
# Oklahoma School Testing Program

# 2009 Technical Report

# Achieving Classroom Excellence

# End-of-Instruction

# Assessments

Submitted to
The Oklahoma State Department of Education
October, 2009

PEARSON

## Executive Summary

### Introduction

The Oklahoma School Testing Program (OSTP) is a state-wide assessment program which includes the End-of-Instruction (EOI) assessments where students who complete an area of instruction must also take the corresponding state-wide, standardized assessment. The subjects included within this testing program are Algebra I, Algebra II, Geometry, Biology I, English II, English III, and U.S. History. Each test is a measure of a student's knowledge relative to the *Priority Academic Student Skills (PASS)* Oklahoma's content standards. These tests are part of the Achieving Classroom Excellence (ACE) legislation passed in 2005 as amended in 2006, which outlines the curriculum, the competencies, and the testing requirements for students to receive a high school diploma from the state of Oklahoma. Algebra I, English II, Biology I, and U.S. History were existing tests in the program with Algebra II, Geometry, and English III added as operational tests for the 2007-2008 testing cycle. These End-of-Instruction tests are administered in Winter, Trimester, Spring, and Summer. The OSTP was established to improve academic achievement for all Oklahoma students and it also meets the requirements of the No Child Left Behind Act (NCLB) since its introduction by the Federal Government in 2001. In 2006, Pearson was contracted by the Oklahoma State Department of Education (SDE) to develop, administer, and maintain the OSTP-ACE EOI tests. This report provides technical details of work accomplished through the end of 2009 on these tests.

### Purpose

The purpose of this 2009 OSTP Technical Report is to provide objective information regarding technical aspects of the OSTP-ACE EOI assessments. This volume is intended to be one source of information to Oklahoma K-12 educational stakeholders (including testing coordinators, educators, parents, and other interested citizens) about the development, implementation, scoring, and technical attributes of the OSTP-ACE EOI assessments. Other sources of information regarding the OSTP-ACE EOI tests, administered mostly online, with some paper formatted tests available, include the administration manuals, interpretation manuals, student, teacher, and parent guides, implementation material, and training materials.

The information provided here fulfills legal, professional, and scientific guidelines (AERA, APA, NCME, 1999) for technical reports of large-scale educational assessments and is intended for use by qualified users within schools who use the OSTP-ACE EOI assessments and interpret the results. Specifically, information was selected for inclusion in this report based on NCLB requirements and the following Standards for Educational and Psychological Testing:

- Standards 6.1 – 6.15 Supporting Documentation for Tests
- Standards 10.1—10.12 Testing Individuals with Disabilities
- Standards13.1—13.19 Educational Testing and Assessment

This technical report provides accurate, complete, current, and clear documentation of the OSTP-ACE EOI development methods, data analysis, and results as is appropriate for use

by qualified users and technical experts. Section 1 provides an overview of the test design, test content, and content standards. Section 2 provides summary information about the test administration. Section 3 details the classical item analyses and reliability results, and Section 4 details the calibration, equating, scaling analyses, and results. Section 5 provides the results of the classification accuracy and classifications studies and Section 6 overviews the procedures and results of the standard setting completed for Biology I, English II, and U.S. History. Finally, Section 7 provides higher-level summaries of all the tests included in the OSTP-ACE EOI testing program.

Information provided in this report presents valuable information about the OSTP-ACE EOI assessments regarding:

1. Content standards
2. Content of the tests;
3. Test form design;
4. Administration of the tests;
5. Identification of ineffective items;
6. Detection of item bias;
7. Reliability of the tests;
8. Calibration of the tests;
9. Equating of tests;
10. Scaling and scoring of the tests;
11. Decision accuracy and classification; and
12. Setting performance standard cut scores.

Each of these facets in the OSTP-ACE EOI assessments development and use cycle is critical to validity of test scores and interpretation of results. This technical report covers all of these topics for the 2008-2009 testing year.

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# Section 1
## Overview of the Oklahoma School Testing Program (OSTP) Achieving Classroom Excellence (ACE) End-of-Instruction (EOI) Assessments

### 1.1 Overview of the OSTP ACE EOI Assessments

The Achieving Classroom Excellence End-of-Instruction (hereafter, ACE and EOI, respectively) is a state-mandated, secondary level, criterion-referenced testing program used to assess student proficiency at the End-of-Instruction in Algebra I, Algebra II, Geometry, Biology I, English II, English III, and U.S. History. The Oklahoma ACE EOI tests are used to assess student proficiency relative to a specific set of academic skills established by committees of Oklahoma educators. This special set of skills is referred to as the *Priority Academic Student Skills,* or *PASS*, which represents skills that students are expected to master by the End-of-Instruction for each subject. All secondary level students, who have completed instruction in Algebra I, Algebra II, Geometry, Biology I, English II, English III, and U.S. History, must take the corresponding Oklahoma ACE EOI tests in order to graduate from high school. The Spring 2009 administration was the first administration with graduation requirements attached to them for the incoming freshman students. For these students, and future students, in order to graduate with a high school diploma from the State of Oklahoma, students must score proficient or above in Algebra I and English II, and two of the following five: Algebra II, Biology I, English III, Geometry, or U.S. History. Students are permitted to retake these tests. All *PASS* standards and objectives are measured by multiple-choice items except for English II and English III, which include one writing prompt. The Winter/Trimester 2008-2009 and Spring 2009 OSTP-ACE EOI Algebra I, Algebra II, Geometry, Biology I, English II, English III, and U.S. History assessments were developed by Pearson in collaboration with the Oklahoma State Department of Education (SDE) and administered by SDE.

Pearson scored, equated, and scaled the assessments. There was one form administered in Winter/Trimester 2008-2009 for each subject. In the Spring 2009 administration, there were eleven forms in Algebra I, Algebra II, Biology I, and Geometry, thirteen forms in English II, sixteen forms in English III, and fourteen forms in U.S. History. Each test form was embedded with field test items to enhance the item pool. In addition, an Equivalent form from one of the previous administrations was designated as a breach form and a Braille test was built for each subject using the Winter/Trimester 2008-2009 test forms and then used again in the Spring 2009 administration. A student could receive an Equivalent test for various reasons, including becoming ill during test administration or experiencing some kind of security breach. The State Department of Education Office of Accountability and Assessments determines eligibility for an Equivalent test on a case-by-case basis. These students' responses were scored and reported using the scoring tables from the previous administration.

### 1.1.a Purpose

Pearson developed the 2008-2009 OSTP-ACE EOI assessments to measure the Oklahoma content standards listed in the following pages below. The objectives associated with content and/or process standards tested are provided in Appendix A.

### 1.1.b PASS Content Standards

The Oklahoma Content Standards by subject appears in Table 1.1.

Table 1.1. Oklahoma Content Standards by Subject

| | |
|---|---|
| **Algebra I** | |
| Standard 1. | Number Systems and Algebraic Operations |
| Standard 2. | Relations and Functions |
| Standard 3. | Data Analysis, Probability & Statistics |
| **Algebra II** | |
| Standard 1. | Number Sense and Algebraic Operations |
| Standard 2. | Relations and Functions |
| Standard 3. | Data Analysis, Probability, & Statistics |
| **Geometry** | |
| Standard 1. | Logical Reasoning |
| Standard 2. | Properties of 2-Dimensional Figures |
| Standard 3. | Triangles and Trigonometric Ratios |
| Standard 4. | Properties of 3-Dimensional Figures |
| Standard 5. | Coordinate Geometry |
| **Biology I** | |
| PASS Process/Inquiry Standards and Objectives | |
| Process 1. | Observe and Measure |
| Process 2. | Classify |
| Process 3. | Experiment |
| Process 4. | Interpret and Communicate |
| Process 5. | Model |
| PASS Content Standards | |
| Standard 1. | The Cell |
| Standard 2. | The Molecular Basis of Heredity |
| Standard 3. | Biological Diversity |
| Standard 4. | The Interdependence of Organisms |
| Standard 5. | Matter/Energy/Organization in Living Systems |
| Standard 6. | The Behavior of Organisms |

Table 1.1 cont. Oklahoma Content Standards by Subject

| | |
|---|---|
| **English II** | |
| Reading/Literature: | |
| Standard 1. | Vocabulary |
| Standard 2. | Comprehension |
| Standard 3. | Literature |
| Standard 4. | Research and Information |
| Writing/Grammar/Usage and Mechanics: | |
| Standard 1/2. | Writing |
| Standard 3. | Grammar/Usage and Mechanics |
| **English III** | |
| Reading/Literature: | |
| Standard 1. | Vocabulary |
| Standard 2. | Comprehension |
| Standard 3. | Literature |
| Standard 4. | Research and Information |
| Writing/Grammar/Usage and Mechanics: | |
| Standard 1/2. | Writing |
| Standard 3. | Grammar/Usage and Mechanics |
| **U.S. History** | |
| Standard 1. | Social Studies Process Skills |
| Standard 2. | Civil War/Reconstruction Era |
| Standard 3. | Immigration/Westward Movement |
| Standard 4. | Industrial Revolution |
| Standard 5. | Imperialism/Isolationism |
| Standard 6. | Twenties Culture/Change |
| Standard 7. | Great Depression |
| Standard 8. | World War II |
| Standard 9. | Post-War Foreign Policy |
| Standard 10. | Post-War Domestic Policy |

## 1.2 Summary of Test Development and Content Validity

In order to obtain adequate content validity of the Oklahoma ACE/EOI tests, Pearson content experts closely study the *Oklahoma Priority Academic Student Skills (PASS)* and work with Oklahoma content area specialists, teachers, and assessment experts, to develop a pool of items that measured Oklahoma's Assessment Frameworks (*PASS*) for each subject. Once the need for field test items was determined, based on the availability of items for future test construction, a pool of items that measured Oklahoma's *PASS* in each subject was developed. These items were developed under universal design guidelines set by the SDE and carefully reviewed and discussed by Content and Bias/Sensitivity Review Committees to evaluate not only content validity, but also plain language, and the quality and appropriateness of the items. These committees were comprised of Oklahoma teachers and SDE staff. The committees' recommendations were

used to select and/or revise items from the item pool used to construct the field test portions of the Winter/Trimester 2008-2009 and the Spring 2009 assessments.

### 1.2.a Aligning Test to *PASS* Content Standards

In addition to the test Blueprints provided by SDE, Table 1.2 describes four criteria for test alignment with the *PASS* Standards and Objectives.

Table 1.2. Criteria for Aligning the Test with *PASS* Standards and Objectives.

| | |
|---|---|
| **1. Categorical Concurrence** | The test is constructed so that there are at least six items measuring each *PASS* standard with the content category consistent with the related standard. The number of items, six, is based on estimating the number of items that could produce a reasonably reliable estimate of a student's mastery of the content measured. |
| **2. Range-of-Knowledge** | The test is constructed so that at least 50% of the objectives for a *PASS* standard have at least one corresponding assessment items. |
| **3. Balance-of-Representation** | The test is constructed according to the Alignment Blueprint which reflects the degree of representation given on the test to each *PASS* standard and objective in terms of the percent of total test items measuring each standard and the number of test items measuring each objective. |
| **4. Source-of-Challenge** | Each test item is constructed in such a way that the major cognitive demand comes directly from the targeted *PASS* skill or concept being assessed, not from specialized knowledge or cultural background that the test-taker may bring to the testing situation. |

### 1.2.b Item Pool Development and Selection

The source of the operational items included a pool of previously field-tested or operationally administered items ranging from the Spring 2005 to the Spring 2008 administration for Algebra I, Biology I, English II, and U.S. History and from the census Spring 2007 field test to the Spring 2008 embedded field test for Algebra II, Geometry, and English III. Note that the items were calibrated live using data from the operational administration in order to estimate parameters for these items.

The ACE EOI tests for the Winter/Trimester 2008-2009 and Spring 2009 cycle were built by including previously field tested and operational items around the anchor sets. In order to equate the forms across years, a set of field test and operational items from the Spring 2008 administration served as anchors for Winter/Trimester 2008-2009 and Spring 2009 administrations. Equating is necessary to account for slight year-to-year differences in test difficulty and to maintain comparability across years. Details of the equating procedures applied are provided in a later section in this document. Content experts also targeted the percentage of items measuring various Depth of Knowledge (DOK) levels for assembling the tests. Table 1.3 provides the DOK level percentages for the Winter/Trimester 2008-2009 and Spring 2009 operational assessments. Notice that the actual percentage is close but not exactly within the target percentages in the operational test for some content areas. These targets are expected to be met in future tests.

Table 1.3. Percentage of Items in Depth of Knowledge Levels

| | DOK | Target | Actual | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Test Session** | **Level** | **DOK** | **Alg. I** | **Alg. II** | **Geo.** | **Bio. I** | **Eng. II** | **Eng. III** | **U.S. His.** |
| Winter/ | 1 | 15%-20% | 20.00% | 16.36% | 21.82% | 20.00% | 4.92% | 12.70% | 21.67% |
| Trimester | 2 | 60%-70% | 61.82% | 67.27% | 60.00% | 65.00% | 75.41% | 66.67% | 58.33% |
| 2008-2009 | 3/4 | 15%-20% | 18.18% | 16.36% | 18.18% | 15.00% | 19.67% | 20.64% | 20.00% |
| | 1 | 15%-20% | 20.00% | 18.18% | 20.00% | 20.00% | 9.84% | 4.76% | 18.33% |
| Spring 2009 | 2 | 60%-70% | 61.82% | 65.45% | 61.82% | 65.00% | 68.85% | 80.95% | 63.33% |
| | 3/4 | 15%-20% | 18.18% | 16.36% | 18.18% | 15.00% | 21.31% | 14.29% | 18.33% |

Note: Alg. I = Algebra I, Alg. II = Algebra II, Geo. = Geometry, Bio. I = Biology I, Eng. II = English II, Eng. III = English III, and U.S. His. = U.S. History.

### 1.2.c Configuration of the Seven Tests

Tables 1.4 and 1.5 provide overviews of the number of operational and field test items for the Winter/Trimester 2008-2009 and Spring 2009 OSTP-ACE EOI assessments. Field test items were embedded in the operational test forms for all content areas in order to build the item bank for future use. The forms in the Spring 2009 assessments were randomly assigned within classrooms in order to obtain equivalent samples of examinees for the field test items. Table 1.4 provides the total number of forms, total number of operational (OP) and field test (FT) items, and maximum possible points for the Winter/Trimester 2008-2009 assessments. Table 1.5 provides the total number of forms, total number of operational (OP) and field test (FT) items, and maximum possible points for the Spring 2009 assessments.

Table 1.4. Configuration of the OSTP-ACE EOI tests for Winter/Trimester 2008-2009

| OSTP-ACE/EOI | Content Area | Form(s) | Total Number of OP Items | Total Number of FT Items | Test Items | Maximum Possible Points on Test Items Per Form: OP MC | OP CR | FT MC | FT CR |
|---|---|---|---|---|---|---|---|---|---|
| Winter/ Trimester 2008-09 | Algebra I | 1 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | Algebra II | 1 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | Geometry | 1 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | Biology I | 1 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | English II | 1 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | English III | 1 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | U.S. History | 1 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |

Note: OP = Operational; FT = Field Test; MC = Multiple Choice; CR = Constructed Response; *=multiple choice/constructed response.

Table 1.5. Configuration of the OSTP-ACE/EOI tests for Spring 2009

| OSTP-ACE/EOI | Content Area | Form(s) | Total Number of OP Items | Total Number of FT Items | Test Items | Maximum Possible Points on Test Items Per Form: OP MC | OP CR | FT MC | FT CR |
|---|---|---|---|---|---|---|---|---|---|
| Spring 2009 | Algebra I | 1 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 2 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 3 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 4 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 5 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 6 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 7 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 8 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 9 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 10 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 11 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| Spring 2009 | Algebra II | 1 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 2 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 3 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 4 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 5 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 6 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 7 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 8 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 9 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 10 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 11 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| Spring 2009 | Geometry | 1 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 2 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 3 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 4 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 5 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 6 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 7 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 8 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 9 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 10 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |
| | | 11 | 55 | 20 | 75 | 55 | 0 | 20 | 0 |

Note: OP = Operational; FT = Field Test; MC = Multiple Choice; CR = Constructed Response.

Table 1.5 cont. Configuration of the OSTP-ACE/EOI tests for Spring 2009

| OSTP-ACE/EOI | Content Area | Form(s) | Total Number of OP Items | Total Number of FT Items | Test Items | Maximum Possible Points on Test Items Per Form: OP MC | OP CR | FT MC | FT CR |
|---|---|---|---|---|---|---|---|---|---|
| Spring 2009 | Biology I | 1 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 2 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 3 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 4 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 5 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 6 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 7 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 8 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 9 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 10 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 11 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| Spring 2009 | English II | 1 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 2 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 3 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 4 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 5 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 6 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 7 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 8 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 9 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 10 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 11 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 12 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| | | 13 | 60/1* | 20 | 80/1* | 60 | 6 | 20 | 0 |
| Spring 2009 | English III | 1 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 2 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 3 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 4 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 5 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 6 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 7 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 8 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 9 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 10 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 11 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 12 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 13 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 14 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 15 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |
| | | 16 | 62/1* | 20 | 82/1* | 62 | 10 | 20 | 0 |

Table 1.5 cont. Configuration of the OSTP-ACE/EOI tests for Spring 2009

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 2 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 3 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 4 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 5 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 6 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| Spring | U.S. | 7 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| 2009 | History | 8 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 9 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 10 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 11 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 12 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 13 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |
| | | 14 | 60 | 20 | 80 | 60 | 0 | 20 | 0 |

Note: OP = Operational; FT = Field Test; MC = Multiple Choice; CR = Constructed Response; *=multiple choice/constructed response.

### 1.2.d Operational and Field-Test Items by Content Area

*Algebra I.* The Winter/Trimester 2008-2009 Algebra I administration was comprised of one form with 55 operational multiple-choice items and 20 field test MC items. There were 16 anchor items to this test, all from the Spring 2008 administration. There were eleven Algebra I test forms in the Spring 2009 administration. Each of the eleven forms contained a duplicate set of 55 operational MC items and 20 unique field test MC items, totaling 75 items per form, and 275 items across forms. The number of items and maximum points possible by content standard is shown in Table 1.6a. Note that Algebra I was reported by content standard and at the objective level. There were four or more items in each reported category. Each item was mapped to one content standard and one objective per content standard.

Table 1.6a. Number of item and points by Content Standard for Algebra I

| | | Total Number of Items/Points Within a Content Standard | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2 | | 3 | | Total | |
| | | Its | Pts | Its | Pts | Its | Pts | Its | Pts |
| Winter/Trimester 2008-09 | Operational | 15 | 15 | 31 | 31 | 9 | 9 | 55 | 55 |
| | FT-Form 1 | 5 | 5 | 11 | 11 | 4 | 4 | 20 | 20 |
| Spring 2009 | Operational | 15 | 15 | 31 | 31 | 9 | 9 | 55 | 55 |
| | FT-Form 1 | 4 | 4 | 11 | 11 | 5 | 5 | 20 | 20 |
| | FT-Form 2 | 6 | 6 | 10 | 10 | 4 | 4 | 20 | 20 |
| | FT-Form 3 | 6 | 6 | 11 | 11 | 3 | 3 | 20 | 20 |
| | FT-Form 4 | 7 | 7 | 11 | 11 | 2 | 2 | 20 | 20 |
| | FT-Form 5 | 5 | 5 | 13 | 13 | 2 | 2 | 20 | 20 |
| | FT-Form 6 | 6 | 6 | 12 | 12 | 2 | 2 | 20 | 20 |
| | FT-Form 7 | 5 | 5 | 13 | 13 | 2 | 2 | 20 | 20 |
| | FT-Form 8 | 6 | 6 | 11 | 11 | 3 | 3 | 20 | 20 |
| | FT-Form 9 | 5 | 5 | 11 | 11 | 4 | 4 | 20 | 20 |
| | FT-Form 10 | 4 | 4 | 10 | 10 | 6 | 6 | 20 | 20 |
| | FT-Form 11 | 4 | 4 | 11 | 11 | 5 | 5 | 20 | 20 |

Note: Its = Number of Items; Pts = Number of Points; FT = Field Test.

