

# How Do We Know WHAT They Know? 3 Essentials to Powerful Assessment

2014 NCTM Regional Conference  
Richmond, VA

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# Goals for today:

- Set purpose for assessment
- Review 3 essentials for assessment.
- Develop awareness of VDOE resources for powerful assessment
  - All VDOE slides for this presentation used with permission.



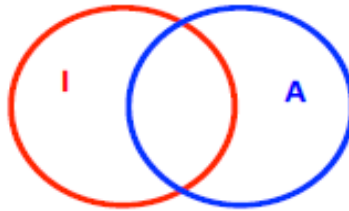
Record one of the graphics that resonates with you, then discuss with your group.

How should instruction and assessment be related?

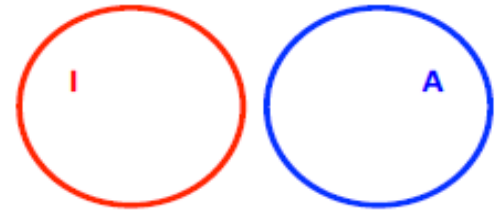
INSTRUCTION 

ASSESSMENT 

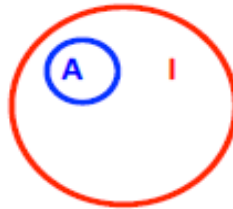
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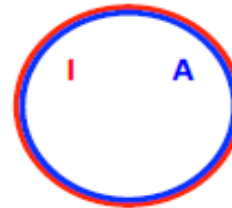
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4



# It's All about Assessment



$$\mathbf{C = I = A}$$

- C
- CL

- C
- CL

- C
- CL

$$\therefore \mathbf{C = I}$$

$$\mathbf{I = A}$$

$$\mathbf{A = C}$$

# 2013 –Modifying Instructional Resources to Promote Problem Solving and Critical Thinking

Virginia Department of Education  
Fall 2013 Mathematics Standards of Learning Institutes

Facilitator's Guide  
Grade Band 3-5

### 2013 Mathematics SOL Institutes

The purpose of the 2013 Mathematics SOL Institutes is to provide teachers with professional development focused on the relationship between curriculum, instruction, and assessment, by targeting the processes of analysis and modification of existing resources to match student learning expectations and promote problem solving.

### Introduction and Instructions

This grade-band professional development will be comprised of two components:

- Module 1 Parts 1-4: Analyzing and modifying assessments – Participants will compare expectations of SOL and Curriculum Framework to an assessment and modify it to meet intended expectations.
- Module 2 Parts 1-3: Modifying mathematical tasks to promote problem solving – Participants will modify existing mathematical tasks to emphasize the use of process skills and problem solving.

### Virginia's Process Goals for Students

#### SOL Vertical Articulation Technical Assistance Documents

- [Grades K-3](#)
- [Grades 3-5](#)
- [Grades 5-8](#)
- [Algebra](#)
- [Geometry](#)

The product of the 2013 Mathematics SOL Institutes is a set of online professional development modules designed to be used by a group of teachers of a specific grade level or course. Modifications could be made to adapt the professional development for more than one grade level/course or for large groups. Each group of teachers should select a facilitator for which this Facilitator's Guide was written. Facilitators should review the activities and handouts prior to facilitating this professional development.

Approximate Time	Facilitator Instructions	Materials
<b>30 minutes total</b>	<b>Module 1 Part 1: Analysis of Assessments</b>	
15 minutes	1) Select and distribute the appropriate assessment for your whole group. 2) Ask participants to complete the assessment individually. While working, participants should be thinking about whether or not it is a "good" assessment and why.	<ul style="list-style-type: none"> <li>• Mathematics Assessment (select the assessment for your course)                             <ul style="list-style-type: none"> <li>- <a href="#">Grade 3</a></li> <li>- <a href="#">Grade 4</a></li> <li>- <a href="#">Grade 5</a></li> </ul> </li> <li>• <a href="#">Assessment Analysis Guiding Questions</a></li> </ul>
15 minutes	3) Have participants discuss their conclusions with a partner or small group. 4) Have small groups share and record their conclusions and justifications with the whole group. 5) View the Assessment Analysis Guiding Questions document and discuss similarities	

Mathematical Problem Solving

Mathematical Communication

Mathematical Reasoning

Mathematical Connections

Mathematical Representations

## Assessment Analysis Guiding Questions

### SOL ALIGNMENT

- Does the assessment assess the standard and targeted components of the Essential Knowledge and Skills in the Curriculum Framework?
- Does the assessment reflect the requirements of the verbs found in the Curriculum Framework?
- Did instruction go beyond the standard?
  - If so, does the assessment reflect your instruction?
  - If not, does the assessment adhere to the parameters of the SOL?

