

# Virginia Board of Education Agenda Item



**Agenda Item:** E.

**Date:** February 23, 2012

<b>Title</b>	First Review of Recommended Cut Scores for the Grades 3-8 Mathematics Standards of Learning Tests Based on the 2009 Mathematics Standards		
<b>Presenter</b>	Mrs. Shelley Loving-Ryder, Assistant Superintendent, Division of Student Assessment and School Improvement		
<b>E-mail</b>	<a href="mailto:Shelley.Loving-Ryder@doe.virginia.gov">Shelley.Loving-Ryder@doe.virginia.gov</a>	<b>Phone</b>	804-225-2102

**Purpose of Presentation:**

Action required by Board of Education regulation.

**Previous Review or Action:**

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

Date: May 24, 2006

Action: Adoption of Cut Scores for the Standards of Learning Mathematics Tests for Grades 3-8

**Action Requested:**

Action will be requested at a future meeting. Specify anticipated date below:

Date: March 22, 2012

**Alignment with Board of Education Goals: Please indicate (X) all that apply:**

	Goal 1: Expanded Opportunities to Learn
X	Goal 2: Accountability of Student Learning
	Goal 3: Nurturing Young Learners
X	Goal 4: Strong Literacy and Mathematics Skills
	Goal 5: Highly Qualified and Effective Teachers and Administrators
	Goal 6: Sound Policies for Student Success
	Goal 7: Safe and Secure Schools
	Other Priority or Initiative. Specify:

**Background Information and Statutory Authority:**

Goal 2: The approval of cut scores for the new, more rigorous mathematics tests for grades 3-8 based on the 2009 mathematics Standards of Learning (SOL) will help schools and school divisions increase the academic success of all students.

Goal 4: The approval of cut scores for the new, more rigorous mathematics tests for grades 3-8 based on the 2009 mathematics SOL will support the development of numeracy skills for all students.

In 2011-2012 new SOL tests measuring the 2009 mathematics content standards will be administered. Because of the changes in the content measured by these tests, new passing scores must be adopted by the Virginia Board of Education. Consistent with the process used in 1998 and 2006, committees of educators were convened in February 2012 to recommend to the Board of Education (BOE) minimum cut scores for the achievement levels of *fail/basic*, *pass/proficient*, and *pass/advanced* for the grades 3-8 mathematics tests. More information about the process used by the committee of educators to develop the recommended cut scores may be found in Attachment A.

**Summary of Important Issues:**

Information about the range of cut scores recommended by the committees for the achievement levels of *fail/basic*, *pass/proficient*, and *pass/advanced* for the grades 3-8 mathematics tests is included in Attachment B.

The Board is asked to review this information and to adopt "cut" scores at the March 2012 meeting for the achievement levels of *fail/basic*, *pass/proficient*, and *pass/advanced* for the grades 3-8 SOL mathematics tests.

**Impact on Fiscal and Human Resources:**

N/A

**Timetable for Further Review/Action:**

Final review in March 22, 2012

**Superintendent's Recommendation:**

The Superintendent of Public Instruction recommends that the Board of Education accept for first review cut scores representing the achievement levels of *fail/basic*, *pass/proficient*, and *pass/advanced* for the grades 3-8 mathematics SOL tests as follows.

- Grade 3: 16 out of 40 for fails/basic, 26 out of 40 for pass/proficient, and 36 out of 40 for pass/advanced
- Grade 4: 17 out of 50 for fails/basic, 31 out of 50 for pass/proficient, and 45 out of 50 for pass/advanced
- Grade 5: 18 out of 50 for fails/basic, 31 out of 50 for pass/proficient, and 45 out of 50 for pass/advanced
- Grade 6: 16 out of 50 for fails/basic, 28 out of 50 for pass/proficient, and 45 out of 50 for pass/advanced
- Grade 7: 17 out of 50 for fails/basic, 31 out of 50 for pass/proficient, and 45 out of 50 for pass/advanced
- Grade 8: 17 out of 50 for fails/basic, 31 out of 50 for pass/proficient, and 46 out of 50 for pass/advanced