*Algebra II.* The Winter/Trimester 2008-2009 Algebra II administration was comprised of one form with 55 operational MC items and 20 field test MC items. There were 15 anchor items to this test, all from Spring 2008 operational administration. There were eleven Algebra II test forms in the Spring 2009 administration. Each of the eleven forms contained a duplicate set of 55 operational MC items and 20 unique field test MC items, totaling 75 items per form, and 275 items across forms. The number of items and maximum points possible by content standard is shown in Table 1.6b. Note that Algebra II was reported by content standard and at the objective level. There were four or more items in each reported category. Each item was mapped to one content standard and one objective per content standard.

Table 1.6b. Number of item and points by Content Standard for Algebra II

| | | Total Number of Items/Points Within a Content Standard | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2 | | 3 | | Total | |
| | | Its | Pts | Its | Pts | Its | Pts | Its | Pts |
| Winter/Trimester 2008-09 | Operational | 15 | 15 | 31 | 31 | 9 | 9 | 55 | 55 |
| | FT-Form 1 | 5 | 5 | 13 | 13 | 2 | 2 | 20 | 20 |
| Spring 2009 | Operational | 15 | 15 | 31 | 31 | 9 | 9 | 55 | 55 |
| | FT-Form 1 | 7 | 7 | 12 | 12 | 1 | 1 | 20 | 20 |
| | FT-Form 2 | 7 | 7 | 12 | 12 | 1 | 1 | 20 | 20 |
| | FT-Form 3 | 7 | 7 | 10 | 10 | 3 | 3 | 20 | 20 |
| | FT-Form 4 | 7 | 7 | 9 | 9 | 4 | 4 | 20 | 20 |
| | FT-Form 5 | 6 | 6 | 10 | 10 | 4 | 4 | 20 | 20 |
| | FT-Form 6 | 6 | 6 | 11 | 11 | 3 | 3 | 20 | 20 |
| | FT-Form 7 | 6 | 6 | 9 | 9 | 5 | 5 | 20 | 20 |
| | FT-Form 8 | 6 | 6 | 10 | 10 | 4 | 4 | 20 | 20 |
| | FT-Form 9 | 6 | 6 | 7 | 7 | 7 | 7 | 20 | 20 |
| | FT-Form 10 | 6 | 6 | 10 | 10 | 4 | 4 | 20 | 20 |
| | FT-Form 11 | 7 | 7 | 9 | 9 | 4 | 4 | 20 | 20 |

Note: Its = Number of Items; Pts = Number of Points; FT = Field Test.

*Geometry.* The Winter/Trimester2007-2008 Geometry administration was comprised of one form with 55 operational MC items and 20 field test MC items. There were 15 anchor items to this test, all from the Spring 2008 operational administration. There were eleven Geometry test forms in the Spring 2009 administration. Each of the eleven forms contained a duplicate set of 55 operational MC items and 20 unique field test MC items, totaling 75 items per form, and 275 items across forms. The number of items and maximum points possible by content standard is shown in Table 1.6c. Note that Geometry was reported by content standard and at the objective level. There were four or more items in each reported category. Each item was mapped to one content standard and one objective per content standard.

Table 1.6c. Number of item and points by Content Standard for Geometry

| | | Total Number of Items/Points Within a Content Standard | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2 | | 3 | | 4 | | 5 | | Total | |
| | | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts |
| Winter/Trimester 2008-09 | Operational | 6 | 6 | 20 | 20 | 12 | 12 | 10 | 10 | 7 | 7 | 55 | 55 |
| | FT-Form 1 | 3 | 3 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 20 | 20 |
| Spring 2009 | Operational | 6 | 6 | 20 | 20 | 12 | 12 | 10 | 10 | 7 | 7 | 55 | 55 |
| | FT-Form 1 | 3 | 3 | 7 | 7 | 5 | 5 | 5 | 5 | . | . | 20 | 20 |
| | FT-Form 2 | 2 | 2 | 8 | 8 | 4 | 4 | 4 | 4 | 2 | 2 | 20 | 20 |
| | FT-Form 3 | 2 | 2 | 5 | 5 | 5 | 5 | 3 | 3 | 5 | 5 | 20 | 20 |
| | FT-Form 4 | 2 | 2 | 6 | 6 | 6 | 6 | 4 | 4 | 2 | 2 | 20 | 20 |
| | FT-Form 5 | 2 | 2 | 6 | 6 | 4 | 4 | 6 | 6 | 2 | 2 | 20 | 20 |
| | FT-Form 6 | 2 | 2 | 5 | 5 | 6 | 6 | 4 | 4 | 3 | 3 | 20 | 20 |
| | FT-Form 7 | 2 | 2 | 5 | 5 | 5 | 5 | 6 | 6 | 2 | 2 | 20 | 20 |
| | FT-Form 8 | 2 | 2 | 7 | 7 | 4 | 4 | 3 | 3 | 4 | 4 | 20 | 20 |
| | FT-Form 9 | 2 | 2 | 7 | 7 | 5 | 5 | 3 | 3 | 3 | 3 | 20 | 20 |
| | FT-Form 10 | 2 | 2 | 5 | 5 | 4 | 4 | 6 | 6 | 3 | 3 | 20 | 20 |
| | FT-Form 11 | 2 | 2 | 8 | 8 | 4 | 4 | 3 | 3 | 3 | 3 | 20 | 20 |

Note: Its = Number of Items; Pts = Number of Points; FT = Field Test.

*Biology I.* The Winter/Trimester 2008-2009 Biology I administration was comprised of one form with 55 operational MC items and 20 field test MC items. There were 18 anchor items to this test, all from the Spring 2008 administration. There were eleven Biology I test forms in the Spring 2009 administration. Each of the eleven forms contained a duplicate set of 60 operational MC items and 20 unique field test MC items, totaling 80 items per form, and 280 items across forms. The number of items and the maximum number points possible by content standard in Biology I are shown in Table 1.6d. Note that Biology I was reported for content and process standards at the standard level. Each reported standard has four or more items. Unlike other content areas, all items in Biology I were primarily mapped to process standards. All items (except safety items) were also mapped to content standards.

Table 1.6d. Number of item and points by Content Standard for Biology I

| | | Total Number of Items/Points Within a Content Standard | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | Total* | |
| | | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts |
| WI08 | Operational | 9 | 9 | 8 | 8 | 9 | 9 | 12 | 12 | 9 | 9 | 9 | 9 | 56 | 56 |
| | FT-Form 1 | 2 | 2 | 4 | 4 | 3 | 3 | 5 | 5 | 4 | 4 | . | . | 18 | 18 |
| SP09 | Operational | 10 | 10 | 9 | 9 | 9 | 9 | 12 | 12 | 9 | 9 | 7 | 7 | 56 | 56 |
| | FT-Form 1 | 3 | 3 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 3 | 3 | 18 | 18 |
| | FT-Form 2 | 4 | 4 | 2 | 2 | 3 | 3 | 5 | 5 | 3 | 3 | 1 | 1 | 18 | 18 |
| | FT-Form 3 | 2 | 2 | 2 | 2 | 3 | 3 | 6 | 6 | 4 | 4 | 2 | 2 | 19 | 19 |
| | FT-Form 4 | 3 | 3 | 4 | 4 | 1 | 1 | 4 | 4 | 4 | 4 | 3 | 3 | 19 | 19 |
| | FT-Form 5 | 3 | 3 | 4 | 4 | 2 | 2 | 3 | 3 | 6 | 6 | 1 | 1 | 19 | 19 |
| | FT-Form 6 | 4 | 4 | 5 | 5 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 19 | 19 |
| | FT-Form 7 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 4 | 4 | . | . | 20 | 20 |
| | FT-Form 8 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 1 | 1 | 19 | 19 |
| | FT-Form 9 | 4 | 4 | 5 | 5 | 2 | 2 | 4 | 4 | 3 | 3 | 1 | 1 | 19 | 19 |
| | FT-Form 10 | 1 | 1 | 6 | 6 | 5 | 5 | 4 | 4 | 4 | 4 | . | . | 20 | 20 |
| | FT-Form 11 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 19 | 19 |

Note: WI08 = Winter/Trimester 2008-2009; SP09 = Spring 2009; Its = Number of Items; Pts = Number of Points; FT = Field Test; Some totals for OP forms and FT forms are less than 60 (for OP) and 20 (for FT) due to dual item alignment – an item does not map to a content standard , but maps to a process

*English II.* The Winter/Trimester 2008-2009 English II administration was comprised of one form with 60 operational MC items, 1 open-ended writing prompt, and 20 field test MC items. There were 21 anchor items to this test, all from the Spring 2008 administration. There were thirteen English II test forms in the Spring 2009 administration. Each of the thirteen forms contained a duplicate set of 60 operational MC items, 1 operational open-ended writing prompt, and 20 unique field test MC items, totaling 81 items per form, and 321 items across forms. Table 1.6e lists the number of items and the maximum possible number of points by content standard in the Winter/Trimester 2008-2009 and Spring 2009 tests. Note that English II was reported at the content standard level. Each item was mapped to one content standard and one objective. Note that the writing prompts in English II, both for Winter/Trimester and Spring, were scored analytically at five traits with a maximum of four score points for each trait. The scores in the analytic traits were reported in the Writing report. The trait scores were weighted differentially to derive a composite score that ranged from 1 to 6. The composite scores contributed to the English II total score.

Table 1.6e. Number of item and points by Content Standard for English II

| | | Total Number of Items/Points Within a Content Standard | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R1 | | R2 | | R3 | | R4 | | W1/W2 | | W3 | | Total | |
| | | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts |
| WI08 | Operational | 7 | 7 | 16 | 16 | 20 | 20 | 5 | 5 | 1 | 6 | 12 | 12 | 61 | 66 |
| | FT-Form 1 | 2 | 2 | 2 | 2 | 7 | 7 | 2 | 2 | . | . | 7 | 7 | 20 | 20 |
| SP09 | Operational | 7 | 7 | 16 | 16 | 19 | 19 | 6 | 6 | 1 | 6 | 12 | 12 | 61 | 66 |
| | FT-Form 1 | 2 | 2 | 9 | 9 | 7 | 7 | 2 | 2 | . | . | . | . | 20 | 20 |
| | FT-Form 2 | 1 | 1 | 5 | 5 | 7 | 7 | 1 | 1 | . | . | 6 | 6 | 20 | 20 |
| | FT-Form 3 | 3 | 3 | 6 | 6 | 4 | 4 | 1 | 1 | . | . | 6 | 6 | 20 | 20 |
| | FT-Form 4 | 3 | 3 | 9 | 9 | 5 | 5 | 3 | 3 | . | . | . | . | 20 | 20 |
| | FT-Form 5 | 1 | 1 | 7 | 7 | 5 | 5 | 1 | 1 | . | . | 6 | 6 | 20 | 20 |
| | FT-Form 6 | 2 | 2 | 3 | 3 | 7 | 7 | 2 | 2 | . | . | 6 | 6 | 20 | 20 |
| | FT-Form 7 | 2 | 2 | 6 | 6 | 4 | 4 | 2 | 2 | . | . | 6 | 6 | 20 | 20 |
| | FT-Form 8 | 2 | 2 | 3 | 3 | 10 | 10 | 1 | 1 | . | . | 4 | 4 | 20 | 20 |
| | FT-Form 9 | 1 | 1 | 7 | 7 | 7 | 7 | 1 | 1 | . | . | 4 | 4 | 20 | 20 |
| | FT-Form 10 | 2 | 2 | 3 | 3 | 8 | 8 | 2 | 2 | . | . | 5 | 5 | 20 | 20 |
| | FT-Form 11 | 1 | 1 | 8 | 8 | 5 | 5 | . | . | . | . | 6 | 6 | 20 | 20 |
| | FT-Form 12 | . | . | 9 | 9 | 1 | 1 | 2 | 2 | . | . | 8 | 8 | 20 | 20 |
| | FT-Form 13 | 1 | 1 | 2 | 2 | 3 | 3 | 1 | 1 | . | . | 13 | 13 | 20 | 20 |

Note: WI08 = Winter/Trimester 2008-2009; SP09 = Spring 2009; Its = Number of Items; Pts = Number of Points; FT = Field Test.

*English III.* The Winter/Trimester 2008-2009 English III administration was comprised of one forms with 62 operational MC items, 1 open-ended writing prompt, and 20 field test MC items. There were 18 anchor items to this test, all from the Spring 2008 administration. There were sixteen English III test forms in the Spring 2009 administration. Each of the sixteen forms contained a duplicate set of 62 operational MC items, 1 operational open-ended writing prompt, and 20 unique field test MC items, totaling 83 items per form, and 383 items across forms (some field-test items were duplicated across forms). Table 1.6f lists the number of items and the maximum possible number of points by content standard in the Winter/Trimester 2008-2009 and Spring 2009 tests. Note that English III was reported at the content standard level. Each item was mapped to one content standard and one objective. Note that the writing prompts in English III, both for Winter/Trimester and Spring, were scored analytically at five traits with a maximum of four score points for each trait. The scores in the analytic traits were reported in the Writing report. The trait scores were weighted differentially to derive a

composite score that ranged from 1 to 10. The composite scores contributed to the English III total score.

Table 1.6f. Number of item and points by Content Standard for English III

| | | Total Number of Items/Points Within a Content Standard | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R1 | | R2 | | R3 | | R4 | | W1/W2 | | W3 | | Total | |
| | | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts |
| WI08 | Operational | 5 | 5 | 18 | 18 | 20 | 20 | 5 | 5 | 1 | 10 | 14 | 14 | 63 | 72 |
| | FT-Form 1 | 2 | 2 | 7 | 7 | 4 | 4 | . | . | . | . | 7 | 7 | 20 | 20 |
| SP09 | Operational | 6 | 6 | 17 | 17 | 19 | 19 | 6 | 6 | 1 | 10 | 14 | 14 | 63 | 72 |
| | FT-Form 1 | 2 | 2 | 9 | 9 | 6 | 6 | 3 | 3 | . | . | . | . | 20 | 20 |
| | FT-Form 2 | 3 | 3 | 9 | 9 | 7 | 7 | 1 | 1 | . | . | . | . | 20 | 20 |
| | FT-Form 3 | 2 | 2 | 8 | 8 | 7 | 7 | 3 | 3 | . | . | . | . | 20 | 20 |
| | FT-Form 4 | 5 | 5 | 6 | 6 | 8 | 8 | 1 | 1 | . | . | . | . | 20 | 20 |
| | FT-Form 5 | 2 | 2 | 5 | 5 | 7 | 7 | 2 | 2 | . | . | 4 | 4 | 20 | 20 |
| | FT-Form 6 | 3 | 3 | 7 | 7 | 5 | 5 | . | . | . | . | 5 | 5 | 20 | 20 |
| | FT-Form 7 | 2 | 2 | 4 | 4 | 7 | 7 | 2 | 2 | . | . | 5 | 5 | 20 | 20 |
| | FT-Form 8 | 2 | 2 | 6 | 6 | 5 | 5 | 3 | 3 | . | . | 4 | 4 | 20 | 20 |
| | FT-Form 9 | 1 | 1 | 9 | 9 | 4 | 4 | 1 | 1 | . | . | 5 | 5 | 20 | 20 |
| | FT-Form 10 | 2 | 2 | 10 | 10 | 4 | 4 | 4 | 4 | . | . | . | . | 20 | 20 |
| | FT-Form 11 | 3 | 3 | 4 | 4 | 4 | 4 | 1 | 1 | . | . | 8 | 8 | 20 | 20 |
| | FT-Form 12 | 2 | 2 | 3 | 3 | 6 | 6 | 1 | 1 | . | . | 8 | 8 | 20 | 20 |
| | FT-Form 13 | 1 | 1 | 2 | 2 | 7 | 7 | 2 | 2 | . | . | 8 | 8 | 20 | 20 |
| | FT-Form 14 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 3 | . | . | 8 | 8 | 20 | 20 |
| | FT-Form 15 | 2 | 2 | 7 | 7 | 2 | 2 | 1 | 1 | . | . | 8 | 8 | 20 | 20 |
| | FT-Form 16 | 1 | 1 | 7 | 7 | 3 | 3 | 1 | 1 | . | . | 8 | 8 | 20 | 20 |

Note: WI08 = Winter/Trimester 2008-2009; SP09 = Spring 2009; Its = Number of Items; Pts = Number of Points; FT = Field Test.

*U.S. History* The Winter/Trimester 2008-2009 U.S. History administration was comprised of one form with 60 operational multiple-choice items and 20 field test MC items. There were 20 anchor items to this test, all from the Spring 2008 administration. There were fourteen U.S. History test forms in the Spring 2009 administration. Each of the fourteen forms contained a duplicate set of 60 operational MC items and 20 unique field test MC items, totaling 80 items per form, and 240 items across forms. The number of items and maximum points possible by content standard in Winter/Trimester 2008-

2009 and Spring 2009 are shown in Table 1.6g. Note that U.S. History was reported only at the content standard level and each reported standard had four or more items.

Table1.6g. Number of item and points by Content Standard for U.S. History

| | | Total Number of Items/Points Within a Content Standard | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 01 | | 02 | | 03 | | 04 | | 05 | | 06 | | 07 | | 08 | | 09 | | 10 | | Total | |
| | | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts | Its | Pts |
| WI08 | Operational | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 60 | 60 |
| | FT-Form 1 | 3 | 3 | 3 | 3 | . | . | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 20 | 20 |
| SP09 | Operational | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 60 | 60 |
| | FT-Form 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 20 | 20 |
| | FT-Form 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 20 | 20 |
| | FT-Form 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 2 | 2 | 20 | 20 |
| | FT-Form 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 20 | 20 |
| | FT-Form 5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 20 | 20 |
| | FT-Form 6 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 20 | 20 |
| | FT-Form 7 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | . | . | 2 | 2 | 2 | 2 | 4 | 4 | 1 | 1 | 4 | 4 | 20 | 20 |
| | FT-Form 8 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 20 | 20 |
| | FT-Form 9 | 1 | 1 | . | . | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 3 | 2 | 2 | 5 | 5 | 3 | 3 | 20 | 20 |
| | FT-Form 10 | 1 | 1 | 3 | 3 | 1 | 1 | . | . | . | . | 1 | 1 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 20 | 20 |
| | FT-Form 11 | 3 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 20 | 20 |
| | FT-Form 12 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 20 | 20 |
| | FT-Form 13 | 4 | 4 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 5 | 5 | . | . | 2 | 2 | 1 | 1 | 20 | 20 |
| | FT-Form 14 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 20 | 20 |

Note: WI08 = Winter/Trimester 2008-2009; SP09 = Spring 2009; Its = Number of Items; Pts = Number of Points; FT = Field Test.

