

# The Washington State Board of Education

Governance | Achievement | High School and College Preparation | Math & Science | Effective Workforce

## **Superintendent Dorn's Mathematics and Science Graduation Requirement Request Legislation**

### **BACKGROUND**

To graduate from high school, current law requires the students in the Class of 2013 to meet standards on two end-of-course high school mathematics assessments (Algebra 1/Integrated 1 and Geometry/Integrated 2) and either the comprehensive science HSPE or a newly developed biology end-of-course assessment. These assessments are in addition to the requirement that students meet standards on the reading and writing assessments.

While requiring students to meet mathematics and science standards to graduate is well established, there is a number of implementation issues with the current schedule that, if not addressed, will likely result in a large number of students not receiving a diploma. These issues include:

- A very large number of students will have had Algebra I and biology courses one or more years prior to taking the "end-of-course" assessment. In some cases, students will have taken these courses before the new standards were adopted. As a result, many students likely will not be prepared for the tests, and it can be argued that using the tests several years after taking a course is not an appropriate or valid use of the tests.

- High stakes will be attached to the first administration of the assessments. In other states, assessments are in place an average of four years before graduation decisions are based on the assessment results.

- New mathematics and science standards have recently been adopted, and school districts may not have had the financial resources to acquire aligned instructional materials for the courses.

- Funding for Learning Improvement Days, I-728, and science and professional development has been eliminated, which would have been used to inform teachers of what will be tested, to design lesson plans, and revamp curriculum to prepare students for the assessments.

- Assessing only biology will result in a major transfer of limited high school science staffing and financial resources to the teaching and remediation of biology content. This will result in fewer resources and staffing available for other science disciplines, such as physical science, earth and space science, physics, chemistry, and the integration of science, technology, engineering, and mathematics (STEM).

- As a result of the implementation, preparedness, and fairness issues noted above, it is likely that a large number of students will complete Collections of Evidence, which are costly to compile in schools and to score.

## **SUMMARY**

Superintendent Dorn will recommend to the Legislature two agency-request bills:

**Mathematics:** The first bill will amend current law to require students in the Classes of 2013 and 2014 to meet the standard on only one high school mathematics end-of-course assessment instead of two. Since most 10<sup>th</sup> and 11<sup>th</sup> grade students are taking Geometry this school year, they will be able to take the Geometry end-of-course assessment as a graduation required exam this spring. Phasing in the implementation of the requirement will also give teachers and students more time to understand what is being assessed, to modify instruction, to provide appropriate assistance to students who do not meet the standards, and result in a more orderly implementation.

**Science:** The science legislation will have four components:

- 1) Continue with the development of the Biology end-of-course exam with initial implementation in spring 2011.
- 2) Phase in two additional science end-of-course exams, the first in Physical Science in 2015 and the second in Integrated Science in 2016. If possible, these assessments will be developed in cooperation with other states using the common core science standards that are being developed.
- 3) Delay the science graduation requirement until the Class of 2017. Require students in the Class of 2017 to pass the Biology end-of-course exam or a biology alternative assessment, to graduate.
- 4) Require students in the class of 2018 and beyond to meet standards in science by passing the Biology end-of-course exam or one of the additional science end-of-course exams, or an appropriate alternative, to graduate.

## **POLICY CONSIDERATIONS**

The board should consider:

- 1) Whether it is reasonable to continue the current timeline for the mathematics and science assessment graduation requirements, or whether the recommended changes will result in a more practicable implementation schedule.
- 2) Whether having only a biology end-of-course assessment will result in higher quality and rigorous science instruction and achievement, or divert too many resources from other valued scientific disciplines.
- 3) Whether the board should stand firm in not “backing-off” of higher mathematics and science standards even though it is aware that implementation and operational issues exist.

## **EXPECTED ACTION**

The Board may choose to formally support, or oppose, one or both of the bills, or may choose not to take any action.