## Standard Setting Modified-Angoff Procedure

Standard setting is a systematic way of making a professional judgment on the number of questions on a test that must be answered correctly to signify that a student's achievement is at the *fails/basic*, *pass/proficient*, or *pass/advanced* achievement level. The number of questions that a student must answer correctly to be classified as "basic," "proficient" or "advanced" is called a "cut score." In the case of the Standards of Learning (SOL) mathematics assessments for grades 3-8, four performance level categories have been established:

*Pass/Advanced*  
*Pass/Proficient*  
*Fails/Basic*  
*Fails/Below Basic*

One cut score will distinguish *Fails/Basic* from *Fails/Below Basic*. A second cut score will distinguish *Pass/Proficient* from *Fails/Basic* and a third cut score will distinguish *Pass/Advanced* from *Pass/Proficient*.

The procedure used for standard setting for the SOL mathematics tests is known as the modified-Angoff procedure. This procedure has been widely used on tests for a number of years. Steps used in the procedure are described below.

1. Judges receive training in the standard-setting process and complete a simulation activity.
2. Judges take the test on which cut scores are to be set to simulate the experience of the students who have taken the test.
3. Judges discuss the performance level descriptor for each achievement level (i.e., *Fails/Below Basic*, *Fails/Basic*, *Pass/Proficient*, and *Pass/Advanced*). An example of a performance level descriptor for the "pass/proficient" achievement level for the grade 7 mathematics test is shown below.

A student performing at the proficient level should be able to:

- Write a power of 10 with a negative exponent in fraction and decimal form.
- Compare and order fractions, decimals, percents, and numbers written in scientific notation.
- Determine the square root of perfect squares less than or equal to 400.
- Use the number line to demonstrate the absolute value of a rational number.
- Extend arithmetic and geometric sequences using the common difference or common ratio.
- Add, subtract, multiply, and divide integers.
- Use proportional reasoning to solve single and multistep practical problems.

- Solve practical problems involving the volume and surface area of rectangular prisms and cylinders; and describe how changing one measured attribute of a rectangular prism affects its volume and surface area.
- Use properties to compare and contrast characteristics of parallelograms, rectangles, rhombi, and trapezoids and use proportions to determine the corresponding sides and angles for similar figures.
- Sketch a reflection, dilation, rotation, or translation on the coordinate plane, given the graph or coordinates of the pre-image.
- Apply the experimental and theoretical probability formulas to determine the probability of an event or compound event containing no more than two events.
- Analyze histograms for a given data set, and compare and contrast them with other graphical representations of the same data.
- Use one representation of a relation to represent and describe the relation in another form.
- Use the properties of real numbers to evaluate verbal and algebraic expressions for replacement values and to solve one and two-step linear equations and inequalities in one variable.

Judges then discuss the characteristics of students who just make it into an achievement level: those who are “just basic,” “just proficient,” and “just advanced,” to further define the particular knowledge and skills that separate those students in one achievement level from those in the others.

4. **Round 1 Ratings:**

Judges independently examine each question on the test, thinking of students who are “just” *proficient* and estimating whether or not these students would answer each item correctly MOST of the time (2/3 of the time). (Note: Judges are instructed to determine what students *should* do, rather than what they *can* now do.) Judges use the same procedure for the *basic* and *advanced* categories. When Round 1 is completed, each judge has recorded “yes” or “no” for each question on the test for “basic,” “proficient,” and “advanced.” Each judge’s ratings on the questions are converted to a cut score.

5. **Round 2 Ratings:**

Judges are provided with a table of each judge’s ratings from Round 1, refine the definitions and descriptors, and repeat the process used in Round 1.

6. **Round 3 Ratings:**

Judges are provided with a table of each judge’s ratings from Round 2, refine the definitions and descriptors, and repeat the process used in Round 2.