## Section 2

## Administration of the ACE EOI assessments

Valid and reliable assessment requires that assessments are first constructed in alignment with the Oklahoma content standards and then administered and scored according to sound measurement principles. Sound assessment practices require that schools administer all assessments in a consistent manner across the state so that all students have a fair and equitable opportunity for a score that accurately reflects their achievement in each subject.

The schools play a key role in administering the OSTP-ACE EOI assessments in a manner consistent with established procedures, monitoring the fair administration of the assessment, and working with the SDE office to address deviations from established assessment administration procedures. The role district and school faculty members play is essential in the fair and equitable administration of successful ACE EOI assessments.

### 2.1 Packaging and Shipping

To provide OSTP-ACE EOI with secure and dependable services for the shipping of the Oklahoma assessment materials, Pearson's Warehousing and Transportation Department maintains the quality and security of material distribution and return by using such methods as sealed trailers and hiring reputable carriers with the ability to immediately trace shipments. Pearson uses all available tracking capabilities to provide status information and early opportunities for corrective action.

Materials are packaged by school and delivered to the district coordinators. Each shipment to a district contains a shipping document set that includes a packing list for each school's materials and a pallet map that shows the identity and pallet assignment of each carton.

Materials are packaged using information provided by the Assessment Coordinators through Pearson's SchoolHouse™ Web site, and optionally with data received directly from Oklahoma. Oklahoma educators also use the SchoolHouse™ site to provide Pearson with the Pre-Identification information needed to print the student identification section on answer documents. Bar-coding of all secure materials during the pre-packaging effort allows the accurate tracking of these materials through the entire packing, delivery, and return process. It also permits us to inventory all materials throughout the packaging and delivery process along with the ability to provide the customer with status updates at any time. Use of handheld radio-frequency scanners in the packaging process help to eliminate the possibility of packing the wrong materials. The proprietary "pick-and-pack" process prompts packaging personnel as to what materials are to go in which shipping box. If the packer tries to pack the wrong item (or number of items into a shipping carton), the system signals an alert.

## 2.2 Materials Return

Test administration handbooks provide clear instructions on how to assemble, box, label, and return testing materials after test administration. Because of the criticality of used test materials and quantities often involved, safety is also a major concern, not only for the materials but for the people moving them. Only single-column boxes are used to distribute and collect test materials, so the weight of each carton is kept to a reasonable and manageable limit.

Paper bands are provided to group and secure used student response booklets for scoring. Color-coded return mailing labels with detailed return information (district address and code number, receipt address, box x of x, shipper's tracking number, etc.) are also provided. These labels facilitate accurate and efficient sorting of each carton and its contents upon receipt at Pearson.

## 2.3. Materials Discrepancies Process

The image scanning process enables Pearson to concurrently capture Optical Mark Read (OMR) responses, images, and security information electronically. All scorable material discrepancies are captured, investigated by our Oklahoma Call Center team, reported, and resolved prior to a batch passing through a clean post edit and images being released for scoring.

As scanning of all material progresses, any discrepancies in material received versus shipped are reported immediately to the SDE and scoring will begin. This system allows us to proceed in scoring clean batches while any discrepant material issues are being resolved. As discrepant materials are received, they will be processed. Data from discrepant material receipts are captured in the same database as all other material receipts resulting in a complete record of materials for each school. As batches clear the clean post edit, clipped images are prepared and distributed for scoring. The Oklahoma Call Center Team notified the SDE regarding unresolved material discrepancies within 24 hours after our initial attempt to contact the school principal. Within one week after materials are returned, our Service Center Team also notified the SDE of any missing or incomplete shipments from schools that received testing materials.

*Resolution of missing secure test materials and used answer booklets.* Pearson provides updates on a daily basis to the initial discrepancy reports, in response to SDE specifications and requests. The Oklahoma Call Center team makes every attempt to resolve all discrepancies involving secure test books and used answer booklets in a timely manner. Using daily, updated discrepancy reports, Pearson is in constant contact with the respective districts/schools. Pearson and the SDE work out details on specific approaches to resolution of material return discrepancies, and what steps will be taken if "lost" secure test books and/or used answer documents are not found and remain unreturned to Pearson.

## 2.4 Processing Assessment Materials Returned by Schools

Pearson's receipt system provides for the logging of materials within 24 hours of receipt and the readiness of same materials for scanning within 72-hours of receipt. District status is available from a web-based system readily accessible by SDE. In addition, the Oklahoma Call Center is able to provide receipt status information if required. The receipt notification Web site's database is updated daily to allow for accurate information being presented to inquiring district/school personnel. As with initial shipping, the secure and accurate receipt of test materials is a priority with Pearson. Quality assurance procedures provide that all materials are checked in using pre-defined procedures. Materials are handled in a highly secure manner from the time of receipt until final storage and shredding. The receipt of all secure materials is verified through the scanning of barcodes and the comparison of this data to that in security files established during the initial shipment of Oklahoma test materials to the district assessment coordinators.

**Section 3**

# Classical Item Analysis and Results

## 3.1 Sampling Plan and Field Test Design

### 3.1.a Sampling Plan

Population data was used for classical and item response theory (IRT) analyses for all Winter/Trimester 2008-2009 and Spring 2009 tests. All students who complete a course with an End-of-Instruction test associated with it must also take the test.

### 3.1.b Field-Test Design

New items are field tested to build-up the item bank for future high stakes administrations. The overall field test design used by Pearson was an embedded field test design where newly developed field test items were embedded throughout the test. The advantage of an embedded field test design is that test-takers do not know where the field test items are located and therefore will treat each item as a scored item. Twenty field test items per form were placed in common positions across forms and administrations (Winter/Trimester and Spring). Field test items were prioritized for inclusion on forms based on current item bank analyses.

### 3.1.c Data Receipt Activities

After all tests were scored, a data file was provided for item analyses and calibration. A data clean up process was completed that removed invalid cases, ineligible responses, absent students, and second time test takers. A statistical key check was also performed at this time. This 'cleaned' sample was used for classical item analyses, calibration, and equating. Upon receipt of data, a research scientist inspected several data fields to determine if the data met expectations, including:

- Student ID
- Demographic fields
- Form identification fields
- Raw response fields
- Scored response fields
- Total score and subscore fields
- Fields used to implement exclusion from analysis rules

*Exclusion Rules.* Following data inspection and cleaning, exclusionary rules were applied to form the final sample that was used for classical item analyses, calibration, and equating. Any student who had attempted at least five responses was included in the data analyses. The demographic breakdown of the students in the Winter/Trimester 2008-2009 and Spring 2009 item analysis and calibration sample appear in Table 3.1 and 3.2, respectively.

Table 3.1. Demographic characteristics of calibration and equating sample for Winter/Trimester 2008-2009

| Subject | Total | Male | Female | African American | Native American | Hispanic | Asian | Pacific Islander | White | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| **Algebra I** | 1499 | 733 | 766 | 308 | 197 | 124 | 23 | 0 | 823 | 24 |
| **Algebra II** | 1915 | 928 | 987 | 325 | 216 | 121 | 40 | 1 | 1194 | 18 |
| **Biology I** | 2073 | 1042 | 1031 | 405 | 228 | 132 | 40 | 3 | 1243 | 22 |
| **English II** | 2628 | 1320 | 1308 | 449 | 367 | 181 | 59 | 2 | 1550 | 20 |
| **English III** | 2783 | 1390 | 1381 | 400 | 404 | 199 | 60 | 27 | 1654 | 39 |
| **Geometry** | 1901 | 926 | 975 | 331 | 235 | 182 | 33 | 1 | 1097 | 22 |
| **U.S. History** | 2600 | 1288 | 1312 | 433 | 344 | 199 | 30 | 2 | 1566 | 26 |

Note: Gender and Ethnicity values may not add to the total due to missing responses.

Table 3.2. Demographic characteristics of calibration and equating sample for Spring 2009

| Subject | Total | Male | Female | African American | Native American | Hispanic | Asian | Pacific Islander | White | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| **Algebra I** | 35736 | 17817 | 17919 | 3696 | 6684 | 3159 | 728 | 54 | 21140 | 275 |
| **Algebra II** | 29644 | 14355 | 15289 | 2591 | 5384 | 2146 | 702 | 38 | 18610 | 173 |
| **Biology I** | 35347 | 17586 | 17761 | 3365 | 6444 | 3092 | 787 | 57 | 21381 | 221 |
| **English II** | 34823 | 17137 | 17686 | 3214 | 6478 | 3032 | 742 | 55 | 21122 | 180 |
| **English III** | 34842 | 17331 | 17511 | 3457 | 6497 | 2618 | 769 | 32 | 21269 | 200 |
| **Geometry** | 34224 | 17132 | 17092 | 3132 | 6348 | 2819 | 760 | 41 | 20933 | 191 |
| **U.S. History** | 32277 | 15993 | 16284 | 3038 | 5890 | 2529 | 802 | 39 | 19788 | 191 |

Note: Gender and Ethnicity values may not add to the total due to missing responses.

*Statistical Key Check.* Administering students items that have only one correct key and are correctly scored is critical for accurate assessment of student performance. In order to screen for potentially problematic items, a statistical key check was conducted and items were flagged that met any of the following criteria:

- Less than 200 students responded to the item
- Correct response p-value less than 0.20
- Correct response uncorrected point-biserial below 0.20
- Distractor p-value greater than or equal to 0.40
- Distractor point-bisierial greater than or equal to 0.05

Any flagged operational item was submitted for key review to the appropriate Pearson content specialist. Any flagged items that are identified by content experts as having answer key issues would be submitted to SDE for review before dropping the item from the operational scoring. There were no items identified in the Winter/Trimester 2008-2009 or Spring 2009 administration as having a key issue. Once the keys were verified, classical item analyses were conducted.

### 3.2 Classical Item Analyses

Once the data receipt activities and statistical key check were completed, the following classical item analyses were conducted for operational and field-test items:

- Total case count
- Summary demographic statistics (e.g., males, females, African American, White, Hispanic, Asian, Pacific Islander, Native American, and Other)
- Frequency distributions for all multiple choice items and frequency distributions of score ratings and condition codes for writing prompts
    - Percentage of students in different multiple choice categories and, for the writing prompt, in different score categories (overall and broken down by gender and ethnicity)
- Item p-value
    - Mean item p-value
- Item-test correlation (point-biserial)
    - Mean item-test correlation (point-biserial)
    - Point-biserial by response option (overall and broken down by gender and ethnicity)
- Omit percentage per item
    - Not reached analysis results per item
- Mean score by response option (overall and broken down by gender and ethnicity)

Once the keys were verified and the item analysis results reviewed, the data were used for calibration and equating.

### 3.2.a Test-levels summaries of classical item analyses

The test-level raw score descriptive statistics for the calibration samples is shown in Table 3.3. Note that students whose tests were invalidated and those students taking the test for a second time were excluded. The operational test results indicate that the omit rates were smaller than 1% for all subjects. The mean raw score and the mean percent of the maximum raw scores were relatively similar for both administrations. As indicated in the test configuration section, there were multiple forms with a duplicate set of operational items and a unique set of field test items in the Winter/Trimester 2008-2009 and Spring 2009 tests. A separate item analysis by test form indicated that, in both administrations, the omit rates were below 2% for all content areas. The mean percent of the maximum possible raw score across forms indicates that the forms were relatively similar in difficulty for all content areas.

Table 3.3. Test level summaries of classical item analyses for Winter/Trimester 2008-2009 and Spring 2009

| Administration | Sample Size | Mean | Mean % of Max | Number of Items/Points | *Average P-value | Average Pt. Biserial | Omit Min | Omit Max |
|---|---|---|---|---|---|---|---|---|
| AlgebraI-W08 | 1499 | 30.06 | 0.55 | 55 | 0.55 | 0.42 | 0.00 | 0.53 |
| AlgebraI-S09 | 35736 | 34.39 | 0.63 | 55 | 0.63 | 0.41 | 0.01 | 0.12 |
| AlgebraII-W08 | 1915 | 32.14 | 0.58 | 55 | 0.58 | 0.44 | 0.00 | 0.26 |
| AlgebraII-S09 | 29644 | 29.46 | 0.54 | 55 | 0.54 | 0.43 | 0.01 | 0.12 |
| Biology I-W08 | 2073 | 39.11 | 0.65 | 60 | 0.65 | 0.40 | 0.00 | 0.39 |
| Biology I-S09 | 35347 | 39.49 | 0.66 | 60 | 0.66 | 0.41 | 0.03 | 0.11 |
| EnglishII-W08 | 2628 | 47.17 | 0.71 | 61/66 | 0.73 | 0.39 | 0.04 | 0.22 |
| EnglishII-S09 | 34823 | 47.63 | 0.72 | 61/66 | 0.73 | 0.39 | 0.00 | 0.13 |
| EnglishIII-W08 | 2783 | 42.42 | 0.59 | 63/72 | 0.60 | 0.39 | 0.00 | 0.40 |
| EnglishIII-S09 | 34842 | 46.17 | 0.64 | 63/72 | 0.65 | 0.43 | 0.00 | 0.23 |
| Geometry-W08 | 1901 | 34.21 | 0.62 | 55 | 0.62 | 0.43 | 0.05 | 0.32 |
| Geometry-S09 | 34224 | 34.46 | 0.63 | 55 | 0.63 | 0.45 | 0.02 | 0.13 |
| USHistory-W08 | 2600 | 37.68 | 0.63 | 60 | 0.63 | 0.43 | 0.00 | 0.15 |
| USHistory-S09 | 32277 | 38.89 | 0.65 | 60 | 0.65 | 0.40 | 0.01 | 0.08 |

*Note: W08 = Winter/Trimester 2008-2009; S09 = Spring 2009; pt. biserial = point biserial.

### 3.3 Procedures for Detecting Item Bias

One of the goals of the OSTP-ACE EOI assessments is to assemble a set of items that provides a measure of a student's ability that is as fair and accurate as possible for all subgroups within the population. Differential item functioning (DIF) analysis refers to statistical procedures that assess whether items are differentially difficult for different groups of examinees. DIF procedures typically control for overall between-group differences on a criterion, usually total test scores. Between-group performance on each item is then compared within sets of examinees having the same total test scores. If the item is differentially more difficult for an identifiable subgroup when conditioned on ability, the item may be measuring something different from the intended construct. However, it is important to recognize that DIF-flagged items might be related to actual differences in relevant knowledge or skills or statistical Type I error. As a result, DIF

statistics are only used to identify potential sources of item bias. Subsequent review by content experts and bias committees are required to determine the source and meaning of performance differences. For the OSTP-ACE EOI tests DIF analyses, DIF statistics were estimated for all major subgroups of students with sufficient sample size: African American, Hispanic, Asian, Native American, and Female. Field-test items with statistically significant differences in performance were flagged so that items could be carefully examined for possible biased or unfair content that was undetected in earlier fairness and bias content review meetings held prior to form construction.

Pearson used the Mantel-Haenszel (MH) chi-square approach for detecting DIF in the multiple choice and open-ended items. Pearson calculated the Mantel-Haenszel statistic (MH D-DIF; Holland & Thayer 1988) to measure the degree and magnitude of DIF. The student group of interest is the *focal* group, and the group to which performance on the item is being compared is the *reference* group. The referent groups for this DIF analysis were White for race and male for gender. The focal groups were females and minority race groups.

Items were separated into one of three categories on the basis of DIF statistics (Holland and Thayer 1988; Dorans and Holland 1993): negligible DIF (category A), intermediate DIF (category B), and large DIF (category C). The items in category C, which exhibit significant DIF, are of primary concern. Positive values of *delta* indicate that the item is easier for the *focal* group, suggesting that the item favors the *focal* group. A negative value of *delta* indicates that the item is more difficult for the *focal* group. The item classifications are based on the Mantel-Haenszel chi-square and the MH delta (Δ) value as follows (Michaelides, 2008):

- The item is classified as C category if the MH D-DIF is significantly greater than 1.0 in absolute value, and its absolute value is at least 1.5.
- The item is classified as B category if the MH D-DIF is significantly different from zero, its absolute value is at least 1.0, and its absolute value is either less than 1.5 or not significantly greater than 1.0.
- The item is classified as A category if the MH D-DIF is not significantly different from zero ($p \geq 0.05$), or if its absolute value is less than 1.0.

### 3.3.a Different Item Functioning Results

The data in Table 3.4 summarizes the number of items in DIF categories for the seven subjects for the Winter/Trimester 2008-2009 and Spring 2009 administration. The results presented in Table 3.4 are for field test items only. Items flagged for DIF were placed before expert content specialist committees during Spring 2009 field test data review as described in the Section 3.4. Field test items that exhibit bias as a result of the content of the item were removed from the item bank excluding them from future use.

Table 3.4. DIF flag incidence across all OSTP-ACE EOI field test items for Winter/Trimester 2008-2009 and Spring 2009

| Subject and Admin. | Total FT Items | Native American | Asian | African American | Hispanic | Female |
|---|---|---|---|---|---|---|
| Algebra I-FT Winter 2007-2008 | 20 | 1 | 0 | 0 | 2 | 0 |
| Algebra II-FT Winter 2007-2008 | 20 | 0 | 0 | 0 | 0 | 0 |
| Geometry-FT Winter 2007-2008 | 20 | 0 | 0 | 1 | 0 | 0 |
| Biology I-FT Winter 2007-2008 | 20 | 0 | 0 | 0 | 0 | 1 |
| English II-FT Winter 2007-2008 | 20 | 0 | 1 | 0 | 0 | 4 |
| English III-FT Winter 2007-2008 | 20 | 0 | 0 | 0 | 1 | 0 |
| U.S. History-FT Winter 2007-2008 | 20 | 0 | 0 | 1 | 0 | 0 |
| Algebra I-FT Spring 2009 | 140 | 0 | 3 | 12 | 6 | 7 |
| Algebra II-FT Spring 2009 | 140 | 0 | 2 | 8 | 10 | 9 |
| Geometry-FT Spring 2009 | 140 | 1 | 3 | 4 | 5 | 2 |
| Biology I-FT Spring 2009 | 140 | 0 | 5 | 8 | 14 | 12 |
| English II-FT Spring 2009 | 260 | 2 | 1 | 13 | 11 | 8 |
| English III-FT Spring 2009 | 320 | 6 | 4 | 22 | 22 | 16 |
| U.S. History-FT Spring 2009 | 280 | 2 | 1 | 12 | 7 | 11 |

Note: Admin. = Administration; FT = Field Test.

### 3.4 Data Review

Data review represents a critical step in the test development cycle. At the Data Review meeting, SDE and Pearson staff had the opportunity to review actual student performance on the newly developed and field tested multiple choice items across the seven subjects based on the Winter/Trimester 2008-2009 and Spring 2009 field test administrations. The data review focused on the content validity, curricular alignment and statistical functioning of field tested items prior to selection for operational test forms. The field test results used in the data review provided evidence that the items were designed to yield valid results and were accessible for use by the widest possible range of students. The review of student performance should provide evidence regarding the fulfillment of requirement 200.2(b)(2)of NCLB. The purpose of the review meeting was to ensure that psychometrically sound, fair and aligned items are used in the construction of the ACE EOI assessments and entered into the respective item banks. Pearson provided technical and psychometric expertise to provide a clear explanation about the content of the items, the field test process, the scoring process, and the resulting field test data to ensure the success of these meetings and the defensibility of the program.