# Superintendent Dorn's **Mathematics and Science Graduation Recommendations**

State Board of Education Meeting  
January 12, 2011

Robert Butts, Assistant Superintendent for Policy and Planning, OSPI  
Ellen Ebert, Science Director, OSPI

## Three Questions:

1. Are our current plans for Mathematics and Science end-of-course assessment graduation requirements fair to our students?
2. Will these plans, once implemented, actually improve Mathematics and Science achievement?
3. If not, what changes and actions are needed?



# Science



# Current Science Assessment Graduation Requirements

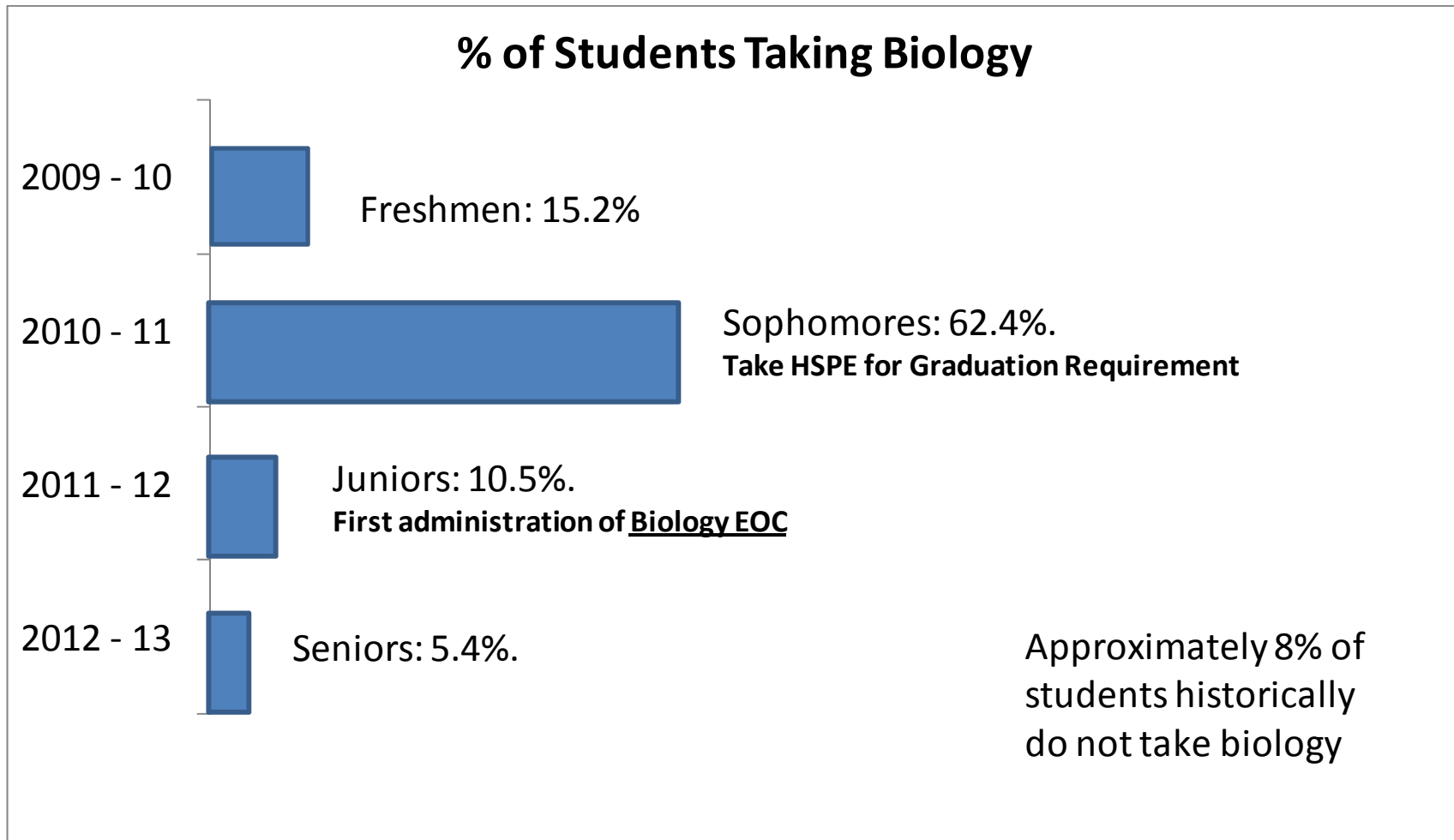
- RCW 28A.655.061
  - Beginning with Class of 2013, students must meet state standards in science or an alternative/alternate assessment in order to graduate
- Senate Bill 6444 (Operating Budget – 2009 Session)
  - OSPI, in consultation with SBE, to develop a high school end-of-course assessment measuring the science standards in **biology**
    - Implement in 2011-12 school year
  - In December 2010, SPI to recommend whether additional end-of-course assessments in science should be developed and in which content areas
    - Recommendation must include a timeline and projected costs to develop and administer the assessments

