| **Virginia Board of Education Agenda Item** | **Seal of the Commonwealth of Virginia** |
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# Agenda Item: L

## Date: October 18, 2018

### Title: Final Review of the Proposed Revised 2018 *Science Standards of Learning*

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## Purpose of Presentation:

Action required by Board of Education regulation.

## Executive Summary:

The *Standards of Learning* are a critical communication with the citizens of the Commonwealth, parents, the business community, and higher education, because the standards convey expectations and intended outcomes for K-12 education. Equally as important, the standards and the frameworks serve as the key guidance for instructional leaders and teachers of science (elementary, middle, high school) in planning science curricula and science programming.

The Board of Education approved the 2010 *Science* *Standards of Learning* on January 14, 2010. The currentstandards may be viewed online at [2010 Science Standards of Learning](http://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml).

The *Science Standards of Learning* (SOL) were first developed in 1983 with subsequent revisions in 1988, 1995, 2003, and again in 2010. Periodic revisions are necessary to update science content, fine tune and clarify important concepts, and refocus emphasis on emerging areas of importance. On January 28, 2016, the Board accepted the timeline for the review of the current standards. The timeline was revised and an Issue Brief was provided to the Board on February 14, 2017. Upon acceptance of the timeline, the following action occurred:

The current *Science Standards of Learning* were adopted in 2010 and were scheduled for review in 2017. On January 28, 2016, the Board delayed the review of the science standards. The rationale behind the delay was to lessen the impact on teachers and administrators due to simultaneous revision and implementation of both English and Science Standards of Learning. The revision of the standards was further delayed in order to incorporate initiatives in the proposed *Standards of Accreditation*. In accordance with the revised timeline, the Department of Education took the following steps to produce the proposed revised *Science Standards of Learning* for the Board’s review:

* posted Superintendent’s Memo #052-16, March 11, 2016, which 1) solicited review input from teachers, administrators, curriculum supervisors, and the general public, and 2) requested division superintendents to submit nominations for participants on the *Standards of Learning* review teams;
* received and reviewed 258 online comments from 38 different sources on the 2010 *Science Standards of Learning* from stakeholders including teachers, parents, and administrators,;
* identified SOL review team members for each discipline from school division nominations;
* met for four days on July 12-15, 2016, with a committee that consisted of science educators and division supervisors to review the public comments, consider recommendations and reports from stakeholder groups, and consider documents such as the Next Generation Science Standards, *Science Framework for the 2015 National Assessment of Educational Progress* (NAEP), Trends in Mathematics and Science Studies 2015 Science Framework (TIMSS), College Board Advanced Placement Course Descriptions (2014), *Working with Big Ideas of Science Education* (2015), and science standards and frameworks and from other states including Rhode Island (2011) and Ohio (2014);
* met with stakeholders including informal education agencies, businesses, and representatives from higher education to garner additional input;
* met with a steering committee of science supervisors to review the proposed revised *Standards of Learning* through the lens of Profile of a Graduate and the 5C’s;
* developed the proposed revised *Science Standards of Learning;*
* worked collaboratively with the Virginia Department of Education Mathematics Instruction team to ensure that mathematics skills were appropriately integrated into the proposed revised *Science Standards of Learning*;
* facilitated the creation of a secure website that allowed a committee of external stakeholders representing institutions of higher education, STEM businesses, science organizations, and the Virginia Education Science Leaders Association to review and comment on the proposed *Science Standards of Learning*;
* received feedback from the Student Assessment Office, the American Chemical Society, Virginia Science Education Leaders Association, James Madison University, and the Virginia Resource Use Education Council;
* developed the proposed revised *Science Standards of Learning*
* presented the proposed 2018 *Science Standards of Learning* to the Virginia Board of Education;
* prepared video support to explain the changes reflected in the proposed *2018 Science Standards of Learning*;
* received public comments from stakeholders on the proposed *2018 Science Standards of Learning*
  + Received 187 sets of comments from educators, science education organizations, and school divisions
  + Held public hearings in Roanoke County and Stafford County
* Reviewed public comment and worked with steering committee members to revise the proposed *2018 Science Standards of Learning* found in Attachment A.
* Email summary of feedback sent to all contributors to the proposed science standards.

