



# **MEASUREMENTS OF STUDENT PROGRESS SCIENCE ASSESSMENT UPDATE**

**OSPI Science Assessment Staff**

**WERA Conference, SeaTac WA, December 2011**

# SCIENCE ASSESSMENT OFFICE STAFF

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- Jessica Cole—Administrative Assistant
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# AGENDA

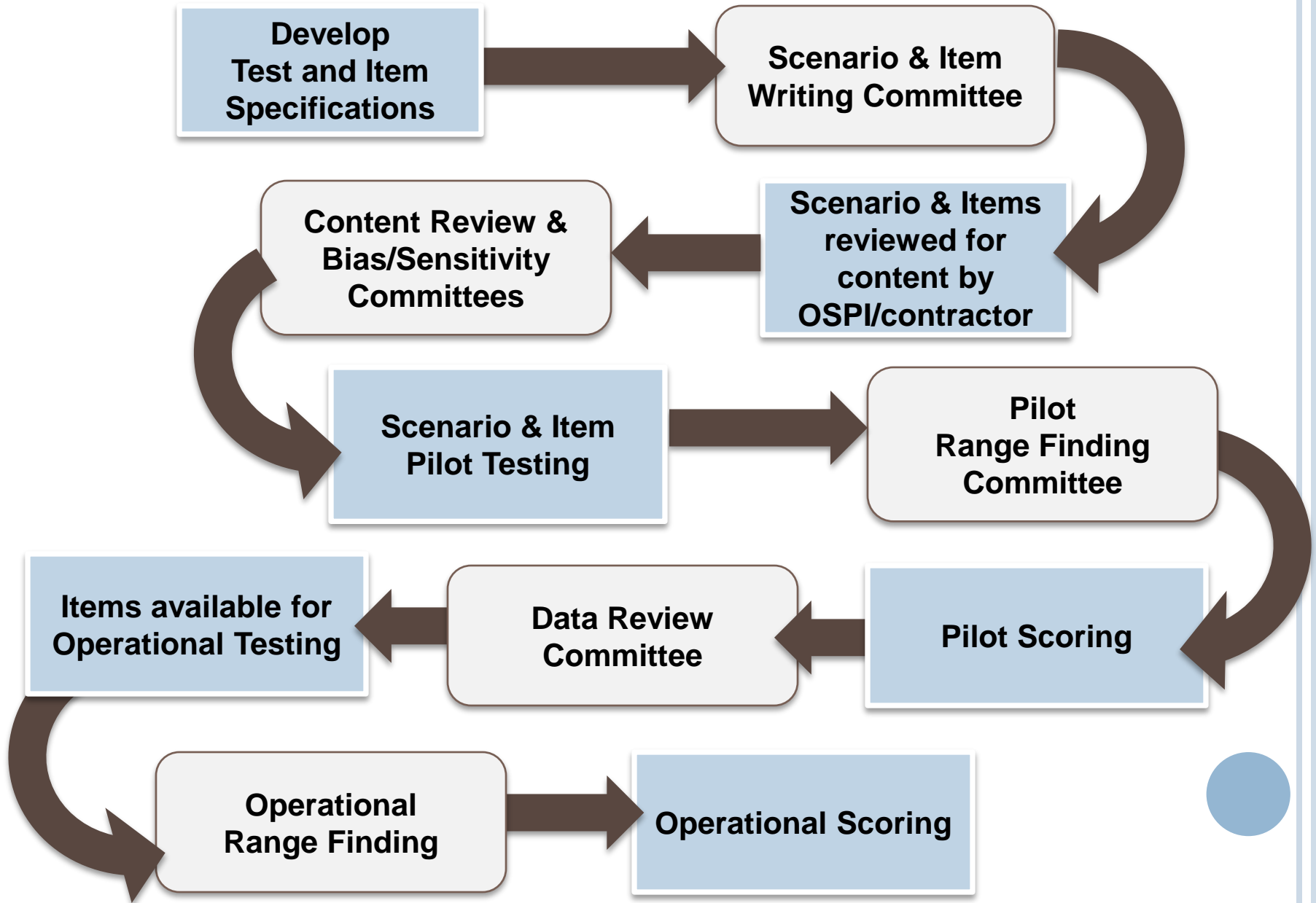
- General overview
- Results of 2011
- New for 2012
- National level events
- Resources available