# What are the Challenges?

- **New science standards were recently adopted (2009)**
  - Little time for teachers and schools to purchase/align instructional materials, develop lessons, provide targeted assistance
- **The assessment is changing**
  - This spring (2011), the current comprehensive science assessment (HSPE) administered for the last time
    - Will assess 2005 standards
  - New biology end-of-course assessment not available until spring 2012
    - Will assess 2009 standards
    - On average, states administer assessments four years before used as exit exams
- **Washington does not require students to take biology**
- **The mismatch between when students take biology and the EOC**
  - Most students take biology as 9<sup>th</sup> and 10<sup>th</sup> graders
  - Biology EOC will not be offered until their 11<sup>th</sup> grade (2012)
    - Students failing the 2011 comprehensive assessment will have to meet the graduation requirement by taking the biology EOC a year or more after taking biology

Class of 2013

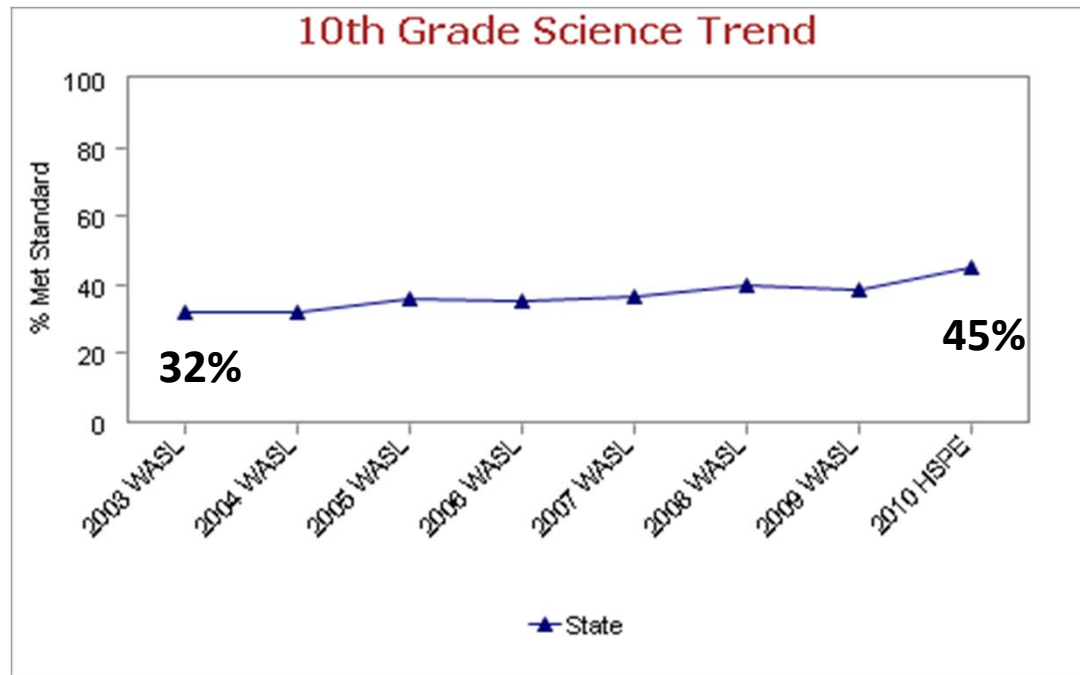
# When Do Students Take Biology?





