal zone including the Chesapeake Bay.</b></li> </ul>						
	<p>ES.11 The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and <b>human activities on its composition and dynamics</b>. Key concepts include</p> <ul style="list-style-type: none"> <li>a) scientific evidence for atmospheric composition changes over geologic time;</li> <li>b) current theories related to the effects of early life on the chemical makeup of the atmosphere;</li> <li>c) atmospheric regulation mechanisms including the effects of density differences and energy transfer; and</li> </ul>						

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	<b>d) potential changes to the atmosphere and climate due to human, biologic, and geologic activity.</b>
<b>Biology</b>	<p>BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include</p> <ul style="list-style-type: none"> <li>a) interactions within and among populations including carrying capacities, limiting factors, and growth curves;</li> <li>b) nutrient cycling with energy flow through ecosystems;</li> <li>c) succession patterns in ecosystems;</li> <li><b>d) the effects of natural events and human activities on ecosystems; and</b></li> <li>e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems.</li> </ul>
<b>Physics</b>	<p>PH.4 The student will investigate and understand <b>how applications of physics affect the world</b>. Key concepts include</p> <ul style="list-style-type: none"> <li><b>a) examples from the real world; and</b></li> <li><b>b) exploration of the roles and contributions of science and technology.</b></li> </ul> <p>PH.7 The student will investigate and understand that energy can be transferred and transformed to provide usable work. Key concepts include</p> <ul style="list-style-type: none"> <li>a) transfer and storage of energy among systems including mechanical, thermal, gravitational, electromagnetic, chemical, and nuclear systems; and</li> <li>b) efficiency of systems.</li> </ul>

Please note, other key K-12 discipline areas contribute to the broad preparation for understanding *sustainability*, preparing students for adult citizenship, and building college and career readiness. Though beyond the scope of this brief, it is important to mention that numerous courses in **Career and Technical Education** and Virginia's *History and Social Science, Fine Arts, and Health Standards of Learning* define competencies and learning goals related to *sustainability* and preparing student for post-secondary education and the world of work.

# Environmental Science Course Content and Process Guidelines

The Virginia Environmental Science Course Content and Process Guidelines are designed to continue the student investigations that began in grades K-8. These outcomes integrate the study of many components of our environment, including the human impact on our planet. These outcomes focus on scientific inquiry, the physical world, the living environment, resource conservation, humans' impact on the environment, and legal and civic responsibility. Instruction should focus on student data collection and analysis through laboratory experiences and field work. These should include descriptive and comparative studies as well as investigation (i.e. meaningful watershed educational experiences). It is expected that teachers will collaborate with museums, aquaria, nature centers, government agencies, associations, foundations, and private industry in efforts to engage the community, provide diverse points of view about the management of natural resources, and offer a variety of learning experiences and career education opportunities.

## I. Scientific Skills and Processes

Students will identify and investigate problems scientifically and will communicate information clearly in writing, discussions, and debates. Key skills and processes include

- chemicals and equipment are used in a safe manner;
- hypotheses are formulated based on direct observations and information from scientific literature and environmental research;
- variables are defined to test hypotheses and provide evidence in constructing and critiquing explanations of phenomena;
- collection, analysis, and reporting of data in the classroom and the field using appropriate materials and technologies;
- data tables, frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted;
- information is reviewed for accuracy, separating fact from opinion;
- conclusions are formed based on quantitative and qualitative data;
- questions are asked to critique the interpretation, relevance, or thoroughness of data or evidence, investigative design, and/or premise(s) of an explanation;
- ethical issues in the environmental field are researched and discussed from multiple viewpoints; and
- career opportunities in the field of environmental science are explored.

The student will demonstrate an understanding of the nature of science and scientific reasoning and logic as it applies to environmental science.

- the natural world is understandable;
- science is based on evidence – both observational and experimental;
- science is a blend of logic and innovation;
- scientific ideas are durable yet subject to change as new data are collected;
- science is a complex social endeavor; and

- scientists try to remain objective and engage in peer review to help avoid bias

The student will demonstrate an understanding of the use of mathematical reasoning and processes in environmental science. Key content includes

- error and uncertainty are inherent in any scientific study;
- experimental and theoretical probability can be calculated for dependent and independent events;
- probability is used to express the likelihood of an event happening under similar conditions; and
- statistics is a branch of mathematics used to analyze large quantities of numerical data especially for the purpose of inferring proportions in a whole from those in a representative sample.