# GENERAL OVERVIEW

# Science Assessment Development Cycle



# Science Assessment Development Cycle (a)

OSPI and  
Teachers  
**Develop  
Test and Item  
Specifications**

OSPI leads  
Teachers in  
**Scenario &  
Item Writing  
Workshop**

**Scenario &  
Items  
reviewed for  
content by  
OSPI/  
contractor**

**Scenario & Item  
Pilot Testing**  
(embedded in  
operational test; not  
counted for points)

**Content Review**  
by OSPI and  
Teachers &  
**Bias/Sensitivity  
Review** by  
community

# Science Assessment Development Cycle (b)

**Pilot Range Finding** of CP and SA items by OSPI and Teachers

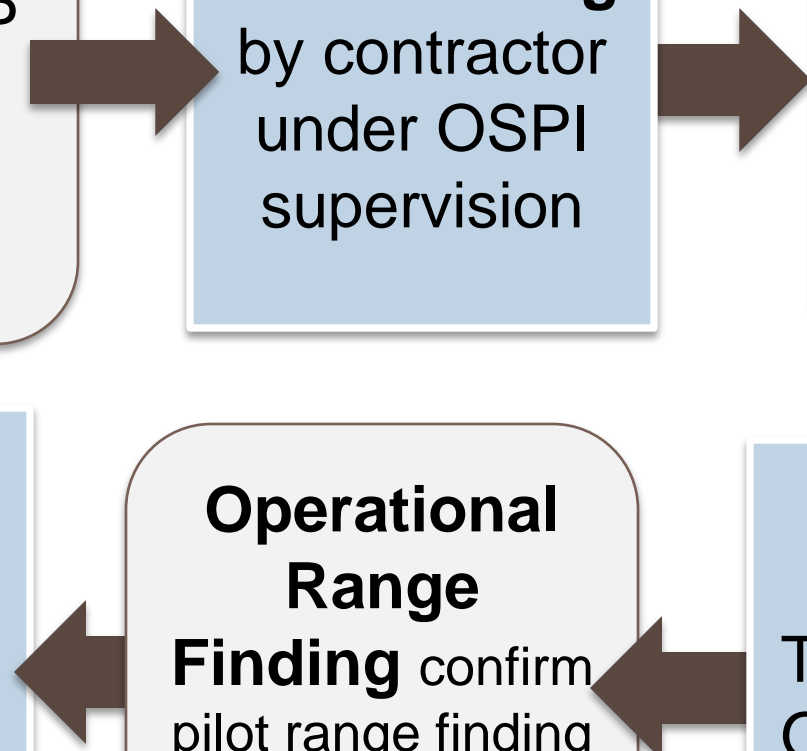
**Pilot Scoring** by contractor under OSPI supervision

**Data Review** of items by Teachers, OSPI and contractor

**Operational Scoring** by contractor under OSPI supervision

**Operational Range Finding** confirm pilot range finding sets by OSPI and contractors

OSPI and Contractor use Test Map to build Operational Test;  
**Test Given to Students**



# BIG IDEAS IN SCIENCE STANDARDS

<b>EALRs 1-3</b> <b>Crosscutting Concepts and Abilities</b>	<b>EALR 4</b> <b>Domains of Science</b>
<b>EALR 1 Systems</b>	<b>Physical Science</b>
<p>...is a way of thinking that makes it possible to analyze and understand complex phenomena.</p>	<p>Force and Motion            Matter: Properties and Change            Energy: Transfer, Transformation and Conservation</p>
<b>EALR 2 Inquiry</b>	<b>Earth and Space Science</b>
<p>...is a process of asking and answering questions about the natural world that forms the bedrock of science.</p>	<p>Earth and Space            Earth Systems, Structures and Processes            Earth History</p>
<b>EALR 3 Application</b>	<b>Life Science</b>
<p>...is about the interaction between science and technology, and how both can help solve real-world problems.</p>	<p>Structures &amp; Functions of Living Systems            Ecosystems            Biological Evolution</p>

# SCENARIOS AND ITEMS

- Scenarios provide context for a set of items
  - Systems, Inquiry, and Application
  - Physical, Earth & Space, and Life Science
- Items associated with a scenario cover a range of standards & range of cognitive complexity
- Items not connected to a scenario are called “stand alone” items, and are clearly marked for students



# WHAT IS A “SCENARIO”?

- Text describing a scientific situation
- Establishes the context for a set of items that follows
- One or two pages long
- Includes a diagram and/or a table



# TYPES OF SCENARIOS

Systems	Inquiry	Application
<ul style="list-style-type: none"><li>• Describe systematic observations, models, or open-ended explorations of a system.</li><li>• Diagram of a system and some text about a specific system.</li></ul>	<ul style="list-style-type: none"><li>• Describe either controlled experiments or field studies and model age-appropriate investigations.</li><li>• Data table with the variables and results.</li></ul>	<ul style="list-style-type: none"><li>• Describe a technological design process student used to solve a problem.</li><li>• A problem or challenge is presented.</li><li>• Results from testing the solution.</li></ul>



# EXAMPLES OF SYSTEMS

<b>Physical</b>	<b>Earth &amp; Space</b>	<b>Life</b>
<ul style="list-style-type: none"><li>• Object on a ramp</li><li>• Boiling water on a stove</li><li>• Electrical circuit</li></ul>	<ul style="list-style-type: none"><li>• Earth, Moon, and Sun</li><li>• Water moving through the land</li><li>• Landforms</li></ul>	<ul style="list-style-type: none"><li>• A single plant or animal</li><li>• An ecosystem—garden, field, schoolyard—with plants, animals, and nonliving parts</li></ul>