# What are the Challenges?

- The current % of high school students meeting the science standard is low, and not growing rapidly

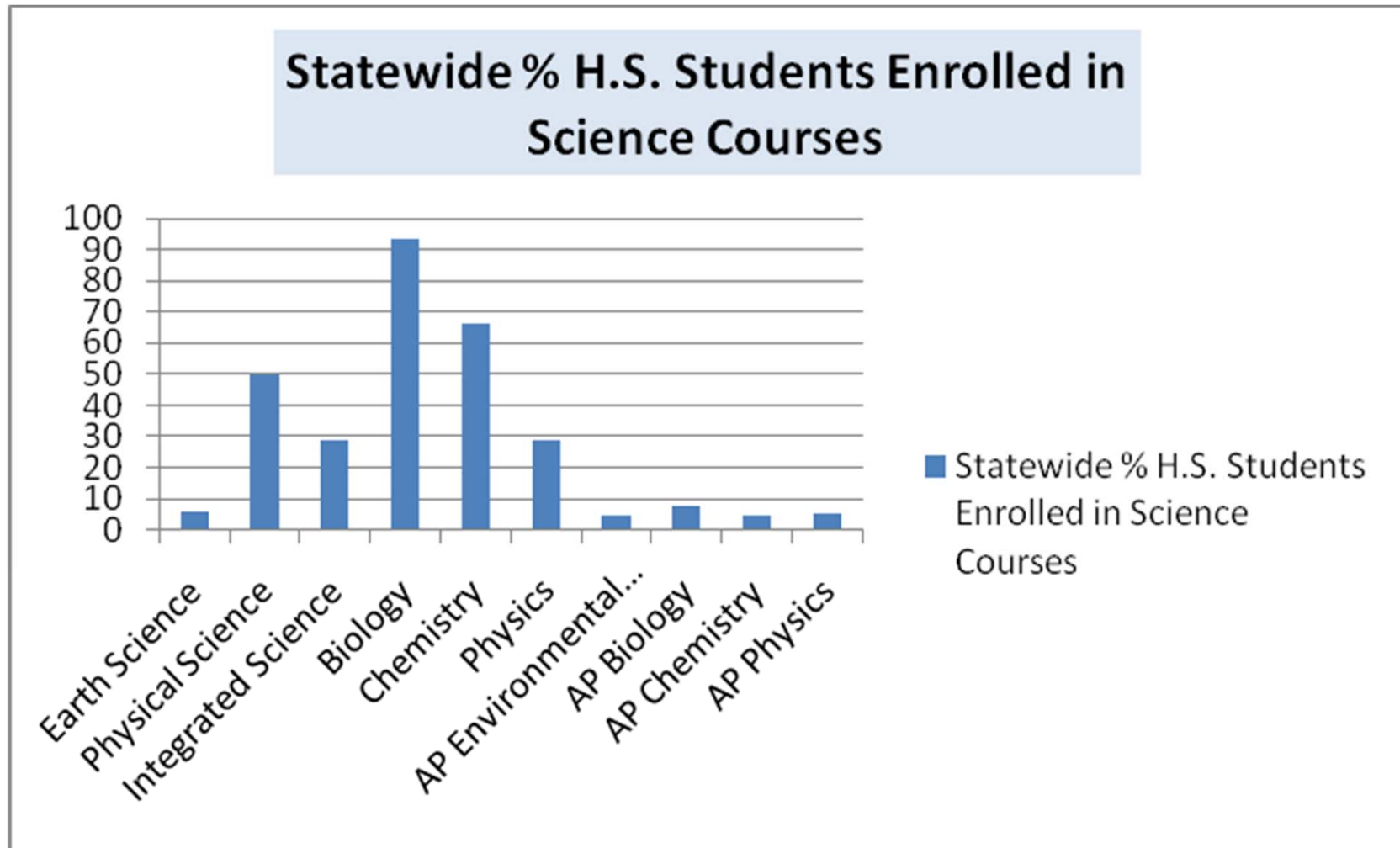


The 2009 Legislature recognized the problem and switched to an end-of-course assessment