### LEVEL OF COGNITIVE DEMAND

- Does the assessment have an appropriate variety of questions requiring various levels of cognitive demand?
- Does the assessment require students to explain and justify?

### FORMAT

- Does the assessment provide various ways for students to demonstrate understanding (open response, multiple

# Learning Outcomes

Participants will be able to

- analyze assessments
- modify existing assessments to raise the level of cognitive demand
- develop strategies to create valid and reliable assessments



# Assessment Analysis

## Sample Assessment

- Is this a good assessment?
  - Complete the assessment individually and then discuss with a partner.
- Be able to justify your conclusions as a table.
- **WHAT makes a good assessment?**



# Assessment Analysis Guiding Questions

- SOL Alignment
  - Does the assessment assess the standard?
  - Does the assessment assess targeted components of the Essential Knowledge and Skills found in the Curriculum Framework?
  - Does the assessment reflect the requirements of the verbs found in the Curriculum Framework?



# Table of Specifications

A *blueprint* for what should be included (and should not be included) on an assessment.





# Steps to Create a Table of Specifications

*Step #1* – **Unpack** objectives for...

- Content
- Cognitive level.

*Step #2* – Plot the **intersection** between the content and level of cognitive demand for each learning objective on a matrix.

*Step #3* – If helpful, indicate the **relative emphasis** of each intersection on the chart.

# Unpacking Objectives

The student will recognize and demonstrate the meaning of equality in an equation.

knowledge

application



# Example TOS

Benchmark Assessment Table of Specifications:  
Aligning Content and Cognition

Content:	Cognitive Levels					
ALGEBRA I STANDARD A.1 The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables.	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
<b>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</b>						
<ul style="list-style-type: none"> <li>Translate verbal quantitative situations into algebraic expressions and vice versa.</li> </ul>						
<ul style="list-style-type: none"> <li>Model real-world situations with algebraic expressions in a variety of representations (concrete, pictorial, symbolic, verbal).</li> </ul>						
<ul style="list-style-type: none"> <li>Evaluate algebraic expressions for a given replacement set to include rational numbers.</li> </ul>						
<ul style="list-style-type: none"> <li>Evaluate expressions that contain absolute value, square roots, and cube roots.</li> </ul>						





# Three Practical Uses of a Table of Specifications

1. To create an assessment.
2. To critique and improve an existing assessment.
3. To create a unit assessment plan.



# Assessment Analysis Guiding Questions

- Level of Cognitive Demand
  - Does the assessment have an appropriate variety of questions requiring various levels of cognitive demand?
  - Does the assessment require students to explain, justify, and use multiple representations?
- Format
  - Does the assessment provide various ways for students to demonstrate understanding? (open response, multiple choice, fill-in-the-blank, shading, sorting, etc)



# Level of Cognitive Demand in Activities

The owner of a Doberman Pinscher wants to create a dog pen with 50 feet of bendable fencing materials that he has available. What would be the dimensions of a pen with the greatest area?

**High**

A rectangle has a length of 6 and a perimeter of  $20\frac{1}{3}$ . Determine the width and explain your solution method.

**Med**

A rectangle has a length of 6 and a perimeter of 20. Determine the width and explain your solution method.