Data review meetings were a collaborative effort between SDE and Pearson. SDE administrators and content specialists attended the meeting facilitated by Pearson content specialists and research scientists who trained the SDE staff on how to interpret and review the field test data. Meeting materials included a document explaining the flagging criteria, a document containing flagged items, and the item images. Pearson discussed with SDE the analyses performed and the criteria for flagging the items. Flagged items were then reviewed and decisions were made as to whether to accept the item, accept the item with revisions, or reject the item. Review of the data included presentation of p-value, point-biserial, point-biserial by response option, response distributions, mean

overall score by response option, and indications of item DIF and IRT mis-fit. Items failing to meet the requirements of sound technical data were carefully considered for rejection by the review panel, thereby enhancing the reliability and improving the validity of the items left in the bank for future use. While the panel used the data as a tool to inform their judgments, the panel (and not the data alone) made the final determination as to the appropriateness or fairness of the assessment items. The flagging criteria for the ACE EOI assessments are as follows:

- P-value: <.25 or >.90
- Point-biserial: <.15
- Distracter point-biserial: >.05 (positive)
- Differential Item Functioning (DIF): Test item biases for subgroups
- IRT mis-fit as flagged by the Q1 index (please see section 4.2 for explanation)

*Bias Review.* One aspect of the data review meetings was to assess potential bias based on DIF results and item content. Although bias in the items had been avoided through writer training and review processes, there is always the potential for bias to be detected through statistical analysis. It is important to include this step in the development cycle because SDE and Pearson do not want to include an item that is biased in some way against a group, because the item may lead to inequitable test results. As described earlier, all field-test items were analyzed statistically for DIF using the field test data. A Pearson research scientist explained the meaning, in terms of level, and the direction of the DIF flags. The data review panel reviewed the item content, the percentage of students selecting each response option, and the point-biserial for each response option by gender and ethnicity for all items flagged for DIF. The data review panel was then asked if there were context (for example, cultural barriers) or language in an item that might result in bias (i.e., an explanation for the existence of the statistical DIF flag).

### 3.4.a Results of Data Review

The number of items inspected during data review is presented in Table 3.5 as a result of the item meeting the statistical flagging criteria for the classical item analyses, DIF, and IRT procedures.

Table 3.5. Number of items per subject flagged and rejected during Winter/Trimester 2008–2009 and Spring 2009 field test data review

| Subject and Admin. | No. of FT Items | No. Flagged | Rejected | Accepted | Accepted with edits |
|---|---|---|---|---|---|
| Algebra I – Winter 2008-2009 | 20 | 15 | 1 | 10 | 4 |
| Algebra II – Winter 2008-2009 | 20 | 8 | 0 | 8 | 0 |
| Geometry – Winter 2008-2009 | 20 | 6 | 0 | 6 | 0 |
| Biology I – Winter 2008-2009 | 20 | 9 | 3 | 6 | 0 |
| English II – Winter 2008-2009 | 20 | 8 | 1 | 7 | 0 |
| English III – Winter 2008-2009 | 20 | 7 | 1 | 6 | 0 |
| U.S. History – Winter 2008-2009 | 20 | 7 | 1 | 4 | 2 |
| Algebra I – Spring 2009 | 220 | 79 | 9 | 65 | 5 |
| Algebra II – Spring 2009 | 220 | 83 | 18 | 56 | 9 |
| Geometry – Spring 2009 | 220 | 61 | 13 | 40 | 8 |
| Biology I – Spring 2009 | 220 | 85 | 16 | 54 | 15 |
| English II – Spring 2009 | 260 | 85 | 29 | 55 | 0 |
| English III – Spring 2009 | 320 | 126 | 34 | 92 | 0 |
| U.S. History – Spring 2009 | 280 | 95 | 17 | 67 | 11 |

Note: No. = Number; Admin. = Administration.

## 3.5 Test Reliability

The reliability of a test provides an estimate of the extent to which an assessment will yield the same results when administered in different times, locations, or samples, when the two administrations do not differ in relevant variables. The reliability coefficient is an index of consistency of test results. Reliability coefficients are usually forms of correlation coefficients and must be interpreted within the context and design of the assessment and of the reliability study. Cronbach's alpha is a commonly used measure of internal consistency. Cronbach's alpha is an internal consistency measure, which is derived from analysis of the consistency of the performance of individuals on items in a test administration. This is the formula for the most common index of reliability, namely, Cronbach's coefficient *alpha* ($\alpha$). In this formula, the $s_i^2$ denotes the variances for the k individual items; $s^2_{sum}$ denotes the variance for the sum of all items:

$$\alpha = (k/(k-1)) * [1- \Sigma(s^2_i)/s^2_{sum}] \qquad (1)$$

Cronbach's alpha was estimated for each of the content areas for the operational portion of the test.

Table 3.6 presents the estimated reliability index, Cronbach's alpha, for the operational tests by subject area for the Winter/Trimester 2008-2009 and Spring 2009 ACE EOI administrations. These reliabilities indicate that the OSTP-ACE EOI assessments had strong internal consistency and that the tests produce relatively stable scores.

Table 3.6. Cronbach's alpha for Winter/Trimester 2008-2009 and Spring 2009 Administration by Subject

| Administration | Cronbach's Alpha |
|---|---|
| Algebra-W08 | 0.92 |
| Algebra-S08 | 0.91 |
| AlgebraII-W08 | 0.92 |
| AlgebraII-S09 | 0.92 |
| Biology I-W08 | 0.91 |
| Biology I-S09 | 0.91 |
| EnglishII-W08 | 0.90 |
| EnglishII-S09 | 0.90 |
| EnglishIII-W08 | 0.91 |
| EnglishIII-S09 | 0.92 |
| Geometry-W08 | 0.92 |
| Geometry-S09 | 0.93 |
| USHistory-W08 | 0.92 |
| USHistory-S09 | 0.91 |

Note: W08 = Winter/Trimester 2008-2009; S09 = Spring 2009

### 3.6 Test Reliability by Subgroup

Table 3.7 addresses the reliability analysis results by the different reporting subgroups for the OSTP-ACE EOI assessments in for the Spring 2009. Table 3.7 illustrates the subject of interest, the subgroups, the number of students used in the analyses and the associated Cronbach's Alpha for each subject and subgroup. In all instances, the reliability coefficients are well-above the accepted lower limit of .70.

Table 3.7. Test Reliability by Subgroup for Spring 2009.

| Subject | Male | Female | African-American | Native American | Hispanic | Asian | White | ELL | IEP | ECDV |
|---|---|---|---|---|---|---|---|---|---|---|
| Algebra I | 0.91 | 0.90 | 0.89 | 0.89 | 0.90 | 0.91 | 0.90 | 0.88 | 0.89 | 0.89 |
| Algebra II | 0.92 | 0.92 | 0.89 | 0.90 | 0.91 | 0.94 | 0.92 | 0.91 | 0.86 | 0.90 |
| Biology I | 0.92 | 0.91 | 0.90 | 0.90 | 0.91 | 0.93 | 0.91 | 0.89 | 0.90 | 0.91 |
| English II | 0.91 | 0.90 | 0.90 | 0.90 | 0.91 | 0.92 | 0.90 | 0.89 | 0.90 | 0.90 |
| English III | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 | 0.93 | 0.93 | 0.86 | 0.89 | 0.92 |
| Geometry | 0.93 | 0.92 | 0.90 | 0.91 | 0.91 | 0.94 | 0.93 | 0.91 | 0.88 | 0.91 |
| U.S. History | 0.92 | 0.90 | 0.90 | 0.90 | 0.90 | 0.92 | 0.91 | 0.87 | 0.90 | 0.90 |

Note: ELL = English Language Learner, IEP = Individual Education Plan; ECDV = Economically Disadvantaged.

## 3.7 Inter-rater Reliability

Inter-rater reliability is interchangeably referred to as the degree of agreement among scorers that allows for the scores to be interpreted as reasonably intended by the test developer (AERA, APA and NCME, 1999). Both the Winter/Trimester 2008-2009 and Spring 2009 English II and English III tests contained one operational writing prompt each. Raters were trained to implement the scoring rubrics, anchor papers, check sets, and resolution reading. The items were scored by two raters analytically on five strands in both administrations. The final writing score for a student in a given strand is the average of the two scores. The inter-rater reliability results for the operational prompt are presented in Table 3.8 for English II and Table 3.9 for English III. The results show that exact and adjacent rater agreement on trait scores for both the Winter/Trimester 2008-2009 and Spring 2009 operational writing prompts were reasonably high. The weighted Kappa statistic (Kraemer, 1982) is an indication of inter-rater reliability after correcting for chance. The Kappa values for the OSTP-ACE EOI Winter/Trimester 2008-2009 and Spring 2009 operational writing prompts are within the moderate range.

Table 3.8. Inter-rater reliability for English II operational writing prompts for Winter/Trimester 2008-2009 and Spring 2009.

| | | | Point Discrepancy Percentages | | | | | | | Agreement Percentages | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trait | Max Point | Valid N | -3 | -2 | -1 | 0 | 1 | 2 | 3 | Exact | Adjacent | +/- 2 or more | Kappa |
| **Winter/Trimester 2008-2009** | | | | | | | | | | | | | |
| 1 | 4 | 2,432 | 0.00 | 0.78 | 19.53 | 58.14 | 20.48 | 1.07 | 0.00 | 58.14 | 40.01 | 1.85 | 0.37 |
| 2 | 4 | 2,432 | 0.00 | 0.86 | 19.33 | 58.68 | 20.31 | 0.82 | 0.00 | 58.68 | 39.64 | 1.68 | 0.39 |
| 3 | 4 | 2,432 | 0.00 | 0.70 | 18.22 | 61.39 | 18.91 | 0.78 | 0.00 | 61.39 | 37.13 | 1.48 | 0.42 |
| 4 | 4 | 2,432 | 0.00 | 0.82 | 19.61 | 58.80 | 19.94 | 0.82 | 0.00 | 58.80 | 39.55 | 1.64 | 0.40 |
| 5 | 4 | 2,432 | 0.00 | 0.86 | 20.76 | 56.95 | 20.52 | 0.86 | 0.04 | 56.95 | 41.28 | 1.76 | 0.40 |
| **Spring 2009** | | | | | | | | | | | | | |
| 1 | 4 | 32,767 | 0.01 | 0.52 | 17.41 | 64.07 | 17.37 | 0.61 | 0.00 | 64.07 | 34.78 | 1.14 | 0.32 |
| 2 | 4 | 32,767 | 0.01 | 0.49 | 17.48 | 64.16 | 17.25 | 0.60 | 0.01 | 64.16 | 34.73 | 1.11 | 0.33 |
| 3 | 4 | 32,767 | 0.00 | 0.50 | 17.04 | 65.04 | 16.84 | 0.57 | 0.00 | 65.04 | 33.88 | 1.07 | 0.33 |
| 4 | 4 | 32,767 | 0.00 | 0.81 | 18.13 | 62.26 | 18.12 | 0.68 | 0.00 | 62.26 | 36.25 | 1.49 | 0.35 |
| 5 | 4 | 32,767 | 0.01 | 0.77 | 19.14 | 60.19 | 19.09 | 0.81 | 0.01 | 60.19 | 38.23 | 1.60 | 0.34 |

Table 3.9. Inter-rater reliability for English III operational writing prompts for Winter/Trimester 2008-2009 and Spring 2009.

| | | | Point Discrepancy Percentages | | | | | | | Agreement Percentages | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trait | Max Point | Valid N | -3 | -2 | -1 | 0 | 1 | 2 | 3 | Exact | Adjacent | +/- 2 or more | Kappa |
| **Winter/Trimester 2008-2009** | | | | | | | | | | | | | |
| 1 | 4 | 2,588 | 0.00 | 0.19 | 15.69 | 67.00 | 16.81 | 0.31 | 0.00 | 67.00 | 32.50 | 0.50 | 0.53 |
| 2 | 4 | 2,588 | 0.00 | 0.35 | 16.23 | 65.77 | 17.23 | 0.43 | 0.00 | 65.77 | 33.46 | 0.78 | 0.49 |
| 3 | 4 | 2,588 | 0.00 | 0.19 | 15.49 | 68.28 | 15.80 | 0.23 | 0.00 | 68.28 | 31.29 | 0.42 | 0.51 |
| 4 | 4 | 2,588 | 0.00 | 0.35 | 16.65 | 65.15 | 17.31 | 0.54 | 0.00 | 65.15 | 33.96 | 0.89 | 0.51 |
| 5 | 4 | 2,588 | 0.00 | 0.46 | 19.59 | 58.96 | 20.32 | 0.66 | 0.00 | 58.96 | 39.91 | 1.12 | 0.48 |
| **Spring 2009** | | | | | | | | | | | | | |
| 1 | 4 | 32,456 | 0.01 | 0.74 | 18.89 | 60.89 | 18.7 | 0.75 | 0.01 | 60.89 | 37.59 | 1.51 | 0.42 |
| 2 | 4 | 32,456 | 0.01 | 0.85 | 18.91 | 60.50 | 18.85 | 0.87 | 0.01 | 60.50 | 37.76 | 1.74 | 0.42 |
| 3 | 4 | 32,456 | 0.00 | 0.51 | 17.97 | 63.29 | 17.66 | 0.56 | 0.00 | 63.29 | 35.63 | 1.07 | 0.40 |
| 4 | 4 | 32,456 | 0.00 | 0.77 | 19.30 | 60.37 | 18.71 | 0.83 | 0.01 | 60.37 | 38.01 | 1.61 | 0.43 |
| 5 | 4 | 32,456 | 0.02 | 1.19 | 21.05 | 55.65 | 20.90 | 1.19 | 0.01 | 55.65 | 41.95 | 2.41 | 0.41 |

## Section 4

## Calibration, Equating, and Scaling

### 4.1 Item Response Theory (IRT) models

*Dichotomous Item Response Theory Model.* The three-parameter logistic (3-PL) item response theory (IRT) model (Lord & Novick, 1968) was used for calibrating the multiple choice or dichotomously scored items. In the 3-PL model (Lord, 1980) the probability that a student with ability estimate of θ responds correctly to item *i* is:

$$P_i(\theta) = c_i + (1 - c_i)\frac{1}{1 + e^{-Da_i(\theta - b_i)}} \qquad (2)$$

where θ is the student proficiency parameter, $a_i$ is the item discrimination parameter, $b_i$ is the item difficulty parameter, $c_i$ is the lower asymptote parameter, and D is a scaling constant. The scaling constant is traditionally 1.7. With multiple-choice items it is assumed that, due to guessing, examinees with minimal proficiency have a probability greater than zero of responding correctly to an item. This probability is represented in the 3PL model by the $c_i$ parameter.

*Polytomous Item Response Theory Model.* For calibrating the polytomously scored constructed response or open ended (OE; or writing prompt) items, the Generalized Partial Credit (GPC; Muraki, 1997) model was used. In the GPC model, the probability that a student with proficiency $\theta$ will have a score in the $k^{th}$ category of the $i^{th}$ item is

$$P_{ik}(\hat{\theta}) = \frac{\exp\left[\sum_{v=1}^{k} a_i(\hat{\theta} - b_{iv})\right]}{\sum_{c=0}^{m_i} \exp\left[\sum_{v=0}^{c} a_i(\hat{\theta} - b_{iv})\right]} \qquad (3)$$

where $m_i$ is the total score levels for item *i* for $k = v$ category responses, $a_i$ is the slope parameter (or $Da_i$), and $b_{iv}$ is the category intersection parameters (or ($b_i - d_{iv}$) where $b_i$ is location/difficulty and $d_{iv}$ is the threshold parameters representing category boundaries relative to the item location parameter).

The IRT models were implemented using MULTILOG 7.0 (Thissen, Chen, & Bock, 2003). MULTILOG estimates parameters simultaneously for dichotomous and polytomous items via marginal maximum likelihood procedures and implements the GPC model with the appropriate parameter coding. All item and student proficiency calibrations were independently conducted and verified by at least two Pearson research scientists.

### 4.2 Assessment of IRT Fit to the model

Item fit was assessed using the Yen's (1981, 1984) Q1 item fit index, which approximately follows a $\chi 2$ distribution:

$$Q_{1i} = \sum_{r=1}^{10} \frac{N_r (O_{ir} - E_{ir})^2}{E_{ir}(1 - E_{ir})} \quad (4)$$

where $Q_{1i}$ is the fit of the *i*th item, $N_r$ is the number of examinees per cell *i*, $O_{ir}$ is the observed proportion of examinees in cell *r* that correctly answers item *i*, and $E_{ir}$ is the predicted portion of examinees in cell *r* that correctly answers item *i*. The predictions are obtained by using trait and item parameter estimates in Equations 2 and 3 and summing over examinees in cell *r*:

$$E_{ir} = \frac{1}{N_r} \sum_{k \in r}^{N_r} \hat{P}_i(\hat{\theta}_k) \quad (5)$$

Since the chi-square statistics are affected by sample size and associated degrees of freedom, the following standardization of the Q1 statistics was used:

$$Z_j = \frac{Q1_i - df}{\sqrt{(2df)}} \quad (6)$$

The Z-statistic is an index of the degree to which obtained proportions of item scores are close to the proportions that would be expected based on the estimated thetas and item parameters. In order to assess item fit, a critical Z-value is computed and item Z-values above this critical Z-value may indicate poor item fit. Differences between expected and observed item performance may indicate poor item fit. The item characteristic curves, classical item analyses, and item content were reviewed for items flagged by Q1 for potential poor fit. An internally developed software program, Q1Static.exe, was used to compute the Q1 item fit index.

Operational items flagged by Q1 that are not flagged by the classical item analyses and have reasonable IRT parameter estimates were not further reviewed. If they are also flagged by classical item analyses and/or have poor IRT parameter estimates (e.g., low *a* parameter), items were reviewed by Pearson content specialists. Any item that was potentially mis-keyed was presented to SDE to make a decision regarding whether to keep or remove the item. No such incidences occurred for Winter/Trimester 2008-2009 or Spring 2009.

### 4.2.a Calibration and IRT Fit Results

#### 4.2.a.i Winter/Trimester 2008-2009

*Algebra I.* For the Winter/Trimester 2008-2009 Algebra I assessment, based on the calibration sample, the Z-statistics for most operational items were smaller than the critical Z-statistic. Operational item 25 exhibited marginally poor fit with a Z-statistic of 5.2. The Item Characteristic Curves (ICCs) were reasonable and examination of the classical statistics for these items were also within a reasonable range (item 25: P-value=0.73 and Pbis=0.41).

*Algebra II.* For the Winter/Trimester 2008-2009 Algebra II assessment, based on the calibration sample, the Z-statistics for most operational items were smaller than the critical Z-statistic. Operational items 1, 39 (linking item), 47 (linking item), 64, and 68 exhibited marginally poor fit with Z-statistics of 4.4, 13.8, 8.9, 4.6, and 5.2, respectively. The ICCs were reasonable and examination of the classical statistics for these items were also within a reasonable range (item 1: P-value=0.82 and Pbis=0.48; item 39: P-value=0.85 and Pbis=0.41; item 47: P-value=0.60 and Pbis=0.41; item 64: P-value=0.25 and Pbis=0.31; item 68: P-value=0.56 and Pbis=0.45).