**Articulation Committee:**

After the work of the standard setting committees has been completed, a smaller group of educators composed of two or three members from each of the standard setting committees is convened to review the results of round 3 for each test. In the case of the mathematics tests for grades 3-8, the purpose of this “articulation committee” was to review the round 3 results for each of the tests for to determine the reasonableness of the recommended cut scores in light of

the performance level descriptors and estimated impact data. The impact data reviewed by the articulation committee provided estimates, based on field test data, of the number of students who would fall into each achievement level if the recommended cut scores were adopted. Based on their review, the articulation committee recommended adjustments to the cut scores for some of the mathematics tests.

**Recommendation Presented to the Board of Education:**

The results of the standard setting committees and the articulation committee are presented as recommendations to the Board of Education as part of first review. On final review, the Board of Education is asked to adopt cut scores on each SOL test.

## Summary and Background Information on Proposed Cut Scores for the Mathematics Tests for Grades 3-8 Based on the 2009 Standards of Learning

	Fail/Basic			
	Background Information		Standard Setting Summary	
Test Name *	Fail/Basic Cut Score for Previous Mathematics Test**	Fail/Basic Cut Score for New Test to Maintain Previous Level of Rigor	Round 3 Median for Basic	Articulation Committee Recommendation
Grade 3	21 out of 50	7 out of 40	6 out of 40	10 out of 40
Grade 4	16 out of 50	7 out of 50	7.5 out of 50	13 out of 50
Grade 5	23 out of 50	10 out of 50	8.5 out of 50	13 out of 50
Grade 6	22 out of 50	13 out of 50	7 out of 50	13 out of 50
Grade 7	19 out of 50	14 out of 50	14 out of 50	13 out of 50
Grade 8	19 out of 50	9 out of 50	8 out of 50	13 out of 50

\* All tests based on the 2009 SOL have 50 items except for grade 3 which has 40 items

\*\* Test based on the 2001 Mathematics Standards of Learning

## Summary and Background Information on Proposed Cut Scores for the Mathematics Tests for Grades 3-8 Based on the 2009 Standards of Learning

	Pass/Proficient				Pass/Advanced			
	Background Information		Standard Setting Summary		Background Information			Standard Setting Summary
Test Name *	Pass/Proficient Cut Score for Previous Mathematics Test**	Pass/Proficient Cut Score for New Test to Maintain Previous Level of Rigor	Round 3 Median for Proficient	Articulation Committee Recommendation	Pass/Advanced Cut Score for Previous Mathematics Test**	Pass/Advanced Cut Score for New Test to Maintain Previous Level of Rigor	Round 3 Median for Advanced	Articulation Committee Recommendation
Grade 3	35 out of 50	16 out of 40	25.5 out of 40	26 out of 40	45 out of 50	28 out of 40	36 out of 40	36 out of 40
Grade 4	31 out of 50	20 out of 50 (-11)	30.5 out of 50	31 out of 50	43 out of 50	34 out of 50 (-9)	44 out of 50	45 out of 50
Grade 5	35 out of 50	22 out of 50 (-13)	26 out of 50	28 out of 50	44 out of 50	34 out of 50(-10)	44 out of 50	45 out of 50
Grade 6	34 out of 50	24 out of 50 (-10)	28 out of 50	28 out of 50	44 out of 50	35 out of 50 (-9)	44 out of 50	45 out of 50
Grade 7	31 out of 50	23 out of 50 (-8)	31 out of 50	31 out of 50	42 out of 50	35 out of 50 (-7)	44 out of 50	45 out of 50
Grade 8	32 out of 50	23 out of 50 (-9)	25 out of 50	27 out of 50	42 out of 50	33 out of 50 (-9)	46 out of 50	46 out of 50

\* All tests based on the 2009 SOL have 50 items except for grade 3 which has 40 items

\*\* Test based on the 2001 Mathematics Standards of Learning