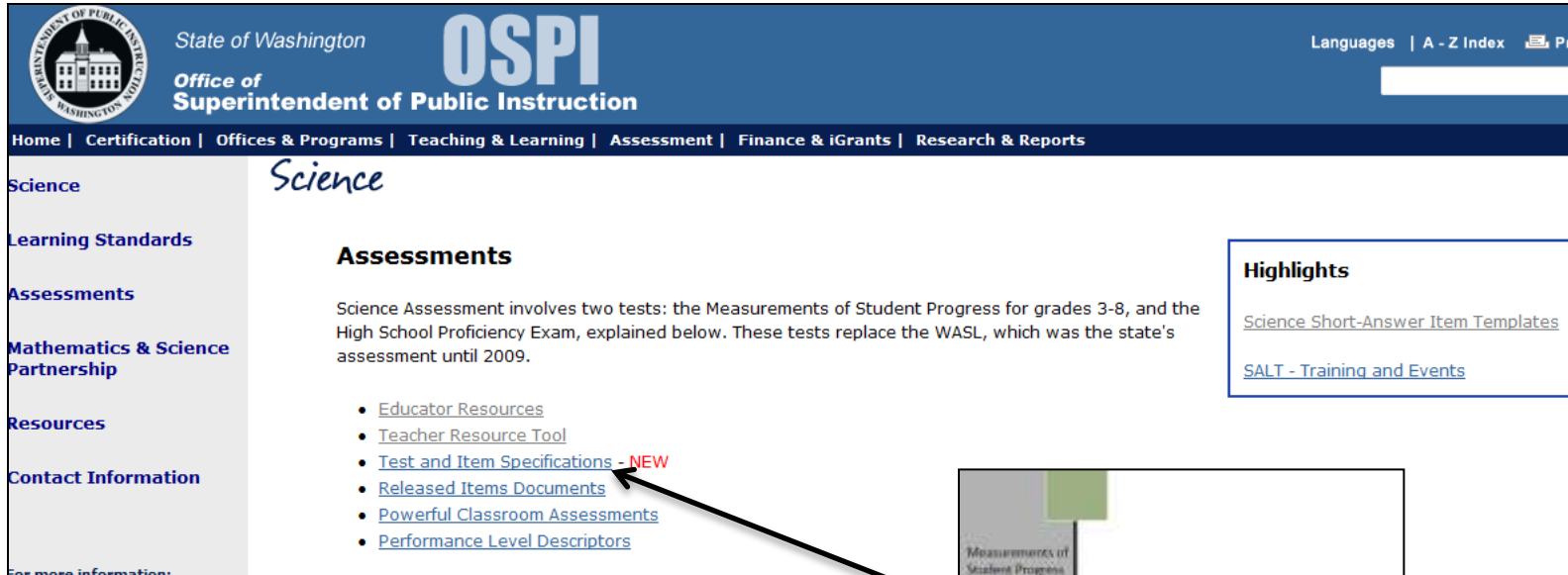


# EXAMPLE WITH AN ANIMAL

<b>Systems</b>	<b>Inquiry</b>	<b>Application</b>
<ul style="list-style-type: none"><li>• Labeled diagram of the animal and some information about the animal's role in the ecosystem.</li></ul>	<ul style="list-style-type: none"><li>• Controlled experiment about the effect of types of food on the weight of the animal.</li><li>• Data table with results of the experiment.</li></ul>	<ul style="list-style-type: none"><li>• Documentation of man-made changes to an ecosystem to attract the animal to the area.</li><li>• Table with data indicating animal visits to the area.</li></ul>



# TEST AND ITEM SPECIFICATIONS DOCUMENT



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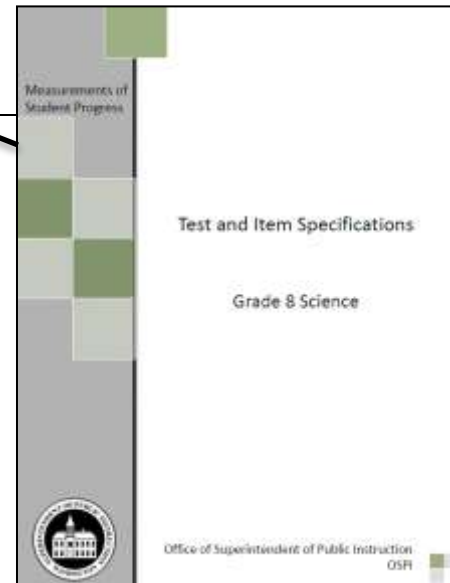
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- [Teacher Resource Tool](#)
- [Test and Item Specifications - NEW](#)
- [Released Items Documents](#)
- [Powerful Classroom Assessments](#)
- [Performance Level Descriptors](#)

### Highlights

- [Science Short-Answer Item Templates](#)
- [SALT - Training and Events](#)



# TEST AND ITEM SPECIFICATIONS DOCUMENT CONTENTS

- Guidelines for development of scenarios
- Test specifications (a.k.a. “test map”)
- Item specifications
  - Specific text describing what an item can ask or direct students to do
  - Notation: ES3B(1) is the first item specification for the content standard ES3B.
- Vocabulary list
- Progression of variables language
- Cognitive complexity



# TEST SPECIFICATIONS GRADES 5 & 8

The test “map” designates the following proportions of points:

- At least 20% Systems (with connected EALR 4 content)
- 30% Inquiry
- 20% Application (which will apply EALR 4 content)
- At most 30% EALR 4 domain knowledge that is not associated with a cross-cutting concept or ability\*

- \*EALR 4 content may be assessed in questions that only assess EALR 4, or in questions that cut across both EALR 4 and a cross-cutting concept or ability (Systems, Inquiry, Application).



## NUMBER AND TYPES OF ITEMS

---

<b>Item Type</b>	<b>Grade 5</b>	<b>Grade 8</b>
Multiple Choice	20-25	24-29
Completion	1-6	1-6
Short Answer	4	5
<b>Total Items</b>	<b>30</b>	<b>35</b>
<b>Total Points</b>	<b>34</b>	<b>40</b>
Pilot Items	5	5

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# RESULTS OF 2011

First assessment of the *Washington State  
K-12 Science Learning Standards*  
(adopted June 2009)

# IMPACT OF NEW LEARNING STANDARDS

- New test map
- New item specifications
- Piloted new scenarios and items in 2010
- New “performance standard” had to be set with the 2011 exams:
  - Performance Level Descriptors (PLDs)
  - Contrasting Groups Study
  - Standard Setting