# What are the Challenges?

- **Many teachers have not had professional development on the new standards or a chance to align their biology courses and instructional materials**
- **A high stakes assessment only in biology will divert limited resources from other science disciplines**
  - High schools will need to:
    - Create additional biology classes
    - Provide biology remediation/Collection of Evidence opportunities
    - Move most effective science teachers to biology instruction, which will impact instruction in other science classes
- **Limited opportunities to hire new science teachers due to budget constraints**
- **High stakes assessments are expensive to implement.**
  - Implementing the science graduation requirement will cost the state \$20.5 million in the 2011-13 biennium.
  - School district costs in other states have ranged from \$128 (Minnesota) to \$442 (Massachusetts)

# Largest enrollments are in Biology, Chemistry, Physical, and Integrated Science Classes



# What are the Challenges?

- Funding to improve science instruction was slashed, and further cuts are likely

	FY 08	FY 09	FY 10	FY 11
<b>LASER</b>	\$ 4,079,000	\$ 1,579,000	\$ 1,473,000	\$ 197,000
<b>Science ESD Coordinators</b>	\$ -	\$ 1,677,500	\$ 1,677,500	\$ 1,677,500
<b>Science Instructional Coaches</b>	\$ -	\$ 1,792,000	\$ 943,250	\$ 943,250
<b>Science Professional Development</b>				
- 4th/5th grade teachers	\$ 1,939,000	\$ 2,513,500	\$ 507,000	\$ -
- Middle/High School teachers	\$ 7,173,000	\$ 8,101,500	\$ 1,620,402	\$ -
<b>TOTALS</b>	<b>\$ 3,191,000</b>	<b>\$ 15,663,500</b>	<b>\$ 6,221,152</b>	<b>\$ 2,817,750</b>

<b>Learning Improvement Days</b>	<b>2 Days</b>	<b>2 Days</b>	<b>1 Day</b>	<b>0 Days</b>
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# National Science Standards

- “Next Generation Science Standards” under development
  - Framework to be completed this spring
  - Standards to be available by December 2011
- New multi-state collaborative assessments likely to be developed
  - Washington and other states will need EOCs
  - EOCs potentially available in 2014 – 2015

# What Teachers have to say on EOCs

- Pro

- Testing will keep teachers focused. If a student cannot pass an EOC, perhaps they don't deserve a diploma.
- Students will take test seriously.
- I strongly agree providing the assessment is aligned with National Science Standards and is developmentally appropriate for high school.
- Requiring a proficiency standard will improve instruction.