*Geometry.* For the Winter/Trimester 2008-2009 Geometry assessment, based on the calibration sample, the Z-statistics for most operational items were smaller than the critical Z-statistic. Operational items 43, 49, 56, 57, 65 (linking item), and 73 exhibited marginally poor fit with Z-statistics of 4.6, 4.0, 4.3, 5.5, 6.0, 4.4, respectively. The ICCs were reasonable and examination of the classical statistics for these items were also within a reasonable range (item 43: P-value=0.91 and Pbis=0.35; item 49: P-value=0.74 and Pbis=0.45; item 56: P-value=0.65 and Pbis=0.49; item 57: P-value=0.65 and Pbis=0.48; item 65: P-value=0.65 and Pbis=0.50; item 73: P-value=0.42 and Pbis=0.46).

*Biology I.* For the Winter/Trimester 2008-2009 Biology I assessment, based on the calibration sample, the Z-statistics for most operational items were smaller than the critical Z-statistic. Operational items 12 and 24 (linking item) exhibited marginally poor fit with Z-statistics of 5.1 and 6.4, respectively. The ICCs were reasonable and examination of the classical statistics for these items were also within a reasonable range (item 12: P-value=0.74 and Pbis=0.47; item 24: P-value=0.95 and Pbis=0.28).

*English II.* For the Winter/Trimester 2008-2009 English II assessment, based on the calibration sample, the Z-statistics for most operational items were smaller than the critical Z-statistic. Operational items 8 and 59 (linking item) exhibited marginally poor fit with Z-statistics of 11.7 and 8.6, respectively. The ICCs were reasonable and examination of the classical statistics for these items were also within a reasonable range (item 8: P-value=0.91 and Pbis=0.30; item 59: P-value=0.65 and Pbis=0.32). The writing prompt or open-ended item was also flagged for poor item fit with a Z-statistic of 107.8. Examination of the Item Category Response Function (ICRF) indicated that the poor fit can be explained, partly, by the fact that less than the expected proportion of students obtained a score in certain categories; however, overall observed and expected proportion

of maximum score curves indicated that the fit was reasonable. The classical statistics were also within reasonable range (P-value=0.53 and Pbis=0.58).

*English III.* For the Winter/Trimester 2008-2009 English III assessment, based on the calibration sample, the Z-statistics for all operational multiple-choice items were smaller than the critical Z-statistic. The writing prompt or open-ended item was also flagged for poor item fit with a Z-statistic of 18.7. Examination of the Item Category Response Function (ICRF) indicated that the poor fit can be explained, partly, by the fact that less than the expected proportion of students obtained a score in certain categories; however, overall observed and expected proportion of maximum score curves indicated that the fit was reasonable. The classical statistics were also within reasonable range (P-value=0.64 and Pbis=0.55).

*U.S. History.* For the Winter/Trimester 2008-2009 U.S. History assessment, based on the calibration sample, the Z-statistics for all operational items were smaller than the critical Z-statistic. There were no U.S. History items flagged by the Q1 index.

No items were dropped from any of the Winter/Trimester 2008-2009 ACE EOI assessments for calibration, equating, or scoring as a result of the Q1 results.

### 4.2.a.ii Spring 2009

*Algebra I.* For the Spring 2009 Algebra I assessment, based on the calibration sample, the Z-statistics for all operational items were smaller than the critical Z-statistic. There were no Algebra I items flagged by the Q1 index.

*Algebra II.* For the Spring 2009 Algebra II assessment, based on the calibration sample, the Z-statistics for most operational items were smaller than the critical Z-statistic. Operational items 35 (linking item), 39 (linking item), and 49 exhibited marginally poor fit with Z-statistics of 100.3, 140.7, and 115.9, respectively. The ICCs were reasonable and examination of the classical statistics for these items were also within the reasonable range (item 35: P-value=0.90 and Pbis=0.30; item 39: P-value=0.81 and Pbis=0.41; item 49: P-value=0.85 and Pbis=0.37).

*Geometry.* For the Spring 2009 Geometry assessment, based on the calibration sample, the Z-statistics for all operational items were smaller than the critical Z-statistic. There were no Geometry items flagged by the Q1 index.

*Biology I.* For the Spring 2009 Biology I assessment, based on the calibration sample, the Z-statistics for all operational items were smaller than the critical Z-statistic. There were no Biology I items flagged by the Q1 index.

*English II.* For the Spring 2009 English II assessment, based on the calibration sample, the Z-statistics for most operational items were smaller than the critical Z-statistic. One operational multiple choice item, item 61 (linking item), exhibited marginally poor fit with a Z-statistic of 145.2. The ICC was reasonable and examination of the classical

statistics for this item were also within the reasonable range (item 61: P-value=0.67 and Pbis=0.31). The writing prompt or open-ended item was also flagged for poor item fit with a Z-statistic of 7219.1. Examination of the Category Response Function (CRF) indicated that the poor fit can be explained, partly, by the fact that a different than the expected proportion of students obtained a score in certain categories mostly at the lower and higher ability levels; however, overall observed and expected proportion of maximum score curves indicated that the fit was reasonable. The classical statistics were also within reasonable range (P-value=0.56 and Pbis=0.61).

*English III.* For the Spring 2009 English III assessment, based on the calibration sample, the Z-statistics for all operational multiple-choice items were smaller than the critical Z-statistic. The writing prompt or open-ended item was also flagged for poor item fit with a Z-statistic of 8799.8. Examination of the CRF indicated that the poor fit can be explained, partly, by the fact that the expected proportion of students were different from the obtained a score in a particularly category mostly at the lower and upper theta estimates; however, overall observed and expected proportion of maximum score curves indicated that the fit was reasonable. The classical statistics were also within reasonable range (P-value=0.74 and Pbis=0.61).

*U.S. History.* For the Spring 2009 U.S. History assessment, based on the calibration sample, the Z-statistics for all operational items were smaller than the critical Z-statistic. There were no U.S. History items flagged by the Q1 index.

No items were dropped from any of the Spring 2009 ACE EOI assessments for calibration, equating, or scoring as a result of the Q1 index.

*Field Test Items.* The field test items across all subjects were evaluated using the Q1 statistic to evaluate the extent the obtained proportions of item scores are close to the proportions that would be expected based on the estimated thetas and item parameters. Any field test items flagged by Q1 were included in the data review for review by contest specialists from Pearson and SDE (for more on data review, please see Section 3.4).

## 4.3 Calibration and Equating

The 3-PL model was used for calibration of Algebra I, Algebra II, Geometry, Biology I, and U.S. History because all of these areas consisted of only multiple choice items. Since English II and English III have multiple choice and constructed response items, a simultaneous calibration with the 3-PL and GPC models was implemented.

A common item non-equivalent groups design was used for all content areas to link the current test forms (i.e., Winter/Trimester 2008-2009 and Spring 2009) to the base years' scale. The common, or anchor, items were selected to be representative of the test content in terms item difficulties and the test blueprint. The anchor items are critical to obtaining results that are comparable from year to year. The Stocking and Lord (1983) procedure was used to equate the tests to the base year, which estimates the equating transformation

constants by minimizing the distance between the test characteristic curves of the common items.

Equating was conducted employing the Stocking and Lord (1983) procedure using publicly available software, STUIRT (Kim & Kolen, 2004). Prior to conducting the equating, anchor item stability checks were performed to eliminate the impact of item drift on equating.

### 4.4 Anchor Item Stability Evaluation Methods

Despite the careful selection of anchor items, it is plausible that the anchor items may perform differentially across administrations. Dramatic changes in anchor item parameter values can result in systematic errors in equating results (Kolen & Brennan, 2004). As a result, prior to finalizing the equating constants, we evaluated changes in the item parameters from the Spring 2008 operational administration to the Spring 2009 administration (only operational items could serve as year-to-year linking items). The process used in this evaluation is called an anchor item parameter stability check. Our approach is iterative and the procedures are outlined next.

The anchor stability check performed is an iterative approach and uses a procedure that is analogous to examining differential item functioning and is called the $d^2$ procedure. The steps taken for Algebra I, Algebra II, English III, and Geometry were as follows:

1) Use a theoretically weighted posterior theta distribution with 40 quadrature points.
2) Place the current linking item parameters on the baseline scale by computing Stocking & Lord (SL) constants using STUIRT and all (k) linking items.
3) Apply the SL linking constants to the current item parameters and compute the current raw to scale table. The results based on all k linking items will comprise the "original table".
4) For each linking item, calculate the weighted sum of the squared deviation between the Item Characteristic Curves (ICC; $d^2$):
   a) Apply the SL constants to the thetas associated with the standard normal theta distribution used to generate the SL constants.
   b) For each anchor item calculate a weighted sum of the squared deviation between the ICCs ($d^2$) based on old (x) and new (y) parameters at each point in this theta distribution.

$$d_i^{\,2} = \sum^{k} \left[ P_{ix}(\theta_k) - P_{iy}(\theta_k) \right]^2 \bullet g(\theta_k) \qquad (4)$$

   c) Review and sort the items in a descending (largest to smallest) fashion according to the $d^2$ estimate.
   d) From Step c) results in an items with the largest area at the top:
      i) Drop the largest $d^2$ item from the linking set.
      ii) Repeat steps 2 through 3c) using k-1 linking items.
   e) Terminate when either the number of linking items remaining is 20% or the raw to scale tables across iterations do not differ. The raw score to scale score table before the last iteration becomes the final table.

The anchor stability check implemented for Biology I, English II, and U.S. History (for Spring 2009 only; Winter/Trimester 2008-2009 followed the procedures outlined above) was slightly modified from the anchor stability checks used for Algebra I, Algebra II, Geometry, and English III, which has stopping criteria at 4d) based on stability of the raw score to scale score table at each of the cut score points. Since the cut score points were not available until after the Standard Setting and the item parameter estimates were required to be on the baseline operational metric, the stopping criteria was modified in 4e). The stopping criteria for Biology I, English II, and U.S. History for Spring 2009 were as follows:

4e) Terminate when either the number of linking items is 11 or there are no "large" $d^2$ values remaining. "Large" is defined by a $d^2$ value that is an outlier based on the original distribution of $d^2$. Outlier is defined as falling outside the 95% confidence interval around the mean of the original $d^2$ distribution. The item with the largest $d^2$ value will dropped and the anchor stability check re-ran and items can only dropped iteratively, one at a time. The Lord and Stocking equating constants computed during the final step, when there are no more "large" $d^2$ values will be the constants used for equating the operational items to the baseline operational scale. This will leave a minimum of 11 items in the linking set.

Before removing any anchor item, the following additional characteristics were examined: 1) prior and current year p-values and point-biserials, 2) prior and current year IRT parameters, 3) prior and current year item sequence, 4) standard and objective/skill of the item, 5) impact on blueprint representation, 6) Passage ID/Title if the item is part of stimulus, and 7) content review of the actual item. Decisions about whether to keep or remove an item were evaluated on a per item basis. If an item (note, only one item can be removed at a time) was removed from the anchor set, the process (beginning at the equating step) was be repeated until there were no further items to be removed (the raw score to scale score table has stabilized or the item is judged that it should be included in the equating set; for example, a portion of the blueprint is not represented if the item is removed).

### 4.4.a Anchor Items for Winter/Trimester 2008-2009 and Spring 2009

Table 4.1 presents the number and proportion of anchor items by subject for the Winter/Trimester 2008-2009 and Spring 2009 administrations. The anchor set was comprised of approximately 20 items or greater than 25% of all operational items and as seen in Table 4.1 varies by subject. In addition, the anchor set was proportionally representative of the total test in terms of content assessed and mimicked the difficulty of the overall test as well.

Table 4.1. Number of anchor items per subject

| Operational Test | Number of Items on Test | Number of Anchors | Percent of Test |
|---|---|---|---|
| Algebra I | 55 | 16 | 29% |
| Algebra II | 55 | 15 | 27% |
| Biology I | 60 | 18 | 30% |
| English II | 61 | 21 | 34% |
| English III | 63 | 18 | 29% |
| Geometry | 55 | 15 | 27% |
| U.S. History | 60 | 20 | 33% |

### 4.4.b Results of the Anchor Item Stability Check

Once the anchor set was finalized, the equating constants obtained from the final Stocking and Lord (1983) run were applied to the non-anchor operational items for computation of raw score to scale score tables. For Winter/Trimester 2008-2009, three items were removed from Algebra I and English II, two items from Algebra II and Geometry, one item from English III, and zero items from Biology I and U.S. History as a result of the anchor item stability check. For Spring 2009, there were two anchor items removed from Algebra I, zero items from Algebra II, one item from Geometry, Biology I, English II, and U.S. History, and zero items from English III. Any item removed from the anchor set still contributed to student scores.

### 4.5 Scaling and Scoring Results

The Lowest Obtainable Scale Score (LOSS), Highest Obtainable Scale Score (HOSS), and final scaling constants for each of the subjects are shown in Table 4.2. The scaling constants, M1 (multiplicative) and M2 (additive), place the true scores associated with each raw score point onto the reporting or operational scale using a straightforward linear transformation:

$$\text{Scale Score} = (\hat{\tau} \times M1) + M2 \qquad (5)$$

where, $\hat{\tau}$ = true score.

The raw score to number-correct scales scores were generated from equated parameter estimates using a publicly available software program POLYEQUATE (Kolen, 2004). For a particular scale score, it is associated with a performance level on the assessment that describes the types of behaviors, knowledge, and skill, a student in this score level is likely to be able to do. For the ACE EOI assessments there are 3 cut scores that divide scores into 4 performance levels, Unsatisfactory, Limited Knowledge, Proficient/Satisfactory, and Advanced. The cut scores for each of the tests appears in Table 4.3. In addition, a Conditional Standard Error of Measurement (CSEM; please see section 7.3 for computation of CSEM) was computed for each of the raw score points. The resulting raw score to scale scores conversions, CSEMs, as well as the performance levels for Algebra I, Algebra II, Geometry, Biology I, English II, English III, and U.S.

History are shown in Tables 4.4 and 4.5 for Winter/Trimester 2008-2009 and Spring 2009, respectively.

Table 4.2. LOSS, HOSS, and Scaling Constants by Subject.

| Subject | LOSS | HOSS | M1 | M2 |
|---|---|---|---|---|
| **Algebra I** | 490 | 999 | 58.0000 | 723.8000 |
| **Algebra II** | 440 | 999 | 77.1164 | 692.2381 |
| **Geometry** | 440 | 999 | 75.51595 | 721.9844 |
| **English III** | 440 | 999 | 74.32896 | 736.1256 |
| **Biology*** | 440 | 999 | 76.49429 | 716.76173 |
| **English II*** | 440 | 999 | 84.80517 | 734.90335 |
| **US History*** | 440 | 999 | 77.92698 | 722.20515 |

***Note:** These are the scaling constants after the June 2009 Standard Setting and State Board of Education approval of the phased-in cut scores.

Table 4.3. Performance Level Cut Scores by Content Area.

| Subject | Cut Scores | | |
|---|---|---|---|
| | Limited Knowledge | Proficient | Advanced |
| **Algebra I** | 639 | 684 | 746 |
| **Algebra II** | 651 | 696 | 774 |
| **Geometry** | 635 | 695 | 774 |
| **English III** | 649 | 695 | 795 |
| **Biology I*** | 627 | 691 | 775 |
| **English II*** | 588 | 693 | 797 |
| **U.S. History*** | 603 | 689 | 747 |

***Note:** These are cut scores after the June 2009 Standard Setting and State Board of Education approval.

Table 4.4. Raw Score to Scale Score Conversion Tables for Winter/Trimester 2008-2009

| | Algebra I | | | Biology I | | | U.S. History | | | English II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 0 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 1 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 2 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 3 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 4 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 5 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 6 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 7 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 8 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 9 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 10 | 490 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 11 | 507 | 55 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 12 | 567 | 59 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 13 | 593 | 59 | 1 | 440 | 41 | 1 | 440 | 54 | 1 | 440 | 36 | 1 |
| 14 | 610 | 57 | 1 | 461 | 44 | 1 | 484 | 58 | 1 | 440 | 36 | 1 |
| 15 | 623 | 52 | 1 | 488 | 48 | 1 | 519 | 61 | 1 | 440 | 36 | 1 |
| 16 | 639 | 46 | 2 | 509 | 51 | 1 | 544 | 62 | 1 | 443 | 37 | 1 |
| 17 | 643 | 40 | 2 | 527 | 51 | 1 | 562 | 60 | 1 | 470 | 42 | 1 |
| 18 | 651 | 35 | 2 | 542 | 50 | 1 | 577 | 56 | 1 | 490 | 45 | 1 |
| 19 | 658 | 30 | 2 | 557 | 48 | 1 | 590 | 52 | 1 | 508 | 46 | 1 |
| 20 | 664 | 26 | 2 | 570 | 46 | 1 | 603 | 47 | 2 | 523 | 46 | 1 |
| 21 | 670 | 23 | 2 | 582 | 43 | 1 | 611 | 42 | 2 | 536 | 45 | 1 |
| 22 | 676 | 21 | 2 | 593 | 40 | 1 | 620 | 38 | 2 | 548 | 44 | 1 |
| 23 | 684 | 19 | 3 | 604 | 38 | 1 | 629 | 34 | 2 | 559 | 41 | 1 |
| 24 | 686 | 18 | 3 | 614 | 36 | 1 | 637 | 31 | 2 | 569 | 39 | 1 |
| 25 | 690 | 17 | 3 | 627 | 34 | 2 | 644 | 29 | 2 | 578 | 36 | 1 |
| 26 | 695 | 16 | 3 | 632 | 32 | 2 | 651 | 27 | 2 | 588 | 34 | 2 |
| 27 | 699 | 15 | 3 | 641 | 31 | 2 | 658 | 26 | 2 | 596 | 33 | 2 |
| 28 | 703 | 15 | 3 | 649 | 29 | 2 | 665 | 24 | 2 | 604 | 31 | 2 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.4 cont. Raw Score to Scale Score Conversion Tables for Winter/Trimester 2008-2009