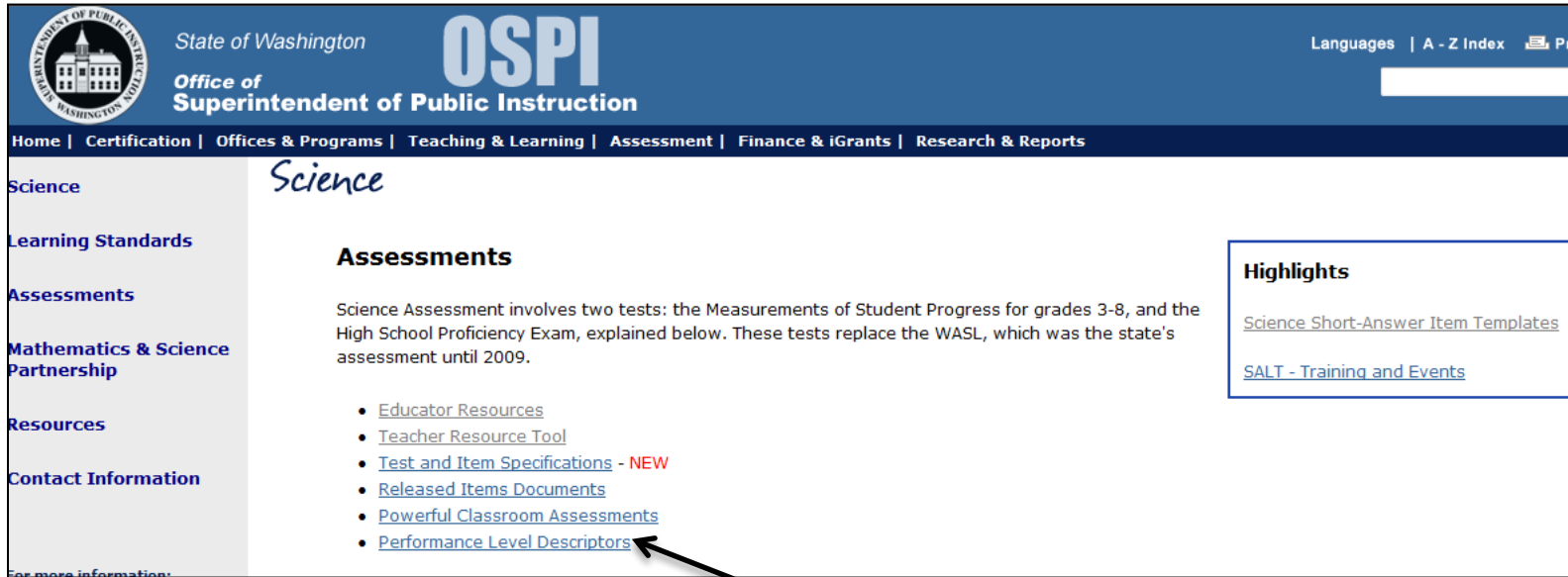



# PERFORMANCE LEVEL DESCRIPTORS (PLDs)

- Performance Level Descriptors give teachers, parents/guardians and students information about the typical skills and knowledge a student demonstrates on state assessments in each performance level.
  - Basic
  - Proficient
  - Advanced



# PERFORMANCE LEVEL DESCRIPTORS



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State Testing Overview *State Testing*

FAQ

Timelines/Calendar

Scale Scores

Test Questions

Performance Levels

Test Resources

Item/Point Totals

Testing Statistics

## Performance Level Descriptors (PLDs)

Performance Level Descriptors give teachers, parents/guardians and students more information about the typical skills and knowledge a student demonstrates on state assessments in each performance level. Committees of Washington state teachers, parents, community members and business representatives develop the Performance Level Descriptors during the standard setting processes.

Performance Level Descriptors have been developed for every tested grade level. Please see TABLE (right).

- Reading is tested in grades 3-8 and in high school.
- Mathematics in grades 3-8, in Algebra 1/Integrated Mathematics 1 ([Year 1](#)), and in Geometry/Integrated Mathematics 2 ([Year 2](#)).
- Writing is tested in grades 4, 7 and high school.

Grade	Reading
3	X
4	X
5	X
6	X
7	X
8	X
High School	X
End-of-	

score levels students can earn. NOTE:

[Grade 3](#) | [Grade 4](#) | [Grade 5](#) | [Grade 6](#) | [Grade 7](#) | [Grade 8](#) | [High School](#)

### Writing

[Grade 4](#) | [Grade 7](#) | [High School](#)

### Mathematics

[Grade 3](#) | [Grade 4](#) | [Grade 5](#) | [Grade 6](#) | [Grade 7](#) | [Grade 8](#)

### Science

The High School Science PLDs apply to the Spring 2011 HSPE. End-of-course PLDs for the 2012 Biology exam will be released in Fall 2012.

[Grade 5](#) | [Grade 8](#) | [High School](#)

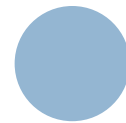
### End-of-Course

Algebra 1/Integrated Mathematics 1 - ([Year 1](#))

Geometry/Integrated Mathematics 2 - ([Year 2](#))

Biology - **Coming Fall 2012**

Scroll down to:



# PERFORMANCE LEVEL DESCRIPTORS

## EXAMPLE FROM 5<sup>TH</sup> GRADE:

### Proficient

A **fifth-grade** student performing at the **Proficient Level** recognizes the inputs and outputs of a familiar simple system; plans simple scientific investigations with some of the necessary steps; uses some data from a given simple investigation to support conclusions; determines how to test the effectiveness of a proposed solution to a problem; and demonstrates understanding of grade-band concepts in physical, earth and space, and life science.

In addition to the skills and knowledge demonstrated at the basic level, a student performing at the **proficient level** can do things like...

- Identify the inputs and outputs of familiar simple systems
- Plan a grade-appropriate scientific investigation for a testable question by describing how to change one variable and measure another variable with some guidance
- Describe, with some guidance, a relationship between variables including supporting evidence when given a straightforward data set from a simple investigation.
- Describe a test of the effectiveness of a proposed solution to a technological design problem
- Determine which of two or three objects traveled fastest given either how far the objects traveled in the same time or the time for the objects to travel the same distance
- Explain that the total amount of matter stays the same when a solid is broken into small pieces



# CONTRASTING GROUPS STUDY

- Teachers took a Moodle-based training about using the PLDs
- Teachers made predictions about student performance on the MSP based on the PLDs, before the test was given
- Predictions were matched to actual performance of students on the MSP
- Data was shared with Standard Setting Committee