## Summary of Major Elements:

The attached drafts of the Proposed Revised 2018 *Science Standards of Learning* include revisions since first review in response to public comment, as listed.

Proposed Revised 2018 *Science Standards of Learning*

* Edits to grade level/subject introductory statements to include the engineering design process.  Opportunities for application the engineering design process using both science and mathematics content will be provided in the proposed *2018 Science Curriculum Frameworks*.
* Science skills and processes changed to Science and Engineering Practices.
* Edits to provide constancy and parallelism in language vertically in science.
* Edits to provide consistency and parallelism in language common in both science and mathematics.
* Edits to improve the progression of science content which led to changes in selected standards (e.g. revision to 5.9 to reflect solely energy, Bio.5 to include synthetic biology, and revision of grade 4 theme to align with content)
* Grammar and language edits.
* Edits to more clearly articulate or correct science content expectations.
* High school courses list in alphabetical order.

All edits found in the proposed revised drafts have been tracked using the following system:

* a single underline (sample) indicates content added to the 2010 standards;
* a single strikethrough (~~sample~~) indicates content deleted from the 2010 standards;
* a double underline (sample) indicates content added to the proposed 2018 standards since the first review; and
* a double strikethrough (sample) indicates content deleted from the 2018 standards since the first review.

## Action Requested:

Final review: Action requested at this meeting.

## Superintendent’s Recommendation:

The Superintendent of Public Instruction recommends that the Board approve the final review of the proposed 2018 *Science Standards of Learning*.

## Rationale for Action:

The *Code of Virginia* requires the review and revisions of the Standards of Learning in each subject area every seven years. Action by the Virginia Board of Education allows the Virginia Department of Education to provide school divisions with the revised 2018 *Science Standards of Learning*.

## Previous Review or Action:

Previous review and action. Specify date and action taken below:

**Date:** June 28, 2018

**Action:** First Review

**Date:** August 27, 2018

**Action:** Public Hearing held in Roanoke, VA

**Date:** September 5, 2018

**Action:** Public Hearing held in Stafford, VA

**Date:** September 13, 2018

**Action:** Public Hearing held in Williamsburg, VA (cancelled due to Hurricane Florence)

## Background Information and Statutory Authority:

The Board of Education has made a commitment to maintain rigorous and relevant expectations for student learning that meet or exceed national and international benchmarks for college and career readiness. The proposed revised *Science Standards of Learning* reflect rigorous, concise, and measurable standards for these courses in Virginia.

*Code of Virginia*, Section 22.1-253.13:1-B… “The Board of Education shall establish a regular schedule, in a manner it deems appropriate, for the review, and revision as may be necessary of the Standards of Learning in all subject areas. Such review of each subject area shall occur at least once every seven years. Nothing in this section shall be construed to prohibit the Board from conducting such review and revision on a more frequent basis…”

This Board item relates to Priority 1 of the *Virginia Board of Education Comprehensive Plan: 2018-2023* to provide high-quality, effective learning environments for all students.

Summary of Online Comments on Virginia’s proposed 2018 *Science Standards of Learning*

The opportunity for public comment was held June 29, 2018- September 18, 2018. Two public hearings were held; one in Roanoke in August and the other in Stafford in September 2018. The public comment period and the public hearings were announced through Superintendent’s Memo.