| | Algebra I | | | Biology I | | | U.S. History | | | English II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 29 | 707 | 15 | 3 | 657 | 28 | 2 | 671 | 23 | 2 | 612 | 30 | 2 |
| 30 | 711 | 14 | 3 | 665 | 27 | 2 | 677 | 22 | 2 | 619 | 28 | 2 |
| 31 | 715 | 14 | 3 | 672 | 26 | 2 | 683 | 22 | 2 | 627 | 27 | 2 |
| 32 | 719 | 14 | 3 | 680 | 26 | 2 | 689 | 21 | 3 | 634 | 27 | 2 |
| 33 | 723 | 14 | 3 | 691 | 25 | 3 | 694 | 20 | 3 | 641 | 26 | 2 |
| 34 | 727 | 14 | 3 | 694 | 24 | 3 | 700 | 20 | 3 | 648 | 25 | 2 |
| 35 | 731 | 13 | 3 | 700 | 24 | 3 | 705 | 19 | 3 | 654 | 24 | 2 |
| 36 | 735 | 13 | 3 | 707 | 23 | 3 | 711 | 19 | 3 | 661 | 24 | 2 |
| 37 | 739 | 13 | 3 | 714 | 23 | 3 | 716 | 19 | 3 | 667 | 23 | 2 |
| 38 | 746 | 13 | 4 | 721 | 23 | 3 | 721 | 19 | 3 | 673 | 23 | 2 |
| 39 | 747 | 13 | 4 | 727 | 22 | 3 | 727 | 19 | 3 | 680 | 23 | 2 |
| 40 | 751 | 13 | 4 | 734 | 22 | 3 | 732 | 19 | 3 | 686 | 22 | 2 |
| 41 | 755 | 14 | 4 | 740 | 22 | 3 | 737 | 19 | 3 | 693 | 22 | 3 |
| 42 | 760 | 14 | 4 | 747 | 22 | 3 | 747 | 19 | 4 | 698 | 22 | 3 |
| 43 | 764 | 14 | 4 | 754 | 22 | 3 | 749 | 19 | 4 | 704 | 22 | 3 |
| 44 | 769 | 15 | 4 | 761 | 22 | 3 | 754 | 19 | 4 | 710 | 22 | 3 |
| 45 | 775 | 15 | 4 | 768 | 22 | 3 | 760 | 19 | 4 | 717 | 22 | 3 |
| 46 | 780 | 16 | 4 | 775 | 22 | 4 | 767 | 20 | 4 | 723 | 22 | 3 |
| 47 | 786 | 17 | 4 | 783 | 23 | 4 | 773 | 20 | 4 | 729 | 22 | 3 |
| 48 | 793 | 18 | 4 | 790 | 23 | 4 | 780 | 21 | 4 | 736 | 22 | 3 |
| 49 | 800 | 21 | 4 | 798 | 24 | 4 | 787 | 22 | 4 | 743 | 23 | 3 |
| 50 | 809 | 24 | 4 | 807 | 25 | 4 | 795 | 22 | 4 | 750 | 23 | 3 |
| 51 | 819 | 30 | 4 | 816 | 26 | 4 | 803 | 24 | 4 | 757 | 24 | 3 |
| 52 | 833 | 40 | 4 | 825 | 27 | 4 | 812 | 25 | 4 | 765 | 25 | 3 |
| 53 | 851 | 53 | 4 | 836 | 29 | 4 | 822 | 27 | 4 | 773 | 26 | 3 |
| 54 | 884 | 65 | 4 | 848 | 31 | 4 | 833 | 29 | 4 | 782 | 27 | 3 |
| 55 | 999 | 34 | 4 | 861 | 35 | 4 | 846 | 33 | 4 | 797 | 28 | 4 |
| 56 | | | | 877 | 39 | 4 | 861 | 37 | 4 | 802 | 30 | 4 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.4 cont. Raw Score to Scale Score Conversion Tables for Winter/Trimester 2008-2009

| | Algebra I | | | Biology I | | | U.S. History | | | English II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 57 | | | | 898 | 42 | 4 | 881 | 41 | 4 | 813 | 32 | 4 |
| 58 | | | | 926 | 42 | 4 | 907 | 44 | 4 | 825 | 34 | 4 |
| 59 | | | | 974 | 34 | 4 | 950 | 40 | 4 | 839 | 37 | 4 |
| 60 | | | | 999 | 28 | 4 | 999 | 31 | 4 | 855 | 41 | 4 |
| 61 | | | | | | | | | | 874 | 44 | 4 |
| 62 | | | | | | | | | | 898 | 47 | 4 |
| 63 | | | | | | | | | | 927 | 46 | 4 |
| 64 | | | | | | | | | | 969 | 39 | 4 |
| 65 | | | | | | | | | | 999 | 32 | 4 |
| 66 | | | | | | | | | | 999 | 32 | 4 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.4 cont. Raw Score to Scale Score Conversion Tables for Winter/Trimester 2008-2009

| | Algebra II | | | Geometry | | | English III | | |
|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 0 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 1 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 2 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 3 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 4 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 5 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 6 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 7 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 8 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 9 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 10 | 440 | 60 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 11 | 471 | 63 | 1 | 440 | 61 | 1 | 440 | 53 | 1 |
| 12 | 523 | 67 | 1 | 511 | 67 | 1 | 440 | 53 | 1 |
| 13 | 555 | 68 | 1 | 545 | 69 | 1 | 440 | 53 | 1 |
| 14 | 577 | 66 | 1 | 569 | 68 | 1 | 487 | 58 | 1 |
| 15 | 595 | 61 | 1 | 587 | 63 | 1 | 522 | 61 | 1 |
| 16 | 609 | 55 | 1 | 602 | 58 | 1 | 546 | 62 | 1 |
| 17 | 622 | 49 | 1 | 614 | 51 | 1 | 564 | 60 | 1 |
| 18 | 633 | 43 | 1 | 635 | 45 | 2 | 578 | 57 | 1 |
| 19 | 643 | 38 | 1 | 636 | 39 | 2 | 590 | 53 | 1 |
| 20 | 651 | 34 | 2 | 645 | 35 | 2 | 601 | 49 | 1 |
| 21 | 660 | 30 | 2 | 654 | 31 | 2 | 611 | 44 | 1 |
| 22 | 667 | 28 | 2 | 662 | 29 | 2 | 619 | 40 | 1 |
| 23 | 674 | 26 | 2 | 669 | 26 | 2 | 628 | 37 | 1 |
| 24 | 681 | 24 | 2 | 676 | 25 | 2 | 636 | 34 | 1 |
| 25 | 688 | 23 | 2 | 683 | 23 | 2 | 649 | 31 | 2 |
| 26 | 696 | 22 | 3 | 689 | 22 | 2 | 650 | 29 | 2 |
| 27 | 700 | 21 | 3 | 695 | 21 | 3 | 657 | 28 | 2 |
| 28 | 706 | 21 | 3 | 701 | 20 | 3 | 663 | 26 | 2 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.4 cont. Raw Score to Scale Score Conversion Tables for Winter/Trimester 2008-2009

| | Algebra II | | | Geometry | | | English III | | |
|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 29 | 712 | 20 | 3 | 707 | 20 | 3 | 670 | 25 | 2 |
| 30 | 717 | 19 | 3 | 712 | 19 | 3 | 676 | 24 | 2 |
| 31 | 723 | 19 | 3 | 718 | 19 | 3 | 682 | 23 | 2 |
| 32 | 728 | 19 | 3 | 723 | 18 | 3 | 687 | 23 | 2 |
| 33 | 734 | 19 | 3 | 728 | 18 | 3 | 695 | 22 | 3 |
| 34 | 739 | 18 | 3 | 734 | 18 | 3 | 698 | 21 | 3 |
| 35 | 745 | 18 | 3 | 739 | 17 | 3 | 704 | 21 | 3 |
| 36 | 750 | 18 | 3 | 744 | 17 | 3 | 709 | 21 | 3 |
| 37 | 756 | 18 | 3 | 749 | 17 | 3 | 714 | 20 | 3 |
| 38 | 762 | 18 | 3 | 754 | 17 | 3 | 719 | 20 | 3 |
| 39 | 767 | 18 | 3 | 760 | 17 | 3 | 724 | 20 | 3 |
| 40 | 774 | 19 | 4 | 765 | 17 | 3 | 729 | 19 | 3 |
| 41 | 779 | 19 | 4 | 774 | 17 | 4 | 734 | 19 | 3 |
| 42 | 786 | 19 | 4 | 777 | 18 | 4 | 739 | 19 | 3 |
| 43 | 792 | 19 | 4 | 783 | 18 | 4 | 744 | 19 | 3 |
| 44 | 799 | 20 | 4 | 789 | 18 | 4 | 749 | 19 | 3 |
| 45 | 806 | 20 | 4 | 796 | 18 | 4 | 754 | 18 | 3 |
| 46 | 814 | 21 | 4 | 803 | 19 | 4 | 759 | 18 | 3 |
| 47 | 822 | 22 | 4 | 810 | 20 | 4 | 764 | 18 | 3 |
| 48 | 831 | 24 | 4 | 818 | 21 | 4 | 769 | 18 | 3 |
| 49 | 841 | 27 | 4 | 827 | 23 | 4 | 774 | 18 | 3 |
| 50 | 852 | 30 | 4 | 837 | 26 | 4 | 779 | 18 | 3 |
| 51 | 866 | 34 | 4 | 848 | 31 | 4 | 784 | 19 | 3 |
| 52 | 883 | 39 | 4 | 863 | 38 | 4 | 795 | 19 | 4 |
| 53 | 909 | 43 | 4 | 883 | 46 | 4 | 796 | 19 | 4 |
| 54 | 954 | 39 | 4 | 918 | 50 | 4 | 801 | 19 | 4 |
| 55 | 999 | 30 | 4 | 999 | 35 | 4 | 807 | 20 | 4 |
| 56 | | | | | | | 813 | 20 | 4 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.4 cont. Raw Score to Scale Score Conversion Tables for Winter/Trimester 2008-2009

| | Algebra II | | | Geometry | | | English III | | |
|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 57 | | | | | | | 820 | 21 | 4 |
| 58 | | | | | | | 826 | 22 | 4 |
| 59 | | | | | | | 834 | 23 | 4 |
| 60 | | | | | | | 841 | 24 | 4 |
| 61 | | | | | | | 849 | 25 | 4 |
| 62 | | | | | | | 858 | 27 | 4 |
| 63 | | | | | | | 868 | 28 | 4 |
| 64 | | | | | | | 879 | 31 | 4 |
| 65 | | | | | | | 891 | 33 | 4 |
| 66 | | | | | | | 905 | 36 | 4 |
| 67 | | | | | | | 921 | 38 | 4 |
| 68 | | | | | | | 940 | 38 | 4 |
| 69 | | | | | | | 965 | 34 | 4 |
| 70 | | | | | | | 999 | 26 | 4 |
| 71 | | | | | | | 999 | 26 | 4 |
| 72 | | | | | | | 999 | 26 | 4 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.5. Raw Score to Scale Score Conversion Tables for Spring 2009

| | Algebra I | | | Biology I | | | U.S. History | | | English II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 0 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 1 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 2 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 3 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 4 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 5 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 6 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 7 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 8 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 9 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 10 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 11 | 490 | 46 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 12 | 538 | 51 | 1 | 440 | 40 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 13 | 566 | 53 | 1 | 466 | 44 | 1 | 440 | 46 | 1 | 440 | 32 | 1 |
| 14 | 585 | 53 | 1 | 491 | 48 | 1 | 452 | 48 | 1 | 440 | 32 | 1 |
| 15 | 600 | 50 | 1 | 512 | 50 | 1 | 486 | 53 | 1 | 444 | 33 | 1 |
| 16 | 613 | 47 | 1 | 529 | 50 | 1 | 512 | 56 | 1 | 466 | 38 | 1 |
| 17 | 624 | 42 | 1 | 544 | 49 | 1 | 533 | 57 | 1 | 485 | 41 | 1 |
| 18 | 639 | 38 | 2 | 558 | 47 | 1 | 551 | 56 | 1 | 501 | 42 | 1 |
| 19 | 642 | 33 | 2 | 570 | 44 | 1 | 566 | 53 | 1 | 515 | 43 | 1 |
| 20 | 650 | 30 | 2 | 582 | 41 | 1 | 580 | 50 | 1 | 527 | 42 | 1 |
| 21 | 657 | 27 | 2 | 592 | 39 | 1 | 592 | 46 | 1 | 539 | 41 | 1 |
| 22 | 664 | 25 | 2 | 602 | 36 | 1 | 603 | 42 | 2 | 550 | 40 | 1 |
| 23 | 671 | 23 | 2 | 612 | 34 | 1 | 613 | 38 | 2 | 560 | 38 | 1 |
| 24 | 677 | 21 | 2 | 627 | 32 | 2 | 622 | 35 | 2 | 569 | 36 | 1 |
| 25 | 684 | 20 | 3 | 629 | 30 | 2 | 631 | 33 | 2 | 578 | 34 | 1 |
| 26 | 688 | 19 | 3 | 637 | 29 | 2 | 639 | 30 | 2 | 588 | 32 | 2 |
| 27 | 693 | 18 | 3 | 645 | 28 | 2 | 647 | 29 | 2 | 595 | 31 | 2 |
| 28 | 698 | 17 | 3 | 652 | 27 | 2 | 654 | 27 | 2 | 603 | 30 | 2 |
| 29 | 703 | 17 | 3 | 659 | 26 | 2 | 661 | 26 | 2 | 610 | 29 | 2 |

Table 4.5 cont. Raw Score to Scale Score Conversion Tables for Spring 2009

| | Algebra I | | | Biology I | | | U.S. History | | | English II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 30 | 708 | 16 | 3 | 666 | 25 | 2 | 668 | 25 | 2 | 618 | 28 | 2 |
| 31 | 712 | 16 | 3 | 673 | 24 | 2 | 674 | 24 | 2 | 625 | 27 | 2 |
| 32 | 717 | 15 | 3 | 680 | 23 | 2 | 681 | 23 | 2 | 632 | 26 | 2 |
| 33 | 721 | 15 | 3 | 691 | 23 | 3 | 689 | 22 | 3 | 639 | 25 | 2 |
| 34 | 726 | 14 | 3 | 692 | 22 | 3 | 693 | 22 | 3 | 645 | 25 | 2 |
| 35 | 730 | 14 | 3 | 699 | 22 | 3 | 699 | 21 | 3 | 652 | 24 | 2 |
| 36 | 734 | 14 | 3 | 705 | 21 | 3 | 705 | 21 | 3 | 659 | 24 | 2 |
| 37 | 738 | 14 | 3 | 711 | 21 | 3 | 711 | 20 | 3 | 665 | 23 | 2 |
| 38 | 746 | 14 | 4 | 717 | 21 | 3 | 716 | 20 | 3 | 671 | 23 | 2 |
| 39 | 747 | 14 | 4 | 723 | 20 | 3 | 722 | 20 | 3 | 678 | 23 | 2 |
| 40 | 751 | 14 | 4 | 729 | 20 | 3 | 728 | 20 | 3 | 684 | 23 | 2 |
| 41 | 755 | 14 | 4 | 735 | 20 | 3 | 734 | 20 | 3 | 693 | 22 | 3 |
| 42 | 760 | 14 | 4 | 741 | 20 | 3 | 740 | 20 | 3 | 696 | 22 | 3 |
| 43 | 765 | 14 | 4 | 747 | 20 | 3 | 747 | 20 | 4 | 703 | 22 | 3 |
| 44 | 770 | 15 | 4 | 753 | 20 | 3 | 752 | 20 | 4 | 709 | 22 | 3 |
| 45 | 775 | 15 | 4 | 759 | 20 | 3 | 758 | 21 | 4 | 716 | 22 | 3 |
| 46 | 780 | 16 | 4 | 766 | 20 | 3 | 765 | 21 | 4 | 722 | 23 | 3 |
| 47 | 787 | 17 | 4 | 775 | 20 | 4 | 772 | 22 | 4 | 729 | 23 | 3 |
| 48 | 793 | 19 | 4 | 779 | 20 | 4 | 779 | 22 | 4 | 736 | 23 | 3 |
| 49 | 801 | 21 | 4 | 786 | 20 | 4 | 787 | 23 | 4 | 743 | 23 | 3 |
| 50 | 810 | 25 | 4 | 793 | 21 | 4 | 795 | 24 | 4 | 750 | 24 | 3 |
| 51 | 820 | 31 | 4 | 800 | 22 | 4 | 804 | 25 | 4 | 758 | 24 | 3 |
| 52 | 834 | 40 | 4 | 809 | 23 | 4 | 814 | 27 | 4 | 766 | 25 | 3 |
| 53 | 852 | 53 | 4 | 817 | 25 | 4 | 824 | 29 | 4 | 774 | 26 | 3 |
| 54 | 885 | 64 | 4 | 827 | 27 | 4 | 836 | 31 | 4 | 783 | 27 | 3 |
| 55 | 999 | 38 | 4 | 839 | 30 | 4 | 850 | 35 | 4 | 797 | 29 | 4 |
| 56 | | | | 852 | 35 | 4 | 866 | 40 | 4 | 803 | 31 | 4 |
| 57 | | | | 869 | 40 | 4 | 886 | 44 | 4 | 815 | 33 | 4 |
| 58 | | | | 893 | 46 | 4 | 914 | 46 | 4 | 828 | 36 | 4 |
| 59 | | | | 933 | 46 | 4 | 967 | 38 | 4 | 843 | 39 | 4 |

Table 4.5 cont. Raw Score to Scale Score Conversion Tables for Spring 2009

| | Algebra I | | | Biology I | | | U.S. History | | | English II | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 60 | | | | 999 | 34 | 4 | 999 | 31 | 4 | 860 | 43 | 4 |
| 61 | | | | | | | | | | 881 | 47 | 4 |
| 62 | | | | | | | | | | 906 | 49 | 4 |
| 63 | | | | | | | | | | 940 | 46 | 4 |
| 64 | | | | | | | | | | 986 | 36 | 4 |
| 65 | | | | | | | | | | 999 | 33 | 4 |
| 66 | | | | | | | | | | 999 | 33 | 4 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.5 cont. Raw Score to Scale Score Conversion Tables for Spring 2009

| | Algebra II | | | Geometry | | | English III | | |
|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 0 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 1 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 2 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 3 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 4 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 5 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 6 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 7 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 8 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 9 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 10 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 11 | 440 | 69 | 1 | 440 | 61 | 1 | 440 | 44 | 1 |
| 12 | 475 | 71 | 1 | 508 | 66 | 1 | 451 | 45 | 1 |
| 13 | 535 | 76 | 1 | 544 | 69 | 1 | 492 | 50 | 1 |
| 14 | 570 | 77 | 1 | 567 | 68 | 1 | 517 | 53 | 1 |
| 15 | 595 | 74 | 1 | 585 | 64 | 1 | 535 | 53 | 1 |
| 16 | 614 | 68 | 1 | 601 | 58 | 1 | 550 | 52 | 1 |
| 17 | 630 | 60 | 1 | 614 | 52 | 1 | 562 | 49 | 1 |
| 18 | 651 | 53 | 2 | 635 | 45 | 2 | 573 | 45 | 1 |
| 19 | 653 | 46 | 2 | 636 | 40 | 2 | 583 | 42 | 1 |
| 20 | 663 | 39 | 2 | 646 | 35 | 2 | 592 | 38 | 1 |
| 21 | 672 | 34 | 2 | 655 | 32 | 2 | 600 | 35 | 1 |
| 22 | 679 | 30 | 2 | 663 | 29 | 2 | 608 | 32 | 1 |
| 23 | 686 | 27 | 2 | 671 | 26 | 2 | 615 | 30 | 1 |
| 24 | 696 | 25 | 3 | 678 | 25 | 2 | 623 | 28 | 1 |
| 25 | 699 | 23 | 3 | 685 | 23 | 2 | 629 | 27 | 1 |
| 26 | 705 | 22 | 3 | 695 | 22 | 3 | 636 | 26 | 1 |
| 27 | 711 | 20 | 3 | 697 | 21 | 3 | 642 | 25 | 1 |
| 28 | 716 | 20 | 3 | 703 | 20 | 3 | 649 | 24 | 2 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.5 cont. Raw Score to Scale Score Conversion Tables for Spring 2009

| | Algebra II | | | Geometry | | | English III | | |
|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 29 | 722 | 19 | 3 | 709 | 19 | 3 | 654 | 23 | 2 |
| 30 | 727 | 18 | 3 | 714 | 18 | 3 | 660 | 22 | 2 |
| 31 | 732 | 18 | 3 | 719 | 17 | 3 | 665 | 22 | 2 |
| 32 | 737 | 17 | 3 | 724 | 17 | 3 | 671 | 21 | 2 |
| 33 | 742 | 17 | 3 | 729 | 16 | 3 | 676 | 21 | 2 |
| 34 | 747 | 17 | 3 | 734 | 16 | 3 | 682 | 21 | 2 |
| 35 | 752 | 17 | 3 | 739 | 16 | 3 | 687 | 20 | 2 |
| 36 | 757 | 16 | 3 | 743 | 16 | 3 | 695 | 20 | 3 |
| 37 | 762 | 16 | 3 | 748 | 15 | 3 | 698 | 20 | 3 |
| 38 | 767 | 16 | 3 | 753 | 15 | 3 | 703 | 19 | 3 |
| 39 | 774 | 16 | 4 | 758 | 15 | 3 | 708 | 19 | 3 |
| 40 | 777 | 16 | 4 | 762 | 15 | 3 | 713 | 19 | 3 |
| 41 | 782 | 16 | 4 | 767 | 15 | 3 | 718 | 18 | 3 |
| 42 | 788 | 17 | 4 | 774 | 15 | 4 | 723 | 18 | 3 |
| 43 | 793 | 17 | 4 | 778 | 16 | 4 | 728 | 18 | 3 |
| 44 | 799 | 18 | 4 | 783 | 16 | 4 | 733 | 18 | 3 |
| 45 | 806 | 18 | 4 | 789 | 16 | 4 | 737 | 17 | 3 |
| 46 | 812 | 19 | 4 | 795 | 17 | 4 | 742 | 17 | 3 |
| 47 | 819 | 20 | 4 | 801 | 18 | 4 | 747 | 17 | 3 |
| 48 | 827 | 22 | 4 | 808 | 19 | 4 | 752 | 17 | 3 |
| 49 | 836 | 24 | 4 | 816 | 21 | 4 | 756 | 17 | 3 |
| 50 | 846 | 27 | 4 | 825 | 24 | 4 | 761 | 17 | 3 |
| 51 | 858 | 31 | 4 | 835 | 29 | 4 | 766 | 17 | 3 |
| 52 | 873 | 37 | 4 | 848 | 37 | 4 | 771 | 17 | 3 |
| 53 | 893 | 43 | 4 | 866 | 49 | 4 | 776 | 18 | 3 |
| 54 | 929 | 46 | 4 | 896 | 58 | 4 | 781 | 18 | 3 |
| 55 | 999 | 32 | 4 | 999 | 30 | 4 | 787 | 18 | 3 |
| 56 | | | | | | | 795 | 19 | 4 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