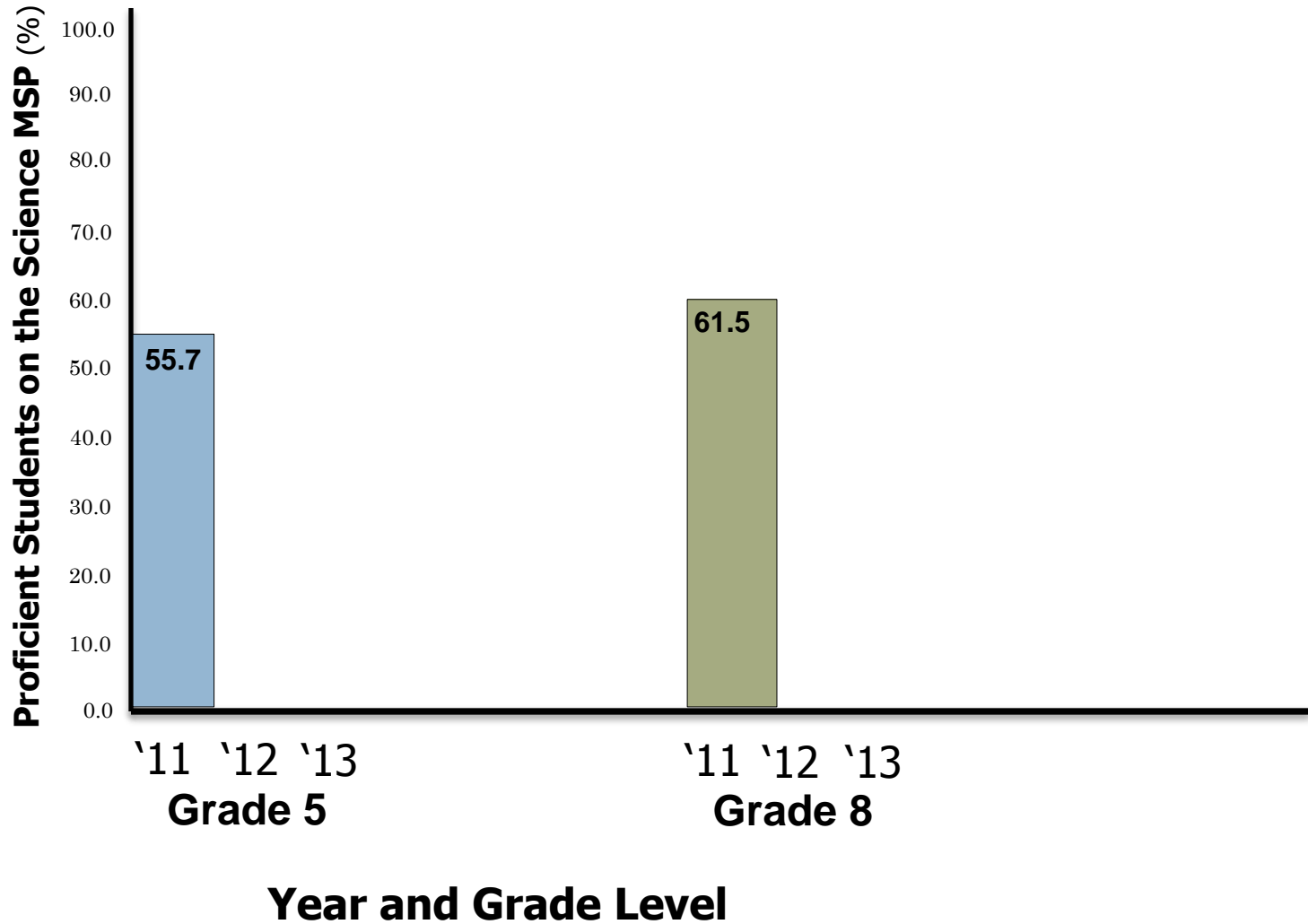


# STANDARD SETTING

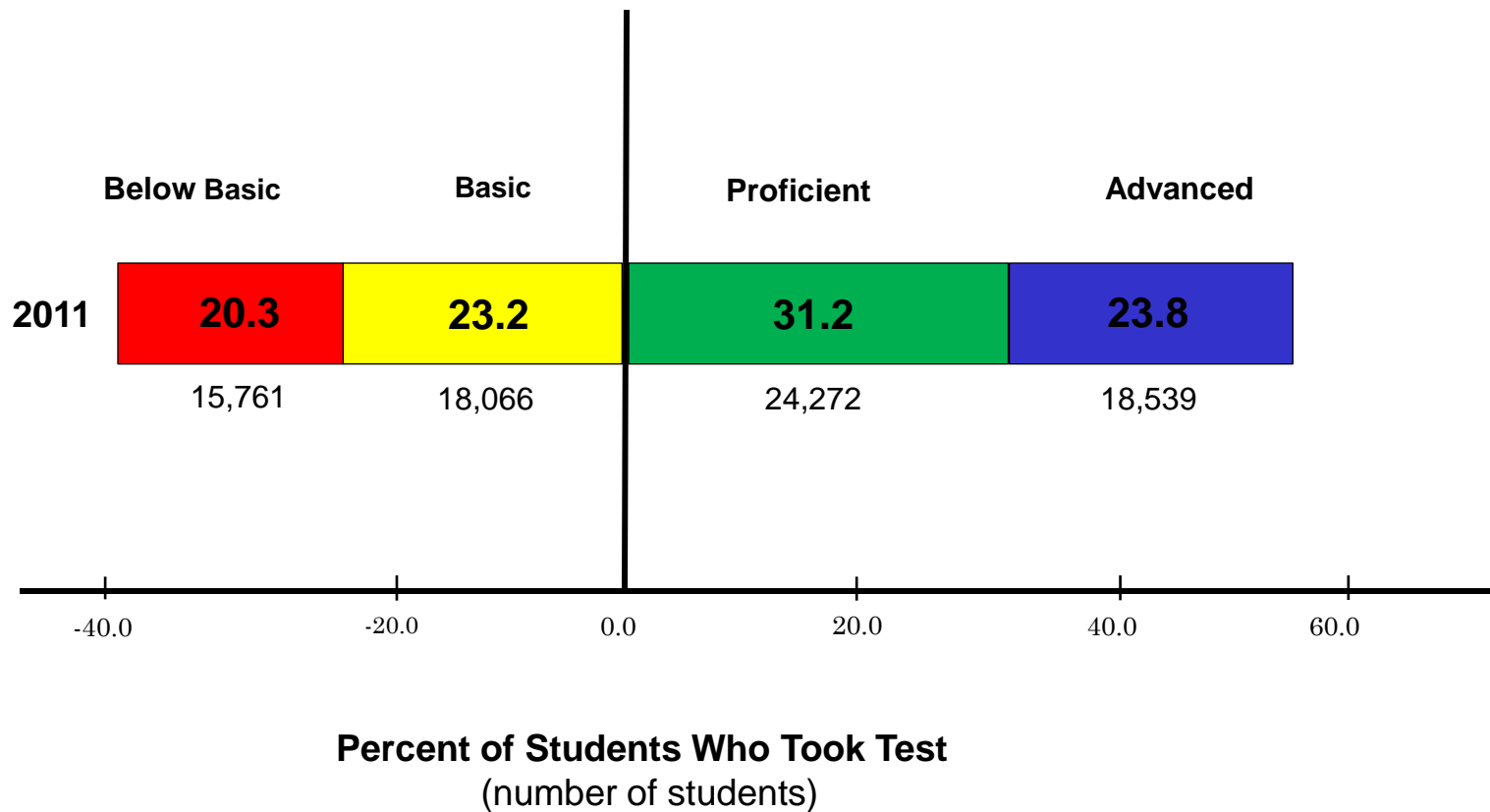
- Grade level committees
  - State-wide representation
  - Used “bookmark process” through three rounds to establish performance-level cut recommendations
- Articulation panel recommendation
- Policy panel recommendation
- State Board of Education set the achievement standard