The student will analyze current environmental issues and apply the process of engineering design in order to propose feasible solutions. Key content includes

- using engineering design is an iterative process in which science and mathematics principles are applied in the formation of a solution;
- developing and evaluating multiple solutions or designs may be appropriate for an environmental problem;
- evaluating solutions using different perspectives to include the scientific, engineering, economic, political, and social aspects of the problem; and
- choosing a solution(s) requires balancing possible positive and negative impacts of a variety of competing interests.

## **II. The Physical World**

The student will investigate and understand the fundamentals of matter and its interactions. Key content includes

- all things are made up of atoms and elements;
- atoms and elements can interact in different ways and can be expressed as different types of chemical reactions;
- chemical processes involve energy;
- the law of conservation of energy and matter;
- water has unique properties and characteristics which plays a critical role in the environment; and
- the distribution and movement of water across the Earth affects the biosphere, hydrosphere, lithosphere, and atmosphere.

The student will investigate and understand how matter flows in the fundamental processes of Earth systems. Key content includes

- the movement of atoms and elements through the biosphere, lithosphere, hydrosphere, and atmosphere as geochemical processes to include the carbon, oxygen, nitrogen, and water cycles;



- the components, dynamics, and processes of the atmosphere, lithosphere, and hydrosphere; and
- the interrelationships among the atmosphere, geosphere, anthrosphere, and the hydrosphere.

The students will investigate and understand the major processes and systems that form Earth, including how water, living things, and rock act together to shape landforms. Key content includes

- the formation of distinctive landforms (the physical processes such as erosion, rock cycle);
- distribution of the continents (plate tectonics); and
- the comparison of how natural and human causes of changes to Earth's land surface.

### **III. The Living World**

The student will investigate and understand that the Earth is one interconnected system to include the hierarchy and the flow of energy within an ecosystem. Key content includes

- the characteristics and components that define each of the Earth's terrestrial and aquatic biomes;
- biotic and abiotic factors in an ecosystem and how energy and matter move between these;
- the movement of energy through the living world to include food webs, food chains, trophic levels; and
- factors limiting population growth in a given area (carrying capacity).

Student will describe stability and change as it relates to both populations and ecosystems. Key content includes

- the Earth in a state of dynamic equilibrium;
- interactions between individuals (i.e. commensalism, mutualism, parasitism, predation, and competition);
- factors that determine growth rates in populations (birth, death, and migration rates);
- adaptations of organisms to the environment in terms of ecological niches and natural selection;
- the role of genetic diversity and population size in the conservation of a species;
- the natural processes of change in the environment, including examples of succession, evolution, and extinction;
- factors that influence patterns of ecological succession, including invasive species, loss of biodiversity, and catastrophic events;
- effects of change in the hydrosphere, atmosphere, geosphere, or anthrosphere on the biosphere; and
- biodiversity and co-evolution in ecosystems.

#### **IV. Resources**

The student will investigate and understand Earth's resources. Key content includes

- certain resources are nonrenewable because they are replenished at timescales of thousands to millions of years;
- environmental benefits and drawbacks of fossil fuels advantages and disadvantages of renewable resources, including solar, hydrogen fuel cells, biomass, wind, and geothermal energy;
- the benefits and drawbacks of nuclear power; and
- the benefits and drawbacks of hydroelectric power.

The student will investigate and understand conservation of Earth's resources. Key content includes

- future availability of nonrenewable resources considering the trend of human consumption of energy;
- the effects of natural and human-caused activities that either contribute to or challenge an ecologically sustainable environment;
- individuals can alter their own behavior to reduce their environmental impact; and
- changes in the availability of energy will affect society and human activities, such as transportation, agricultural systems, and manufacturing.

#### **V. Human impact, global climate change, and civic responsibility**

The student will investigate and understand the human impact on our environment. Key content includes

- Population ecology, carrying capacity, human population dynamics, impacts of population growth advantages and disadvantages of balancing short term interests with long term welfare of society;
- individual activities and decisions can have an impact on the environment;
- people impact their environment through the use of natural resources to include how agriculture, forestry, ranching, mining, urbanization, transportation, and fishing impact the land, water, air, and organisms; and
- the allocation of state and federal lands.