* Overall positive response to the new conceptual approach to the structure of the standards; although concerns were expressed as to how the changes will impact assessment.
* Overall positive response to the introduction of themes in grades K-6.
* Shifting of content in 4th and 5th grades to align to proposed themes caused concerns, specifically with oceanography content moved to 4th grade. Several stakeholders alluded to gaps in strands caused by the alignment to the themes (4th grade focused on living systems and processes and 5th grade focused on energy and matter).
* Modeling explicit in the Science and Engineering Practices has led to questions on how modeling can be integrated into classroom instruction.
* Several stakeholders expressed a lack of knowledge on how to implement engineering processes into science instruction.
* Negative response to a perceived removal of content due to a removal of explicit terminology (vocabulary lists) within the standards. The comments specifically included the areas of magnets, fossils, classification, and cell theory.
* Placement of content in strands to support concepts introduced in the stem of the standards was met with trepidation. Specifically the placement of protein synthesis in biology as a biochemical process.
* Technical edits were proposed.
* Feedback and input to increase vertical alignment of content within strands.

## Timetable for Further Review/Action:

Upon approval of the Proposed Revised 2018 *Science Standards of Learning* the Department of Education will implement the standards according to the proposed implementation timeline found in Table 1.

Table 1

2018 Science Standards of Learning Anticipated Implementation Timeline and Communication Plan

| **School Year** | **Date** | **Action** | **Communication** | **Method** |
| --- | --- | --- | --- | --- |
| 2018-2019 | October | Board of Education approves the 2018 *Science Standards of Learning* (SOL) | Announce approval of the SOL, implementation timeline, and expectations for incorporating the new standards into local curricula | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| November | Final versions of the 2018 ScienceSOL and summary of changes posted | Announce posting of final versions and expectations for incorporating the new standards into local curricula | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| March | First Review of Proposed *2018 Science Standards Curriculum Framework* | Announce initial review of the 2018 Science Standards Curriculum Frameworks | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| March | Draft version of the *2018 Science Standards Curriculum Frameworks* open for public comment. | Announce draft curriculum framework open for public comment | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| May | Final Review of the proposed *2018 Science Standards Curriculum Framework* | Announce final review of the 2018 Science Standards Curriculum Frameworks and timeline of implementation | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| Summer | School divisions begin incorporating 2018 *Science* SOL and CF into written curricula |  |  |
| Summer | Develop additional performance assessment exemplars and common rubrics that align to the *2018 Science Standards of Learning* and to support VDOE professional development. | Develop and integrate aligned performance assessments into VDOE and support organization performance assessment professional development. | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels including direct communication with VDOE partners with PA. |
| Fall | VDOE provides professional development on the changes to the SOL and CF | Announce professional development | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| Fall/Winter | VDOE conducts the textbook review process in accordance with previously approved BOE textbook adoption timeline | Announce the process and call for nominees to serve | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| 2019-2020 | Full year | 2010 *Science* SOL and 2018 *Science* SOL included in the written and taught curricula | Detail instruction and assessment timeline and expectations | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| Fall | VDOE provides professional development on the changes to the SOL and CF | Announce professional development | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| Spring | VDOE completes the textbook review process and seeks approval from the Board of Education | Announce completion | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| Summer | School divisions continue incorporating 2018 *Science* SOL and CF into written curricula |  |  |
| 2020-2021 | Fall/Winter | VDOE provides SOL Practice Items aligned with the 2018 *Science SOL* | Announce posting of resource | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| Fall and Spring | SOL assessments measure the 2010 *Science* SOLand include field test items measuring the 2018 *Science* SOL |  |  |
| 2021-2022 | Full year | Written and taught curricula reflect the 2018 *Science* SOL | Detail instruction and assessment timeline and expectations | Superintendent’s Memo, VDOE social media, TeacherDirect, and other communication channels |
| Fall and Spring | SOL assessments measure the 2018 *Science* SOL |  |  |

## Impact on Fiscal and Human Resources:

The Department of Education administers the state standards review process and the implementation of those standards, once approved by the Board. The agency’s existing resources can absorb the standard review responsibility at this time.