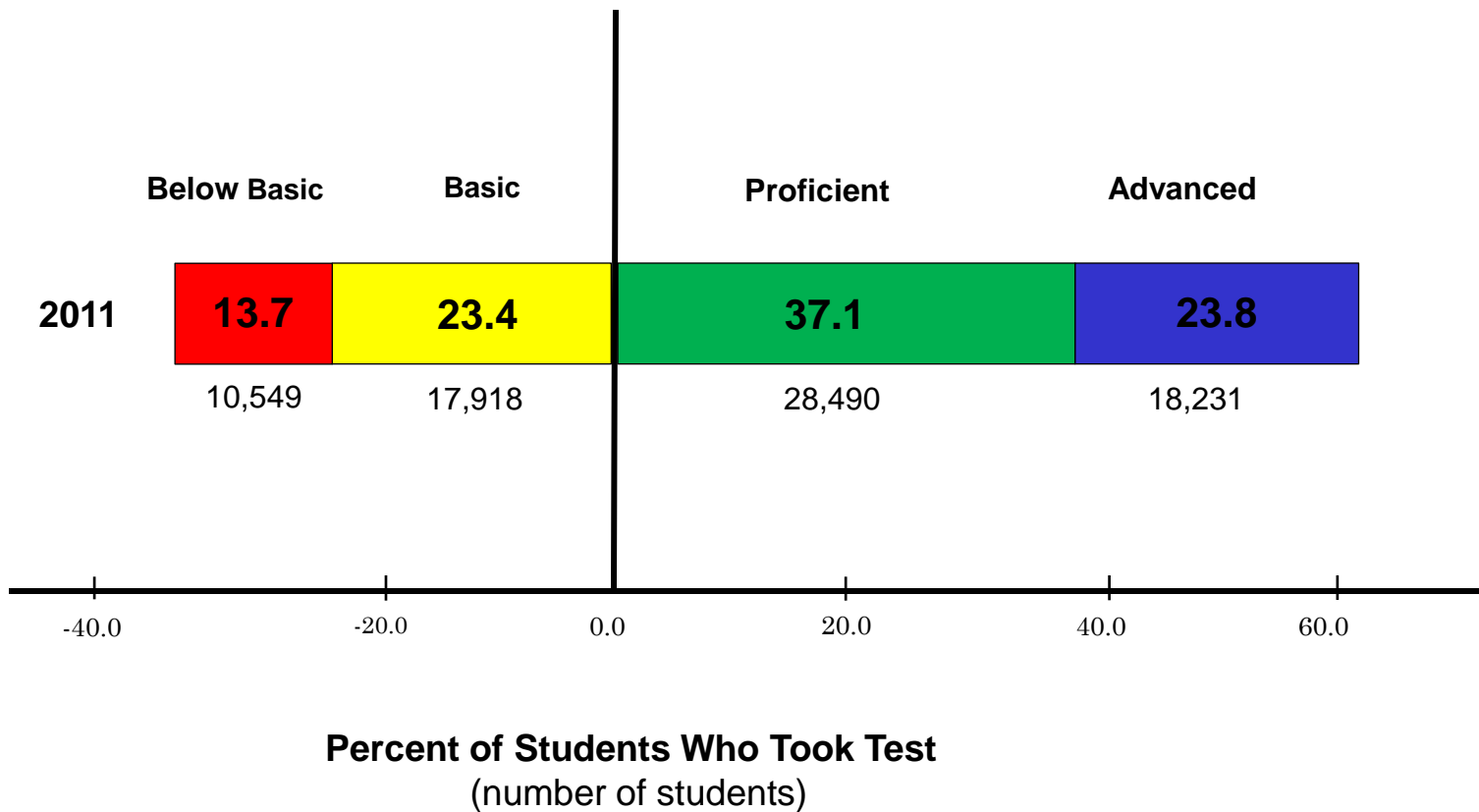
# STATE-WIDE RESULTS

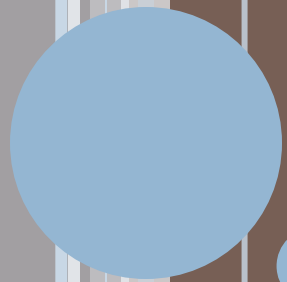


# GRADE 5: STUDENTS AT EACH PERFORMANCE LEVEL



# GRADE 8: STUDENTS AT EACH PERFORMANCE LEVEL





**NEW FOR 2012**

# FEW CHANGES

- Increase online testing participation
  - Need an increase from 2011 → 2012
  - 5<sup>th</sup> grade 19% → 50%
  - 8<sup>th</sup> grade 35% → 50%
- New online testing platform from DRC
  - Still have:
    - Demo
    - Practice test: Online Tools Training (OTT)
  - To be released in January