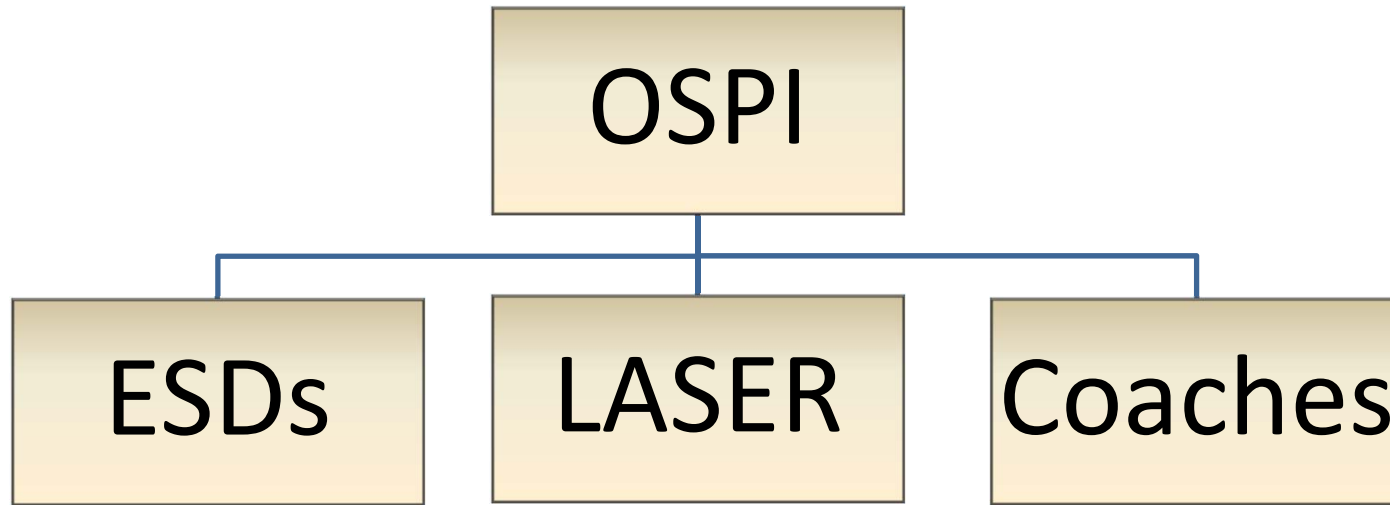
- Con

- We need students who are broadly scientifically literate: Not students who only know biology.
- This will stall the emphasis on STEM.
- Teachers will spend a huge amount of time making sure the remediation is completed. I hope the advanced students do not miss out on their education.
- Test assures only “teach that which is tested.” As a past presidential awardee, I find freedom to go beyond way more enriching.

# Superintendent Dorn's Recommendations

- Implement Biology end-of-course exams in 2012 (as planned)
- Phase in two additional end-of-course exams that are developed with other states and based on the new national standards
  - Physical Science in 2015
  - Integrated Science in 2016
- Delay the graduation requirement until the Class of 2017
  - Class of 2017: Require students to pass the Biology EOC or alternative
  - Class of 2018 and beyond: Require students to pass Biology, Physical Science, or Integrated Science EOC or alternative
- Take actions to ensure students have an opportunity to be successful

# Actions Required



- Continue to build -- and fund -- a statewide Leadership/Professional Development System
- Develop resources for schools, teachers, students and parents



# Actions Required

- Work with the ESD coordinators and teachers to develop a ***Guide to Biology*** to include:
  - Performance expectations
  - Released items
  - Model syllabi with pacing guides
  - Learning progressions
  - Tools that teachers can use to develop their own scenarios
  - Model lessons
  - Formative assessments
  - Virtual toolbox
- Complete guides for other science content areas as EOCs are developed
- Work with other states to develop science EOCs based on new standards



# Current Mathematics Assessment Graduation Requirements

- **To graduate, Classes of 2013 and 2014 must meet:**
  - The standards on two high school end-of-course mathematics assessments (Algebra 1/Integrated 1 and Geometry/Integrated 2);
  - The standard on a comprehensive mathematics assessment;
  - The standard on an objective alternative assessment (e.g., grades comparison, COE, SAT, ACT, AP); or
  - An alternate assessment for students eligible for Special Education.
- **Classes of 2015 and beyond:**
  - The comprehensive assessment option is eliminated.

