Test and Item Specifications Guide

2016–17 Science Assessments

Overview of Test & Item Specs

- Test Structure, Format, and Scoring
- Test alignment to OAS for Science
- Test Blueprint
- Depth of Knowledge (DOK)
- Universal Test Design
- Test Administration Details
- Item Specifications

Purpose

- The item specifications provide guidelines and suggestions for the type of content to be included in test items, but they do not provide an exhaustive list of what can be included.

- The item specifications are intended to be used by multiple audiences: Oklahoma Educators, OSDE staff, and testing vendors.

Important Note

The material in the test and item specifications should not be used as a curriculum guide.

Science Test Development

- Oklahoma educators reviewed and modified the blueprint for the assessment.
- Test and item specifications were created by educators across Oklahoma using classroom examples to create question model stems for the assessment.
- Students throughout Oklahoma provided feedback on item design during cognitive labs.
- Science educators across Oklahoma wrote field test items.
- ELL specialists, special education teachers, and science educators accepted, altered or rejected field test items as they deemed appropriate.
- After field testing, items will be accepted or rejected based on performance data

Test Format

- The new format was developed using input from science educators, ELL specialists, special education teachers and students across Oklahoma.
- The test and item specifications document describes the **new cluster** format for the Oklahoma Core Curriculum Tests for Science.
- Grade 5 Science will include multiple choice items only.
- Grade 8 Science and Biology will include multiple choice, technology-enhanced items and paired multiple choice items.

Cluster Format

- A **cluster stimulus** consists of the passages, graphs, models, figures, diagrams, data tables, etc. that students must read and examine in order to respond to the items in the cluster.
- The **cluster items** within each cluster must work together cohesively to provide a valid measure of the performance expectation/standard being assessed.

New Features

- Hyperlinks were inserted into the test and item specifications documents in order to provide information about:
  - Depth of knowledge descriptions
  - Curriculum resources used to inform test and item specification design, such as the Oklahoma Science Frameworks
  - Student misconceptions
  - Scientific journals, research, and topics for specific performance expectations

Depth of Knowledge (DOK)

- Items within a cluster are structured to assess a range of skill and knowledge applications within a performance expectation/standard.
  - Level 1: Recall and Reproduction
  - Level 2: Skills and Concepts
  - Level 3: Strategic Thinking

- Many cognitive processes and their associated action verbs can be classified at different DOK levels depending on the complexity of what students are expected to do.

DOK: Cognitive Process Example

Example of Cognitive Process Across Various DOK Levels			
Cognitive Process: Understanding	**DOK 1** • Solve a one-step problem • Represent simple relationships in words, pictures, or symbols	**DOK 2** • Specify and explain relationships (e.g., non-examples/ examples; cause-effect) • Make and record observations • Make basic inferences or logical predictions from data/ observations • Use models/diagrams to represent or explain concepts	**DOK 3** • Use concepts to solve non-routine problems • Explain, generalize, or connect ideas using supporting evidence • Make and justify claims • Explain thinking when more than one response is possible • Explain phenomena in terms of concepts

References:

Webb Science Levels of Depth of Knowledge: http://www.newleaders.org/wp-content/uploads/All-content-areas-DOK-levels-32802.pdf

Hess Cognitive Rigor Matrix, Science: http://static.pdesas.org/content/documents/M2-Activity_2_Handout.pdf

Layout of Item Specifications

The front matter of each Test & Item Spec. document provides a key to the layout.

Overview of Layout of Item Specifications by Performance Expectation

For each OASS performance expectation, the item specifications are organized in the following way:

Core Idea Category: Performance Expectation Code[1] **Performance Expectation Code and Text[2]**		
OASS Clarification Statement: [3]		
OASS Assessment Boundary: [4]		
Science & Engineering Practice: [5]	**Disciplinary Core Idea:**	**Crosscutting Concept:**
In Lay Terms: [6]		
Cluster Clarifications: [7]		
Cluster Stimulus Attributes: [8] • *Typical stimulus elements:* • *Possible contexts:* • *Content and evidence to be included:*		

[1] *Core idea category and code for each performance expectation from the OASS (e.g., **Biological Unity and Diversity, HS-LS4-5**)*

[2] *Coding and text of the performance expectation from the OASS*

[3] *Clarification statement for the performance expectation from the OASS*

[4] *Assessment boundary for the performance expectation from the OASS*

[5] *Science & Engineering Practice, Disciplinary Core Idea, and Crosscutting Concept that underpin the performance expectation from the OASS*

[6] *Description of the basic meaning and intent of the performance expectation in easily understandable terms*

[7] *Additional details, clarifications, and content*

New Features: Detailed model stems

Detailed model stems were created by Oklahoma educators to provide guidance on question design to test developers.

Model Item Descriptions for HS-LS1-1:

#	Item Type	DOK	Model Stem (Items ask students to...)	Response Characteristics*
1	MC	1 or 2 per complexity	Explain cause-effect relationships or relationships between structures/ components in a protein synthesis example. [Which statement explains the relationship between genes and hemoglobin proteins?]	Key may focus on genes containing the nucleotide sequences that determine the protein structure versus containing parts that are used to build the protein, activating parts of the protein, or breaking down to produce the protein. Distractors may include statements that do not sufficiently explain, statements that explain alternate phenomena, or statements lacking critical conceptual connections.

Student Misconceptions (example)

- **Matter and Its Interactions: MS–PS1–5 (Grade 8)**
- http://assessment.aaas.org/topics/SC#/
  - The atoms of the reactants of a chemical reaction are transformed into other atoms.
  - New atoms are created during chemical reactions.
  - Atoms can be destroyed during a chemical reaction.
  - Everything that exists (including light, energy) is made of matter.
  - Matter does not include gases or liquids; gases are weightless.
  - If matter is continually subdivided, the pieces will eventually weigh nothing.

Oklahoma Science Frameworks

- The following link may be useful in helping teachers translate standards into classroom practice.
  - http://sde.ok.gov/sde/science-implementation/science-frameworks
  - The Frameworks **do not** represent a directive to teachers, schools or districts for classroom practice.
  - They **do** represent ways Oklahoma educators think about translating standards into classroom instruction.

Future Professional Development

The OSDE plans to provide training opportunities beginning in Summer 2016.

Questions:

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