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# NATIONAL LEVEL EVENTS

# COMMON CORE STATE STANDARDS

For Mathematics and English Language Arts

- Adopted by Washington in 2011
- Planning for full operational testing in 2014-2015 school year
- SMARTER-Balanced Assessment Consortium



# COMMON CORE STATE STANDARDS

## For English Language Arts & Literacy in History/Social Studies, **Science, and Technical Subjects**

- “It is important to note that these Reading standards are meant to complement the specific content demands of the disciplines, not replace them.” pg. 60
- “In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.” pg. 65



# FRAMEWORK FOR K-12 SCIENCE EDUCATION: PRACTICES, CROSSCUTTING CONCEPTS, AND CORE IDEAS

- Released in July 2011
- Provides a coherent vision for science teaching and learning; research-based; inclusion of all students; 21<sup>st</sup> century skills
  - Scientific and Engineering Practices
  - Crosscutting Concepts
  - Core Disciplinary Ideas
- Washington's current *K-12 Science Learning Standards* have many similar elements



# NEXT GENERATION SCIENCE STANDARDS (NGSS)

- Based upon the Framework; lead by Achieve
- Washington is a lead state partner
- Multiple rounds of review by lead states, and then all states, until autumn 2012
- December 2012—Final document expected
- Washington will give serious consideration to adopting the NGSS when finalized
- Washington state efforts being lead by Ellen Ebert (ellen.ebert@k12.wa.us)
- [www.nextgenscience.org](http://www.nextgenscience.org)



# HOW DO WE PREPARE?

- Remember: Washington's current *K-12 Science Learning Standards* have many similar elements to the Framework, which is the basis of the NGSS
- Align curriculum, teaching and assessments to the *K-12 Science Learning Standards* (adopted in 2009)
- Pay particular attention to EALR 3 Application; this is where engineering practices are described in Washington's standards



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# RESOURCES AVAILABLE

# OSPI SCIENCE ASSESSMENT WEBPAGE

www.k12.wa.us

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Features: SCHOOL OF THE FUTURE DESIGN COMPETITION PLANNING SHOULD BEGIN NOW

What's New: Seattle's Madison Middle School Wins National Award

About OSPI: K-12 public education in Washington state.

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**Assessments**

Mathematics & Science Partnership

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Science Assessment  
(360) 729-6296  
Science@k12.wa.us

Science offices at OSPI provide guidance for the development and implementation of Washington learning standards and oversee assessments required by federal and state laws and regulations.

Learning Standards  
The state's K-12 Science Learning Standards describe what students should know and be able to do at each grade band.

Assessments  
Assessments are designed to help districts, schools, teachers, parents, and students determine the level of proficiency of a student's understanding of the science learning standards.

Mathematics and Science Partnerships  
Federal funding for MSPs is provided through the No Child Left Behind Act to help increase the content knowledge of mathematics and/or science teachers in their students.

www.k12.wa.us/science/assessments.aspx

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- [Performance Level Descriptors](#)

Assessing Science in Grades 3-8:  
**Measurements of Student Progress (MSP)**  
In spring 2010, the [Measurements of Student Progress \(MSP\)](#) replaced the WASL. The 2010 science MSP measured the level of progress that Washington students have achieved based on the 2005 GLCEs. In Spring 2011, the science MSP will test the 2009 Standards.

The science MSP will take place in a single day. It includes multiple choice, short answer and completion items.

Assessing Science in High School:  
**High School Proficiency Exam (HSPE)**  
In the 2009-2010 and 2010-11 school year, the new [High School Proficiency Exam \(HSPE\)](#) for grade 10 will assess the same Science standards as assessed on the WASL.

In the 2011-2012 school year, the High School Proficiency Exam in science will be replaced by a Biology End-of-Course exam, which will assess the new K-12 Science Standards (adopted June 2009).

Highlights  
[Science Shift Answer Item Templates](#)  
[SNT - Training and Events](#)

# SCIENCE ASSESSMENT RESOURCES



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Science

## Science

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## Science

### Educator Resources

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- [Grade 8](#)
- [Biology EOC](#)

#### [Science Short-Answer Item Templates](#) **UPDATED**

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#### OSPI Science Assessment presentation at Washington Educational Research Association (WERA) Conference, December 9-10, 2010

- [MSP](#) (PPT)

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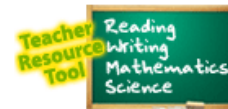
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# SHORT ANSWER ITEM TEMPLATES

## Science

### Science Short-Answer Item Templates

These Word documents contain templates for the question and the scoring rubric of common short-answer items on the Science MSP and Biology End-of-Course. The templates can be edited for use in classroom practice by incorporating content from any unit in a science curriculum.



### Inquiry Items

Conclusion:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>
New Procedure:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>
New Field Study:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>

### Application Items

Research & Explore:	N/A	<a href="#">Grade 8</a>	<a href="#">EOC</a>
Plan & Test:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	N/A
Redesign:	<a href="#">Grade 5</a>	<a href="#">Grade 8</a>	<a href="#">EOC</a>
Criteria & Constraints:	N/A	N/A	<a href="#">EOC</a>
Test Solution:	N/A	N/A	<a href="#">EOC</a>
Careers:	<a href="#">Grade 5</a>	N/A	N/A



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These documents include updates to the science assessment system for 2011, sample items to familiarize teachers and students with the item types on the assessments, and scoring information for educators.