# Why move forward with Mathematics?

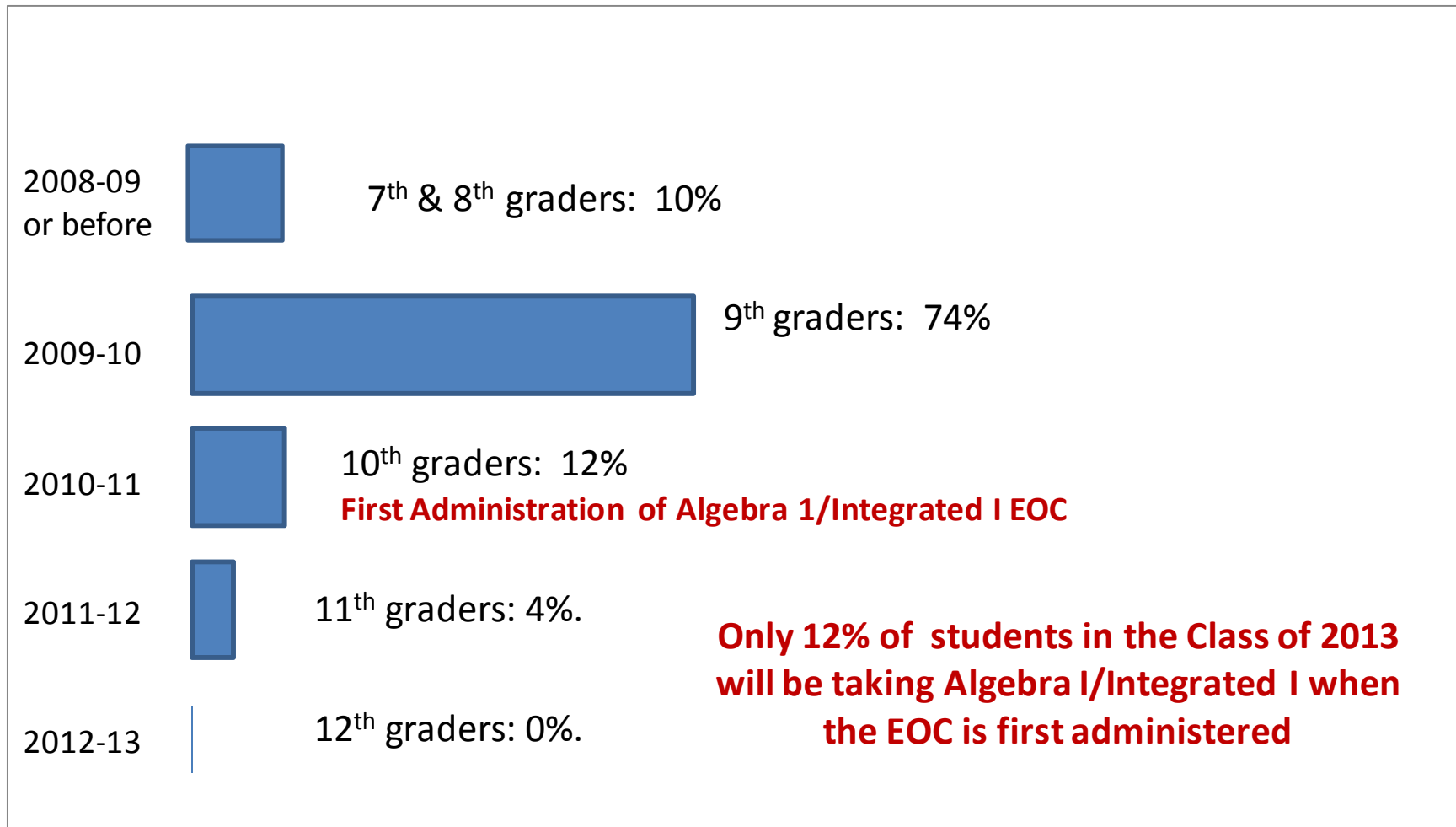
- The mathematics standards have been in place longer
  - Has allowed more time for alignment, obtaining instructional materials, professional development
- Algebra I/Geometry and Integrated I/II are required to graduate

# What are the Challenges?

- **Several problems remain, however**
  - Percent meeting the HS Math standard is low (42%)
  - EOCs will be used for high stakes on 1<sup>st</sup> administration
  - Schools will have to devote more resources to these mathematics courses
  - **Many** students will have taken Algebra 1/Integrated 1 one or more years before the EOCs are administered