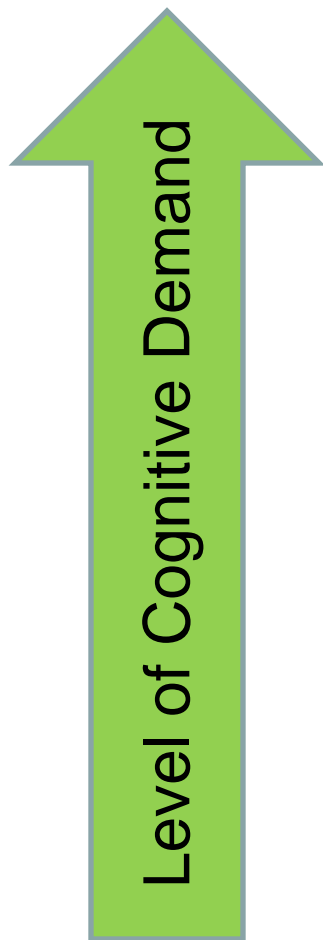
**Med**

A rectangle has a length of 6 and width of 4. Determine the perimeter.

**Low**

Level of Cognitive Demand

# Level of Cognitive Demand in Activities



Write a real-world problem using this expression.

Is the value of this expression more or less than 1? How do you know?

Simplify.

$$3\frac{1}{4} - 2\frac{3}{8}$$



# Assessment Analysis

## Small Group discussion

- Identify whether or not each problem is aligned to the intended SOL, using the Curriculum Framework to justify.
  - and -
- Identify the level of cognitive demand of each problem as “low,” “medium,” or “high.” Be able to justify your groups’ consensus.

# Assessment Analysis – Level of Cognitive Demand

## Discussion



<b>Problem:</b>	<b>Alignment to standard:</b> Yes/no	<b>Level of cognitive demand:</b> Low/medium/not aligned	<b>Answer and EKS correlation:</b>
1	Yes	Medium	$\frac{1}{4}$
2	Yes	Low	$\frac{5}{8}$ mi
3	Yes	Low	$\frac{7}{12}$
4	No		d; it is not a practical problem
5	Yes	Low	$\frac{1}{2}$ yd
6	Yes	Low	$\frac{11}{12}$
7	No		c; it is not a practical problem
8	Yes	Medium	First and second situation



# Professional Development

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## MATHEMATICS

### PROFESSIONAL DEVELOPMENT RESOURCES

VDOE provides targeted professional development through Mathematics Standards of Learning (SOL) Institutes. Since 2009, the institutes have:

- outlined the content standard changes from the 2001 Mathematics SOL to the 2009 Mathematics SOL (2009);
- supported district leaders and teachers in the implementation of the 2009 Mathematics SOL (2009, 2010, 2011, 2012);
- provided training in the vertical progression of content and pedagogy (2010);
- provided instructional guidance in content areas of greatest challenge (2010);
- provided professional development resources focused on facilitating students' mathematical understanding through problem solving, communication, and reasoning (2011); and provided professional development resources focused on the use of formative assessment resources to drive instructional decisions (2012).

The 2011 Mathematics SOL Institutes continue to support implementation of the 2009 Mathematics Standards of Learning (SOL), framed by the five goals for students becoming mathematical problem solvers, communicating mathematically, reasoning mathematically, making mathematical connections, and using mathematical representations to model and interpret practical situations.

### Mathematics SOL Institutes

[Expand All](#) | [Collapse All](#)

+ 2014

+ 2013 – [Modifying Resources to Promote Problem Solving and Critical Thinking](#)

+ 2012 – [Using Formative Assessment Resources to Drive Instructional Decisions](#)

+ 2011 – [Facilitating Students' Mathematical Understanding through a Focus on Process Goals for Students](#)

+ 2010 – [Implementing New Content and Increased Rigor of the 2009 Mathematics Standards of Learning](#)

+ 2009 – [Overview of Changes from the 2001 to 2009 Mathematics Standards of Learning](#)

#### STANDARDS OF LEARNING

[Mathematics K-12](#)

Includes:

- [Curriculum Frameworks](#)
- [Enhanced Scope & Sequence Guides](#)
- [Test Blueprints](#)
- [Released Tests and](#)
- [Practice Items](#)



# Did we meet our learning goals?

- Discussed purpose for assessment
- Reviewed 3 essentials for assessment:
  - Alignment
  - Cognitive Level
  - Format
- Developed awareness of VDOE Resources to be used in creating powerful assessments

Hope you find MORE Great Math at YOUR doorstep!