Table 4.5 cont. Raw Score to Scale Score Conversion Tables for Spring 2009

| | Algebra II | | | Geometry | | | English III | | |
|---|---|---|---|---|---|---|---|---|---|
| **Raw Score** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** | **Scale Score** | **CSEM** | **Perf. Level** |
| 57 | | | | | | | 798 | 19 | 4 |
| 58 | | | | | | | 805 | 20 | 4 |
| 59 | | | | | | | 811 | 21 | 4 |
| 60 | | | | | | | 818 | 22 | 4 |
| 61 | | | | | | | 826 | 23 | 4 |
| 62 | | | | | | | 834 | 24 | 4 |
| 63 | | | | | | | 843 | 26 | 4 |
| 64 | | | | | | | 853 | 28 | 4 |
| 65 | | | | | | | 864 | 31 | 4 |
| 66 | | | | | | | 876 | 34 | 4 |
| 67 | | | | | | | 891 | 37 | 4 |
| 68 | | | | | | | 909 | 40 | 4 |
| 69 | | | | | | | 933 | 40 | 4 |
| 70 | | | | | | | 968 | 35 | 4 |
| 71 | | | | | | | 999 | 28 | 4 |
| 72 | | | | | | | 999 | 28 | 4 |

Note: CSEM = Conditional Standard Error of Measure; Perf. Level = Performance Level; 1 = Unsatisfactory, 2 = Limited Knowledge, 3 = Proficient, 4 = Advanced

# Section 5

# Classification Consistency and Accuracy Studies

## 5.1 Classification Consistency and Accuracy

Every test administration will result in some error in classifying examinees. The concept of the standard error of measurement (SEM) has an impact on how to explain the cut scores used to classify students into different performance levels. For example, some students may have a true performance level greater than a cut-score. However, due to random variations (measurement error), the observed test score may be below the cut score. As a result, the students may be classified as having a lower performance level. As discussed in Section 7.4 on SEM, a student's observed score is most likely to fall into a standard error band around his or her true score. Thus, the classification of students into different performance levels can be imperfect, especially for the borderline students whose true scores lie close to the performance level cut-scores.

According to Livingston and Lewis (1995, p. 180), the accuracy of a classification is "the extent to which the actual classifications of the test takers…agree with those that would be made on the basis of their true score" and are calculated from cross-tabulations between "classifications based on an observable variable and classifications based on an unobservable variable." Since the unobservable variable, also known as true score, is not available, Livingston and Lewis provide a method to estimate the true score distribution of a test and create the cross-tabulation of the true score and observed variable (raw score) classifications. Consistency is "the agreement between classifications based on two non-overlapping, equally difficult forms of the test" (p. 180). Consistency is estimated using actual response data from a test and the test's reliability in order to statistically model two parallel forms of the test and compare the classifications on those alternate forms. There are three types of accuracy and consistency indices that can be generated using Livingston and Lewis' approach: overall, conditional on level, and by cut-score.

The overall accuracy of performance level classifications is computed as a sum of the proportions on the diagonal of the joint distribution of true score and observed score levels. Essentially, overall accuracy is a proportion (or percentage) of correct classifications across all levels. The overall consistency index is computed as the sum of the diagonal cells in a consistency table. Another way to express overall consistency is to use the kappa coefficient, as used in the inter-rater reliability studies in Section 3.7. Like the inter-rater reliability studies, kappa provides an estimate of agreement or the proportion of consistent classifications between two different tests after taking into account chance.

Consistency conditional on performance level is computed as the ratio between the proportion of correct classifications at the selected performance level (for example, proficient students who were classified as proficient) and the proportion of all the students classified into that level (total proportion of students who were considered

proficient). Accuracy conditional on performance level is computed in a similar manner. The only difference is that in the consistency table where both row and column marginal sums are the same, in the accuracy table the sum based on estimated status is used as a total for computing accuracy conditional on performance level.

To evaluate decisions at specific cut-scores the joint distribution of all the performance levels are collapsed into dichotomized distributions around that specific cut-score (for example collapsing Unsatisfactory and Limited Knowledge and then Proficient and Advanced to assess decisions at the Proficient cut-score). The accuracy index at cut-score is computed as the sum of the proportions of correct classifications around this selected cut-score. The consistency at a specific cut-score is obtained in a similar way, but by dichotomizing the distributions at the cut-score performance level and between all other performance levels combined.

Table 5.1 for Winter/Trimester 2008-2009 and Table 5.2 for Spring 2009 present the overall accuracy and consistency indices and accuracy and consistency conditioned on performance level for all of the ACE EOI tests. There are four performance levels on the ACE EOI tests: Unsatisfactory, Limited Knowledge, Proficient, and Advanced. Table 5.3 for Winter/Trimester 2008-2009 and Table 5.4 for Spring 2009 provide the accuracy and consistency estimates by cut-score for all subjects.

Table 5.1. Estimates of Accuracy and Consistency of Performance Classification for Winter/Trimester 2008-2009.

| Winter/Trimester 2008-2009 | Accuracy | Consistency | Kappa | False Positives | False Negatives |
|---|---|---|---|---|---|
| Algebra I | 0.77 | 0.72 | 0.60 | 0.13 | 0.10 |
| Algebra II | 0.79 | 0.72 | 0.61 | 0.13 | 0.08 |
| Biology I | 0.76 | 0.71 | 0.59 | 0.08 | 0.15 |
| English II | 0.78 | 0.72 | 0.57 | 0.14 | 0.08 |
| English III | 0.80 | 0.74 | 0.60 | 0.13 | 0.07 |
| Geometry | 0.79 | 0.74 | 0.62 | 0.08 | 0.13 |
| U.S. History | 0.80 | 0.73 | 0.61 | 0.12 | 0.08 |

Table 5.2. Estimates of Accuracy and Consistency of Performance Classification for Spring 2009.

| Spring 2009 | Accuracy | Consistency | Kappa | False Positives | False Negatives |
|---|---|---|---|---|---|
| Algebra I | 0.79 | 0.73 | 0.60 | 0.09 | 0.12 |
| Algebra II | 0.77 | 0.69 | 0.58 | 0.15 | 0.08 |
| Biology I | 0.78 | 0.72 | 0.59 | 0.11 | 0.11 |
| English II | 0.80 | 0.74 | 0.59 | 0.07 | 0.14 |
| English III | 0.81 | 0.75 | 0.62 | 0.13 | 0.06 |
| Geometry | 0.79 | 0.75 | 0.63 | 0.14 | 0.08 |
| U.S. History | 0.79 | 0.72 | 0.60 | 0.11 | 0.09 |

As shown in Tables 5.1 and 5.2 overall accuracy indices range between 76 and 80 percent for Winter/Trimester 2008-2009 and 77 and 81 percent for Spring 2009 and overall

consistency ranging between 71 percent and 74 percent for Winter/Trimester 2008-2009 and 69 and 75 percent for Spring 2009. Kappa coefficients range from 0.57 and 0.62 for Winter/Trimester 2008-2009 and 0.58 and 0.63 for Spring 2009. The false positive and negatives rates also appearing in Table 5.1 and 5.2 for Winter/Trimester 2008-2009 and Spring 2009, respectively. The rate of false positives for the Winter/Trimester range from 8 percent to 13 percent, which were similar to the Spring 2009 that ranged from 7 percent to 15 percent. The false negative rates were also similar across administration ranging from 7 to 15 percent for Winter/Trimester and 6 to 14 percent for Spring 2009.

Tables 5.3 and 5.4 provide the accuracy and consistency and false positive and false negative rates by cut-score for Winter/Trimester 2008-2009 and Spring 2009, respectively. The data in these tables reveals that the level of agreement for both accuracy and consistency is above 85 percent in all cases, with most above 90 percent. In general, the high rates of accuracy and consistency support the cut decisions made using these assessments. Similar to Tables 5.1 and 5.2, the false positive and false negative rates were comparable for the Winter/Trimester 2008-2009 and Spring 2009 administrations and are quite low.

The importance of the dichotomous categorization is particularly notable when they map onto pass/fail decisions for the assessments. For the EOI tests, the U+L/P+A is the important dichotomization because it directly translates to the pass/fail decision point. Similar to other dichotomization distinctions, there are three main scenarios at this cut point: 1) students' observed performance is accurately reflective of their true ability (i.e., passed and should have passed); 2) students' true ability is below the standard, but they score above the standard (false positives); and 3) students' true ability is above the standard, but they score below the standard (false negatives). In examining Tables 5.3 and 5.4, in Winter/Trimester 2008-2009 Algebra I, for example, 92 percent of students are correctly classified as pass or fail based on their performance (scenario 1), 6 percent passed but their true performance is below the standard (scenario 2), and 3 percent failed although their true performance is above the standard (scenario 3). Overall, the accuracy rates for accurate classification are above 90% for the Winter/Trimester and Spring administrations for all subjects – students are appropriately (more than 90% of the time) categorized into pass/fail classifications based on their true ability using their observed score (raw score) as their classification score.

Table 5.3. Accuracy and Consistency estimates by cut-score: False positives and false negatives rates for Winter/Trimester 2008-2009.

| Winter/ Trimester 2008-2009 | Accuracy | | | Consistency | | | False Positives | | | False Negatives | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U / L+P+A | U+L / P+A | U+L+P / A | U / L+P+A | U+L / P+A | U+L+P / A | U / L+P+A | U+L / P+A | U+L+P / A | U / L+P+A | U+L / P+A | U+L+P / A |
| Algebra I | 0.93 | 0.92 | 0.92 | 0.92 | 0.89 | 0.90 | 0.01 | 0.06 | 0.06 | 0.06 | 0.02 | 0.01 |
| Algebra II | 0.94 | 0.92 | 0.92 | 0.92 | 0.89 | 0.90 | 0.04 | 0.04 | 0.05 | 0.02 | 0.04 | 0.03 |
| Biology I | 0.95 | 0.92 | 0.89 | 0.93 | 0.89 | 0.89 | 0.04 | 0.03 | 0.01 | 0.01 | 0.05 | 0.09 |
| English II | 0.98 | 0.91 | 0.89 | 0.97 | 0.90 | 0.85 | 0.01 | 0.07 | 0.05 | 0.01 | 0.02 | 0.06 |
| English III | 0.95 | 0.93 | 0.92 | 0.94 | 0.90 | 0.89 | 0.04 | 0.04 | 0.05 | 0.01 | 0.03 | 0.03 |
| Geometry | 0.95 | 0.91 | 0.92 | 0.94 | 0.90 | 0.89 | 0.04 | 0.01 | 0.03 | 0.01 | 0.07 | 0.05 |
| U.S. History | 0.96 | 0.93 | 0.92 | 0.94 | 0.90 | 0.89 | 0.02 | 0.04 | 0.06 | 0.02 | 0.04 | 0.02 |

Note: U =Unsatisfactory; L = Limited Knowledge; P = Proficient; and A = Advanced.
Note: U / L+P+A = Unsatisfactory divided by Limited Knowledge plus Proficient plus Advanced; U+L / P+A = Unsatisfactory plus Limited Knowledge divided by Proficient plus Advanced; U+L+P / A = Unsatisfactory plus Limited Knowledge plus Proficient divided by Advanced.

Table 5.4. Accuracy and Consistency estimates by cut-score: False positives and false negatives rates for Spring 2009.

| Spring 2009 | Accuracy | | | Consistency | | | False Positives | | | False Negatives | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | U / L+P+A | U+L / P+A | U+L+P / A | U / L+P+A | U+L / P+A | U+L+P / A | U / L+P+A | U+L / P+A | U+L+P / A | U / L+P+A | U+L / P+A | U+L+P / A |
| Algebra I | 0.96 | 0.92 | 0.91 | 0.94 | 0.90 | 0.88 | 0.01 | 0.01 | 0.07 | 0.03 | 0.07 | 0.02 |
| Algebra II | 0.91 | 0.91 | 0.94 | 0.88 | 0.88 | 0.92 | 0.07 | 0.05 | 0.04 | 0.03 | 0.04 | 0.02 |
| Biology I | 0.95 | 0.91 | 0.91 | 0.94 | 0.89 | 0.89 | 0.03 | 0.02 | 0.07 | 0.02 | 0.07 | 0.02 |
| English II | 0.98 | 0.93 | 0.88 | 0.98 | 0.90 | 0.86 | 0.01 | 0.03 | 0.03 | 0.01 | 0.04 | 0.09 |
| English III | 0.96 | 0.94 | 0.91 | 0.94 | 0.91 | 0.89 | 0.03 | 0.03 | 0.07 | 0.02 | 0.03 | 0.01 |
| Geometry | 0.95 | 0.92 | 0.92 | 0.93 | 0.90 | 0.91 | 0.01 | 0.06 | 0.07 | 0.05 | 0.02 | 0.01 |
| U.S. History | 0.96 | 0.92 | 0.91 | 0.95 | 0.89 | 0.88 | 0.02 | 0.04 | 0.06 | 0.02 | 0.04 | 0.03 |

Note: U =Unsatisfactory; L = Limited Knowledge; P = Proficient; and A = Advanced.
Note: U / L+P+A = Unsatisfactory divided by Limited Knowledge plus Proficient plus Advanced; U+L / P+A = Unsatisfactory plus Limited Knowledge divided by Proficient plus Advanced; U+L+P / A = Unsatisfactory plus Limited Knowledge plus Proficient divided by Advanced.

**Section 6**

# Standard Setting

## 6.1 Overview and Standard Setting Process

Committees of Oklahoma educators convened June 1 through June 4, 2009, in Oklahoma City, Oklahoma, to set standards for the Achieving Classroom Excellence (ACE) Biology I, English II, and U.S. History assessments. A total of 75 educators participated for three or four days to recommend cut scores. The item mapping procedure was applied to set the standards. The outcomes of the committee meetings are described in this summary and more detailed information is provided in a Standard Setting Technical Report (please see "Oklahoma State Testing Program Standard Setting for ACE Biology I, English II, and U.S. History").

On the afternoon of Monday, June 1, prior to the standard setting conference, training was held for all table leaders. During this training the table leaders were introduced to the standard setting facilitators, briefed on their role in the standard setting process, and received advance instruction on the item mapping process.

The standard setting conference began on Tuesday, June 2. The morning of Tuesday, June 2, was devoted to introductions of the SDE and Pearson staff, a description of standard setting process, a description of the ACE Biology I, English II, and U.S. History tests, and a general overview of the agenda for the meeting. For this stage of the conference, all panelists met together in one large room.

Following the midmorning break, the committees were dispersed into subject-specific conference rooms and took the appropriate ACE test in order to gain familiarity with the content represented on the test. Once the committee members had completed the test they were asked to review the Performance Level Descriptors (PLDs) for their subject in order to obtain a clear and concrete understanding of the performance levels and the differences between adjacent levels. Committee members were asked to identify general themes of the performance levels and behavioral anchors that describe "threshold students" – those students who could be described as minimally competent at a particular performance level.

The item mapping procedure was the judgmental process used in this standard setting. In this procedure, panelists were instructed to identify the last item in an ordered item book that a threshold student at a given level would have a response probability of answering correctly more often than not. After additional small-group training on the item mapping procedure the three committees began the standard setting process in the late afternoon of Tuesday, June 2. These committees were to set Limited Knowledge, Proficient, and Advanced performance level cuts. The standard setting process consisted of three rounds of judgments.

*Round 1.* In Round 1, panelists were asked to move through the item ordered booklet and indicate their independent recommendation for three cuts based on judgments about the performance of threshold students at each of the three levels. Panelists were provided with feedback between each round. The feedback was intended to inform the panelist's decisions, but not to dictate their ratings. Following Round 1, panelists met in small groups of 5 or 6 and were provided the cut-scores for each panelist and the mean and median cut-score at each level for that table. In reviewing the cut-score report panelists were asked to think about the following:

- How similar are their cut-scores are to that of the group (i.e., is a given panelist more lenient or stringent than the other panelists)?
- If so, why is this the case?
- Do panelists have different conceptualization of these borderline students?

Panelists were informed that it was not necessary for them to come to consensus on their cut-score judgments, but they should discuss differences to get a feel for why differences exist. Next, panelists were given the mean and median cut-scores for the committee (across tables). The facilitator lead the discussion with all tables combined. The facilitator noted the differences and similarities across tables but reminded the panelists that consensus was not required.

*Round 2.* In Round 2, based on the discussion at the end of Round 1 and judgments about the items, panelists were asked reevaluate their recommended cut from Round 1, and move if desired. Following Round 2, panelists received the same feedback for each table and for the full committee that was provided following Round 1. Additionally, panelists were provided a graphical display of the impact (distribution of students at each performance level) if using the committee's median cut-score. The impact data graphic representation provided panelists with information on what percentages of students are at each performance level for the populations of interest (all students, African-American/White/Hispanic/Native American, female/male). Panelists were given time to discuss, within the big group, the appropriateness of the committee level cut-scores given the proportion of students that would fall in each level.

*Round 3.* In Round 3, based on further discussion and review of the impact data, panelists were asked to make a final review of their cut-score recommendation and make adjustments if desired. Following Round 3, panelists were shown the cut-scores they were recommending based on this round of ratings, given the mean and median cut-scores for the committee (across tables), and provided a graphical display of the impact of using the median cut score for all students. Panelists were informed that this was their final cut-score judgments that would be sent to the State Board of Education for approval.