The student will investigate and understand pollution and waste management. Key content includes

- the effects and potential implications of pollution and resource depletion on the environment at the local and global levels to include air and water pollution, solid waste disposal, depletion of the stratospheric ozone, global warming, and land uses;
- the mechanisms of bioaccumulation and biomagnification;
- pest management; and
- methods used for remediation of land, air, and water pollution.

The student will investigate and understand global climate change. Key content includes

- the use of scientific evidence in reporting changes in average global temperature, greenhouse gases, quantities of arctic and land ice, ocean temperature, ocean acidification, and sea level rise;
- the relationship of global climate change on the frequency or magnitude of extreme weather events; and
- actual and potential effects of habitat destruction, erosion, and depletion of soil fertility associated with human activities.

The student will investigate and understand civic responsibility and environmental policies. Key content includes

- consumer choices in Virginia impacts jobs, resources, pollution, and waste here and around the world;
- political, legal, social, and economic decisions may affect global and local ecosystems;
- the impact of media on public opinion and public policy;
- individuals and interest groups influence public policy;
- cost-benefit analysis and trade-offs in conservation policy; and
- compare methods used to protect the environment by local, state, national, and international governments and organizations

# Supplemental Information on Growth Measures

Presentation to the  
Education Subcommittee of  
the Senate Finance Committee  
1/18/18

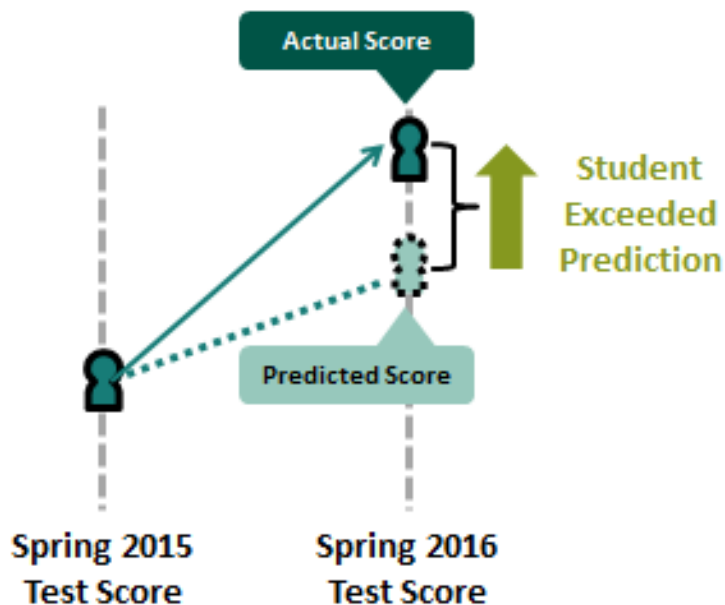
# 2017 Growth Pilot

- **The 2016 General Assembly directed the Department of Education to conduct a pilot to investigate a student growth model that could be applied for school and division accountability.**
- **Contracts were awarded to Education Analytics and SAS.**
- **Both vendors proposed the use of growth measures involving statistical predictions based on the student's prior achievement on SOL tests and the performance of similar students.**

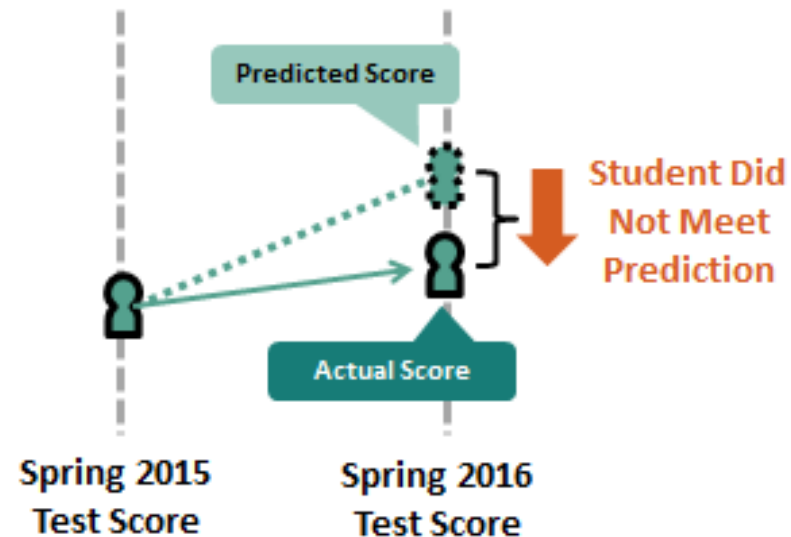
# An Example...