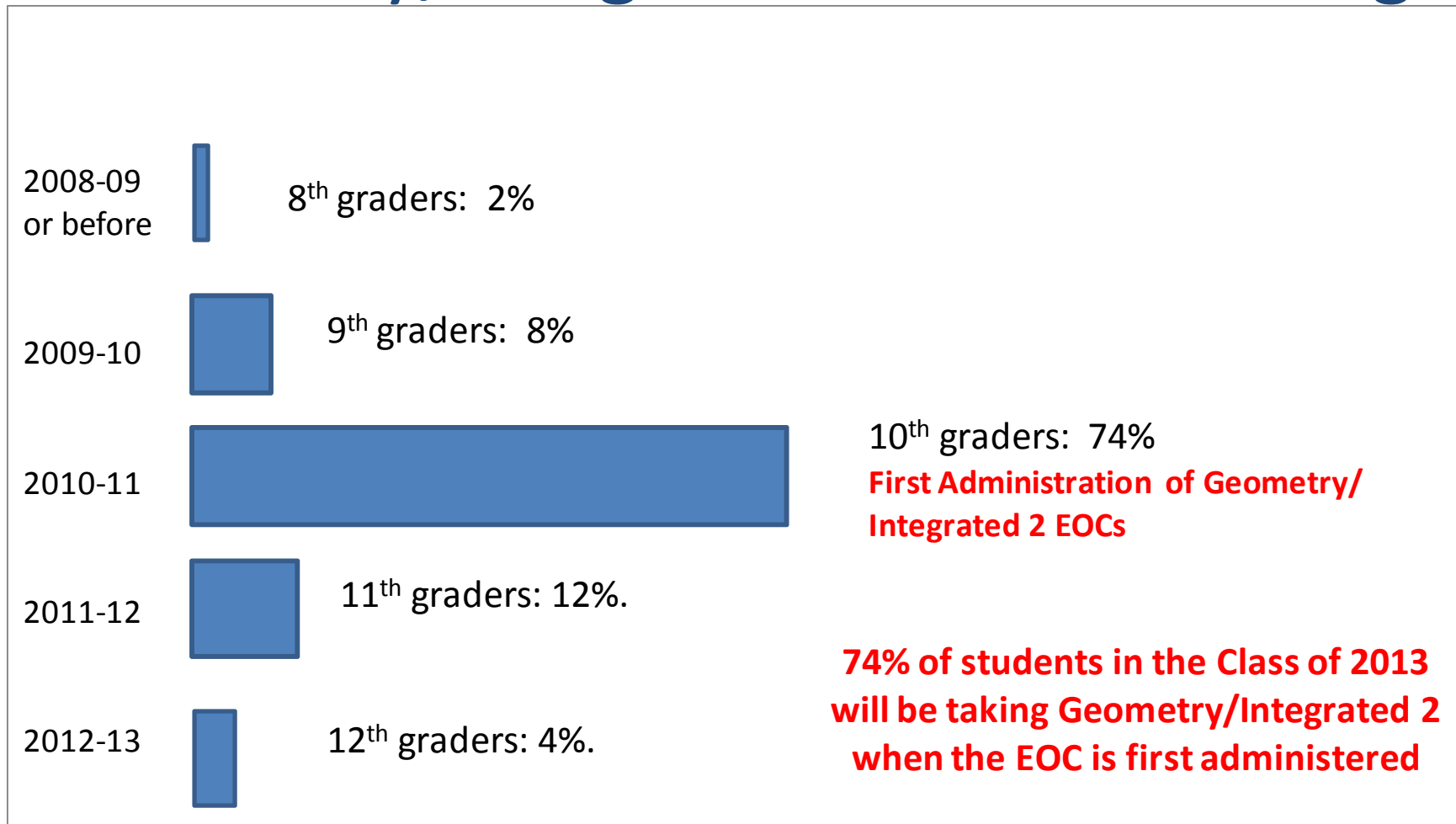
# Class of 2013

## Algebra/Integrated I Course taking



# Class of 2013

## Geometry/Integrated 2 Course taking



# Superintendent Dorn's Recommendations

- **To graduate, Classes of 2013 and 2014 must meet:**
  - The standard on one high school end-of-course mathematics assessment;
  - The standard on a retake;
  - The standard on an objective alternative assessment (e.g., grades comparison, COE, SAT, ACT, AP); or
  - An alternate assessment for students eligible for Special Education.

(The comprehensive assessment option is eliminated)
- **Classes of 2015 and beyond:**
  - Must meet standard on two assessments
  - No other changes



# Benefits

- Maintains current level of rigor
- Continues with an aggressive implementation schedule
- However, recognizes that major implementation issue can be addressed with requiring only one standard to be met for first two years
- Reduces school and district costs in the near-term

# Further Information

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