- [Grade 5](#)
- [Grade 8](#)

#### [Teacher Resource Tool](#)

The Web-based teacher resource tool assists teachers with information about the test questions on the Reading, Writing, Mathematics, and Science State Assessments. Teachers can access descriptions of the test questions, the item specifications, student performance on each question, and sample questions for classroom instructions.



#### OSPI Science Assessment presentation at Washington Educational Research Association (WERA) Conference, December 9-10, 2010

- [MSP \(PPT\)](#)

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### Educator Resources

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- [Grade 5](#)
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- [Biology EOC](#)

#### [Science Short-Answer Item Templates](#) **UPDATED**

#### [Lessons Learned from Scoring Student Work](#) **NEW**

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# SCIENCE ASSESSMENT RESOURCES



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Science

## Science

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[Assessments](#)

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[Resources](#)

[Contact Information](#)

For more information:

Science Assessment  
(360) 725-6298  
[Science@kt12.wa.us](mailto:Science@kt12.wa.us)

## Assessments

Science Assessment involves two tests: the Measurements of Student Progress for grades 3-8, and the High School Proficiency Exam, explained below. These tests replace the WASL, which was the state's assessment until 2009.

- [Educator Resources](#)
- [Teacher Resource Tool](#)
- [Test and Item Specifications - NEW](#)
- [Released Items Documents](#)
- [Powerful Classroom Assessments](#)
- [Performance Level Descriptors](#)

### Assessing Science in Grades 3-8: Measurements of Student Progress (MSP)

In spring 2010, the [Measurements of Student Progress](#) (MSP) replaced the WASL. The 2010 science MSP measured the level of progress that Washington students have achieved based on the 2005 GLEs. In Spring 2011, the science MSP will test the 2009 Standards.

The science MSP will take place in a single day. It includes multiple choice, short answer and completion items.

## Highlights

[Science Short-Answer Item Templates](#)

[SALT - Training and Events](#)

# TEACHER RESOURCE TOOL

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2009-10 Web-based Resource Tool  
 Diagnostic information from the 2010 MSP/HSPE with resource materials

**Reading**  
**Writing**  
**Mathematics**  
**Science**

**Science**  
 This site provides:  
 • Diagnostic information from the 2010 science MSP/HSPE  
 • Test and Item Specifications  
 • Powerful Classroom Assessment (PCA)

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 Writing  
 Mathematics  
 Science

Please provide feedback at:  
 teachertool@k12.wa.us  
 (360) 725-4974

2009-10 Web-based Resource Tool  
 Diagnostic information from the 2010 MSP/HSPE with resource materials

Reading Writing Mathematics Science

**2010 Science Assessment  
 Grade 8**

Grade Year: Select  
 Select  
 2009-10  
 2008-09  
 2007-08

The eight 2008-09 Science Assessment consisted of:  
 • 2 inquiry scenarios  
 • 4 system scenarios  
 • 4 stand alone items

There were 30 multiple choice items (1 point) and 5 short answer items (2 points) for a total of 40 points.  
 The points were equally balanced between physical, Earth/space, and living systems.

Inquiry in Science				
Scenario Description	Item Description	Item Type	Cognitive Complexity	State Performance
Investigation into a physical system	Which variable was the manipulated (changed) variable in the investigation?	MC	***	79.5%
	Which variable was the responding (dependent) variable in the investigation?	MC	***	74.6%

# TEACHER RESOURCE TOOL: TO BE UPDATED WITH 2011 TESTS SOON

Grade    
 Year










## 2010 Science Assessment Grade 8

The eighth grade 2010 Science Assessment consisted of

- 2 inquiry scenarios
- 4 system scenarios
- 4 stand alone items

There were 30 multiple choice items (1 point) and 5 short answer items (2 points) for a total of 40 points.

The points were equally balanced between physical, Earth/space, and living systems.

Inquiry in Science				
Scenario Description	Item Description	Item Type **	Cognitive Complexity ***	State Performance +
<b>Investigation into a physical system</b>	Which variable was the manipulated (changed) variable in the investigation?	MC		79.5%
	Which variable was the responding (dependent) variable in the investigation?	MC		74.6%
	Explain what could have caused different results in similar investigations.	SA		.54
	How does a given type of wave travel from one point to another?	MC		56.1%
<b>Investigation into an earth/space system</b>	Which variable was the manipulated (changed) variable in the investigation?	MC		84.4%
	Which variable was the responding (dependent) variable in the investigation?	MC		65.7%
	Write a conclusion to the investigation.	SA		1.01
	Explain the conditions that may have caused different results in similar investigations.	SA		.49
	How does energy change during a given event?	MC		47.3%



\* Scenario Description  
[\(view detail description\)](#)

\*\* Item Type

MC: Multiple Choice item  
(1 point)

SA: Short Answer item  
(2 points)

\*\*\* Cognitive Complexity Levels

 = Conceptual Understanding  
 = Application of Concept

[\(view detail description\)](#)

+ State Performance  
[\(view detail description\)](#)



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## Highlights

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# UPCOMING EVENTS:

- Scenario and Item Writing Workshop
  - February 7-10, 2012; grade 5 and Biology EOC
  - February 13-16, 2012; grade 8 and Biology EOC
- Content Review
  - April 9-13, 2012; grades 5 and 8
  - April 16-20 & 23-27, 2012; Biology EOC
- Performance Level Descriptor Training
  - February 1- April 27, 2012; Biology EOC
- Contrasting Groups Study
  - April 9-27, 2012; Biology EOC



# QUESTIONS?

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