After the statewide assessments are administered, a statistical prediction is made for each student based on his/her previous performance and that of similar students across Virginia. Students' actual scores and predicted scores are compared to determine whether each student met or exceeded the prediction and by how much.

Student 1:



Student 2:



# Concerns with the Predictive Growth Models

- **Results are based on a comparison of student performance against predicted performance rather than actual performance from the previous year.**
- **Data analysis will be difficult to replicate by school divisions.**
- **Results must be calculated each year and cannot be completed until approximately three to six weeks after spring testing is complete.**
- **Cost to calculate are incurred each year.**

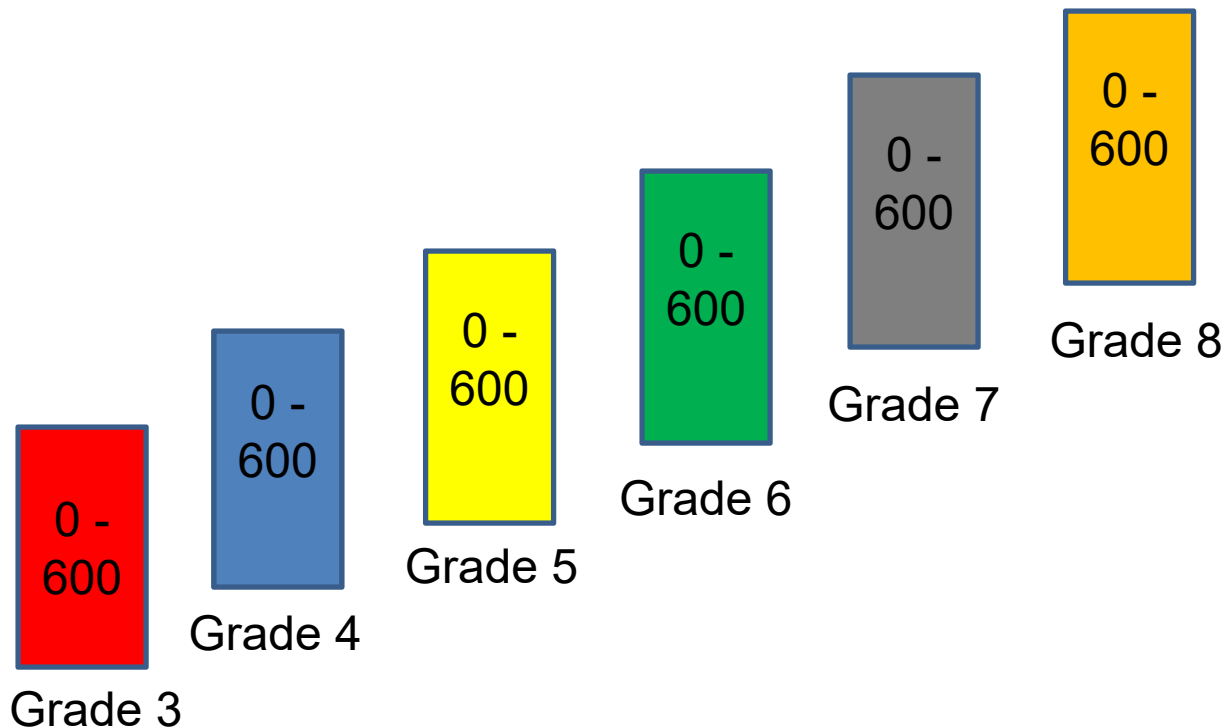
## Use of a “Growth” Scale as a Measurement of Growth

- Funds in introduced budget would be used to support the development of growth (vertical) scales.
- Growth is based on comparing a student’s performance to his/her own previous performance on SOL tests.
- Requires linking SOL tests together.
- Expectations for growth can be defined so that the teacher and student know what is needed at the beginning of the year.
- Understandable and transparent.



# Current SOL Scale

Scores on each SOL test are currently reported on a 0 - 600 scale that is specific to that test.



# Sample Growth Scale

A growth scale would allow for the reporting of scores across SOL tests.