### 6.2 Results – Biology I, English II, and U.S. History Cut Scores

The Biology I, English II, and U.S. History ordered item books were comprised of 82, 88 and 87 ordered score points, respectively. Table 6.1 summarizes the cut scores after the Final Round of ratings for Biology I, English II, and U.S. History. These are the recommendations from the committees based on item location in the ordered item book.

The scale score cuts (and raw scores) associated with these recommendations and the percentage of students in the Unsatisfactory, Limited Knowledge, Proficient, and Advanced performance levels based upon these cuts are presented in Table 6.2. The impact resulting from the final cut-score recommendations appears in Figure 6.1.

Table 6.1. OIB Cut Scores after the Final Round of Rating by Subject.

| Subject | Score | Limited Knowledge | Proficient | Advanced |
|---|---|---|---|---|
| Biology I | Mean | 15.41 | 40.52 | 72.96 |
| | Median | 15.00 | 40.00 | 74.00 |
| English II | Mean | 14.00 | 49.22 | 77.43 |
| | Median | 14.00 | 50.00 | 78.00 |
| U.S. History | Mean | 13.16 | 36.84 | 69.72 |
| | Median | 13.00 | 36.00 | 70.00 |

Table 6.2. Raw Score and Scale Score Cut Scores After the Final Round of Rating

| Subject | % Unsatis-factory | Limited Knowledge | | % Limited Knowledge | Proficient | | % Proficient | Advanced | | % Advanced |
|---|---|---|---|---|---|---|---|---|---|---|
| | | RS* | SS | | RS* | SS | | RS* | SS | |
| Biology I | 9 | 24 | 594 | 19 | 33 | 659 | 42 | 47 | 745 | 30 |
| English II | 3 | 26 | 543 | 19 | 41 | 646 | 49 | 55 | 749 | 29 |
| U.S. History | 7 | 22 | 579 | 23 | 33 | 663 | 29 | 43 | 722 | 41 |

Note: Biology I and U.S. History have a total possible score of 60 points and English II has a total possible score of 66 points; RS = Raw Score; SS = Scale Score.

***** These are the scale scores associated with cut scores from the committee median recommendation (prior to approval by the State Board of Education and to final scaling).

Figure 6.1 shows the percentage of students in each performance level using the cut scores after the Final Round of rating for Biology I, English II, and U.S. History.

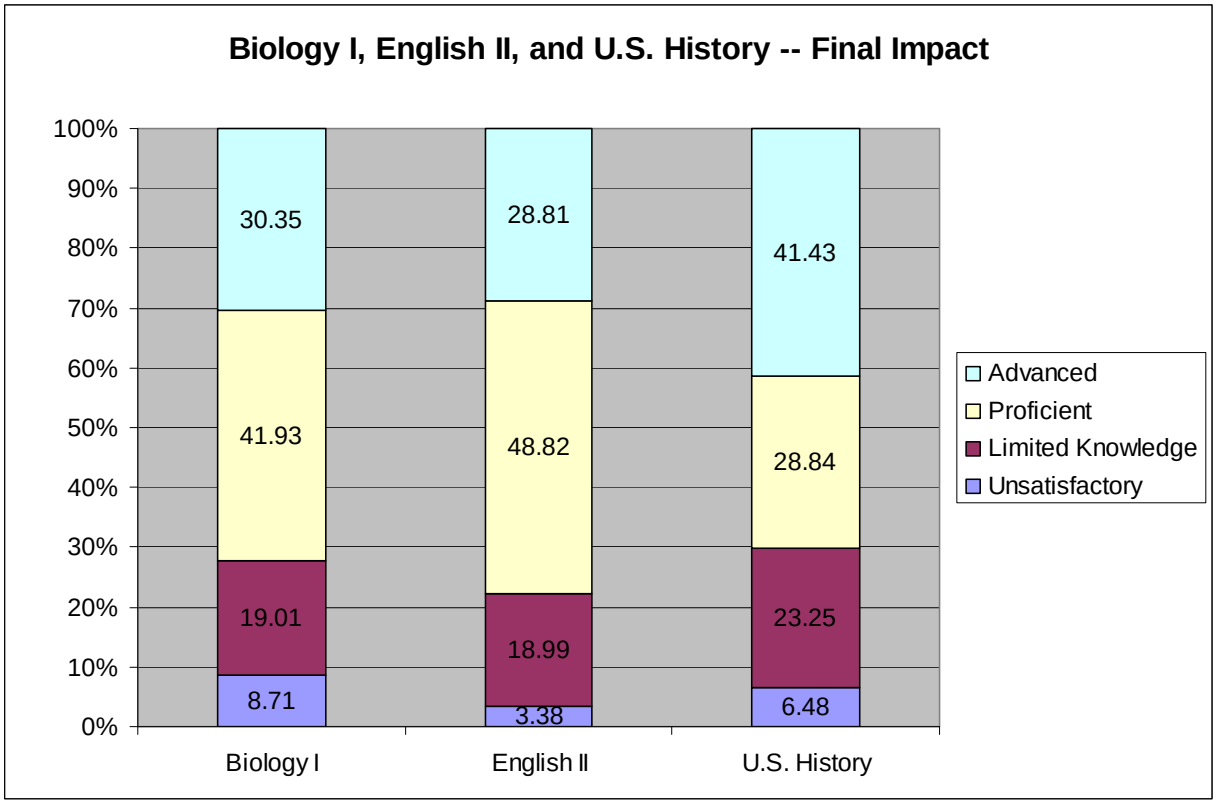


Figure 6.1. The percentage of students in each performance level using the cut scores after the Final Round of rating for Biology I, English II, and U.S. History.

## Section 7

## Summary Statistics

### 7.1 Means and Standard Deviations

The summary descriptive statistics (mean, median, and standard deviation) of the scale scores for Winter/Trimester 2008-2009 and Spring 2009 appears in Table 7.1 and 7.2, respectively. The scales scores presented exclude invalid student cases and second time testers.

Table 7.1. Descriptive Statistics of the Scale Scores for Winter/Trimester 2008-2009

| Winter/Trimester | Total | | | | Female | | | | Male | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2008-2009 | N | Mean | SD | Med. | N | Mean | SD | Med. | N | Mean | SD | Med. |
| Algebra I | 1,499 | 704.8 | 64.6 | 711 | 766 | 709.3 | 61.0 | 715 | 733 | 700.0 | 68.0 | 707 |
| Algebra II | 1,915 | 724.1 | 87.2 | 734 | 987 | 721.6 | 83.5 | 728 | 928 | 726.7 | 90.8 | 737 |
| Biology I | 2,073 | 728.8 | 86.1 | 734 | 1,031 | 722.8 | 79.9 | 727 | 1,042 | 734.6 | 91.5 | 740 |
| English II | 2,628 | 740.0 | 84.6 | 743 | 1,308 | 747.2 | 82.2 | 750 | 1,320 | 733.0 | 86.4 | 736 |
| English III | 2,783 | 740.0 | 76.0 | 744 | 1,381 | 745.9 | 71.3 | 749 | 1,390 | 735.0 | 79.4 | 739 |
| Geometry | 1,901 | 732.8 | 76.1 | 739 | 975 | 732.2 | 74.5 | 734 | 926 | 733.4 | 77.8 | 739 |
| U.S. History | 2,600 | 719.1 | 84.6 | 724 | 1,312 | 704.2 | 82.9 | 711 | 1,288 | 734.3 | 83.6 | 737 |

Note: N = Sample size; SD = Standard Deviation; Med. = Median.

Table 7.2. Descriptive Statistics of the Scale Scores for Spring 2009

| Spring 2009 | Total | | | | Female | | | | Male | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | SD | Med. | N | Mean | SD | Med. | N | Mean | SD | Med. |
| Algebra I | 35,736 | 725.5 | 58.6 | 730 | 17,919 | 725.2 | 57.4 | 730 | 17,817 | 725.7 | 59.7 | 730 |
| Algebra II | 29,644 | 710.5 | 89.9 | 716 | 15,289 | 711.5 | 86.9 | 716 | 14,355 | 709.4 | 92.9 | 716 |
| Biology I | 35,347 | 726.6 | 80.8 | 729 | 17,761 | 722.7 | 77.1 | 723 | 17,586 | 730.5 | 84.2 | 735 |
| English II | 34,823 | 743.9 | 82.8 | 750 | 17,686 | 751.9 | 80.1 | 750 | 17,137 | 735.8 | 84.7 | 743 |
| English III | 34,842 | 745.0 | 77.0 | 752 | 17,511 | 754.7 | 74.1 | 756 | 17,331 | 735.2 | 78.6 | 742 |
| Geometry | 34,224 | 733.1 | 77.7 | 739 | 17,092 | 733.4 | 75.6 | 739 | 17,132 | 732.8 | 79.8 | 739 |
| U.S. History | 32,277 | 722.9 | 82.9 | 728 | 16,284 | 710.6 | 78.8 | 711 | 15,993 | 735.5 | 85.2 | 740 |

Note: N = Sample size; SD = Standard Deviation; Med. = Median.

### 7.2 Performance Level Distribution

The percentage distributions of students in the four performance levels based on student performance in the Winter/Trimester 2008-2009 and Spring 2009 administration and the cut-scores (please see Table 4.3 in section 4.6 for cut scores) are presented in Table 7.3 (please see Appendix B and C for distribution by scale score for Winter/Trimester 2008-2009 and Spring 2009, respectively). As above, these percentages exclude invalid student cases and second time test takers. The percentage distributions for each of the content areas are comparable to previous administrations (e.g., Winter/Trimester 2007-2008 and Spring 2008).

Table 7.3. Percentage of Students by Performance Level for Winter/Trimester 2008-2009 and Spring 2009

| Subject | N | Unsatisfactory | Limited Knowledge | Proficient | Advanced |
|---|---|---|---|---|---|
| **Winter 2008-09** | | | | | |
| Algebra I | 1,499 | 10.0% | 20.7% | 39.9% | 29.4% |
| Algebra II | 1,915 | 17.7% | 13.7% | 38.8% | 29.8% |
| Biology I | 2,073 | 9.6% | 18.7% | 39.6% | 32.2% |
| English II | 2,628 | 3.8% | 20.4% | 49.1% | 26.7% |
| English III | 2,783 | 8.9% | 14.4% | 49.7% | 27.0% |
| Geometry | 1,901 | 7.0% | 19.6% | 40.9% | 32.5% |
| U.S. History | 2,600 | 7.3% | 24.3% | 26.1% | 42.3% |
| **Spring 2009** | | | | | |
| Algebra I | 35,736 | 5.1% | 14.7% | 38.9% | 41.3% |
| Algebra II | 29,644 | 17.0% | 19.4% | 39.1% | 24.6% |
| Biology I | 35,347 | 8.7% | 19.0% | 41.9% | 30.4% |
| English II | 34,823 | 3.4% | 19.0% | 48.8% | 28.8% |
| English III | 34,842 | 10.0% | 12.3% | 49.5% | 28.2% |
| Geometry | 34,224 | 6.9% | 18.6% | 43.2% | 31.3% |
| U.S. History | 32,277 | 6.5% | 23.2% | 28.8% | 41.4% |

## 7.3 Conditional Standard Error of Measurement

The conditional standard error of measurement (CSEM) was computed for each reported scale score. The CSEMs were computed using an IRT-based approach based on the following formula:

$$\text{CSEM}(O_X \mid \theta) = \sqrt{\left[\sum_{X=0}^{MaxX} O_X^2 \, p(X \mid \theta)\right] - \left[\sum_{X=0}^{MaxX} O_X \cdot p(X \mid \theta)\right]^2} \qquad (6)$$

where $O_X$ is the observed (scaled) score for a particular number right score X, $\theta$ is the IRT ability scale value conditioned on, and $p(\bullet)$ is the probability function. Pearson has implemented a computational approach for estimating CSEM($O_x \mid \theta$) in which $p(X \mid \theta)$ is computed using a recursive algorithm given by Thissen, Pommerich, Billeaud, and Williams (1995). Their algorithm is a polytomous generalization of the algorithm for dichotomous items given by Lord and Wingersky (1984). The values of θ used with the algorithm are obtained through the true score equating process (i.e., by solving for θ through the test characteristic curve for each number right score x). There is one CSEM per number correct or raw score and the CSEMs by subject appear in Section 4.6 in Tables 4.4 and 4.5 for Winter/Trimester 2008-2009 and Spring 2009, respectively.

## 7.4 Standard Error of Measurement

Measurement error is associated with every test score. A student's true score is the hypothetical average score that would result if the student took the test repeatedly under similar conditions. The Standard Error of Measurement (SEM), as an overall test-level

measure of error, provides a range around any given observed test score that likely includes the student's true score. This SEM is computed by taking the square root of the average value of the variances of the error of measurement associated with each of the raw score or scales scores:

$$SEM = \sqrt{\frac{\sum_j (CSEM_j^{\,2} \cdot N_j)}{N_T}} \qquad (7)$$

where,

SEM = Standard Error of Measurement
CSEM = Conditional Standard of Measurement
$N_j$ = number of examinees obtaining score *j* in the population
$N_T$ = total number of students in test sample

SEM was computed for each of the content areas. Table 7.4 presents the overall estimates of SEM for each of the content areas for the Winter/Trimester 2008-2009 and Spring 2009 administrations.

Table 7.4. Overall Estimates of SEM by Subject

| Subject | SEM |
|---|---|
| **Winter/Trimester 2008-2009** | |
| Algebra I | 4.51 |
| Algebra II | 5.66 |
| Biology I | 5.02 |
| Geometry | 5.31 |
| English II | 4.68 |
| English III | 4.98 |
| U.S. History | 5.17 |
| **Spring 2009** | |
| Algebra I | 4.81 |
| Algebra II | 5.27 |
| Biology I | 5.22 |
| Geometry | 5.27 |
| English II | 4.86 |
| English III | 5.00 |
| U.S. History | 5.16 |

Note: SEM = Standard Error of Measurement.

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# Appendix A

## Standards, Objectives/Skills, and Process assessed by Subject

| Algebra I | |
|---|---|
| **Standard 1: Number Sense and Algebraic Operations** | |
| Standard 1.1 | Equations and Formulas |
| | 1.1a Translate |
| | 1.1b Literal Equations |
| | 1.1c Problem Solving with Formulas |
| | 1.1d Problem Solving |
| Standard 1.2 | Expressions |
| | 1.2a Simplify expressions… |
| | 1.2b Compute with polynomials… |
| | 1.2c Factor polynomials |
| | |
| **Standard 2: Relations and Functions** | |
| Standard 2.1 | Relations/Functions |
| | 2.1a Distinguish linear and nonlinear |
| | 2.1b Distinguish between relations… |
| | 2.1c Dependent, Independ, Domain, Range |
| | 2.1d Evaluate a function… |
| Standard 2.2 | Linear Equations and Graphs |
| | 2.2a Solve linear equations |
| | 2.2b Graph Transformations |
| | 2.2c Slope |
| | 2.2d Equation of a Line |
| | 2.2e Match to a graph, table, etc. |
| Standard 2.3 | Linear Inequalities and Graphs |
| | 2.3a Solve linear inequalities |
| | 2.3b Match to a table, graph, etc. |
| Standard 2.4 | Systems of Equations |
| | |
| **Standard 3: Data Analysis, Probability & Statistics** | |
| Standard 3.1 | Data Analysis |
| | 3.1a Data Representations |
| | 3.1b Data Predictions |
| | 3.1c Problem Solving |
| Standard 3.2 | Line of Best Fit |

| Algebra II | |
|---|---|
| **Standard 1: Number Sense and Algebraic Operations** | |
| Standard 1.1 | Rational Exponents |
| | 1.1a Convert expressions from radical notations to rational exponents and vice versa. |
| | 1.1b Add, subtract, multiply, divide, and simplify radical expressions and expressions containing rational exponents. |
| Standard 1.2 | Polynomial and Rational Expressions |
| | 1.2a Divide polynomial expressions by lower degree polynomials. |
| | 1.2b Add, subtract, multiply, divide, and simplify rational expressions, including complex fractions. |
| Standard 1.3 | Complex Numbers |
| | 1.3b Add, subtract, multiply, divide, and simplify expressions involving complex numbers. |
| | |
| **Standard 2: Relations and Functions** | |
| Standard 2.1 | Functions and Function Notation |
| | 2.1a Recognize the parent graphs of polynomial, exponential, and logarithmic functions and predict the effects of transformations on the parent graphs, using various methods and tools which may include graphing calculators. |
| | 2.1b Use function notation to add, subtract, multiply, and divide functions. |
| | 2.1c Combine functions by composition. |
| | 2.1d Use algebraic, interval, and set notations to specify the domain and range of functions of various types. |
| | 2.1e Find and graph the inverse of a function, if it exists. |
| Standard 2.2 | Systems of Equations |
| | 2.2a Model a situation that can be described by a system of equations and inequalities and use the model to answer questions about the situation. |
| | 2.2b Solve systems of linear equations and inequalities using various methods and tools which may include substitution, elimination, matrices, graphing, and graphing calculators. |
| | 2.2c Use either one quadratic equation and one linear equation or two quadratic equations to solve problems. |
| Standard 2.3 | Quadratic Equations and Functions |
| | 2.3a Solve quadratic equations by graphing, factoring, completing the square and quadratic formula. |
| | 2.3b Graph a quadratic function and identify the x- and y-intercepts and maximum or minimum value, using various methods and tools which may include a graphing calculator. |
| | 2.3c Model a situation that can be described by a quadratic function and use the model to answer questions about the situation. |

| Algebra II continued | |
|---|---|
| Standard 2.4 | Identify, graph, and write the equations of the conic sections (circle, ellipse, parabola, and hyperbola). |
| Standard 2.5 | Exponential and Logarithmic Functions |
| | 2.5a Graph exponential and logarithmic functions. |
| | 2.5b Apply the inverse relationship between exponential and logarithmic functions to convert from one form to another. |
| | 2.5c Model a situation that can be described by an exponential or logarithmic function and use the model to answer questions about the situation. |
| Standard 2.6 | Polynomial Equations and Functions |
| | 2.6a Solve polynomial equations using various methods and tools which may include factoring and synthetic division. |
| | 2.6b Sketch the graph of a polynomial function. |
| | 2.6c Given the graph of a polynomial function, identify the x- and y-intercepts, relative maximums and relative minimums, using various methods and tools which may include a graphing calculator. |
| | 2.6d Model a situation that can be described by a polynomial function and use the model to answer questions about the situation. |
| Standard 2.7 | Rational Equations and Functions |
| | 2.7a Solve rational equations. |
| | 2.7b Sketch the graph of a rational function. |
| | 2.7c Given the graph of a rational function, identify the x- and y-intercepts, asymptotes, using various methods and tools which may include a graphing calculator. |
| | 2.7d Model a situation that can be described by a rational function and use the model to answer questions about the situation. |
| | |
| **Standard 3: Data Analysis, Probability, & Statistics** | |
| Standard 3.1 | Analysis of Collected Data … |
| | 3.1a Display data on a scatter plot. |
| | 3.1b Interpret results using a linear, exponential or quadratic model/equation. |
| | 3.1c Identify whether the model/equation is a curve of best fit for the data, using various methods and tools which may include a graphing calculator. |
| Standard 3.3 | Identify and use arithmetic and geometric sequences |

| Geometry | |
|---|---|
| **Standard 1: Logical Reasoning** | |
| Standard 1.1 | Identify and use logical reasoning skills (inductive and deductive) to make and test conjectures, formulate counter examples, and follow logical arguments. |
| Standard 1.2 | State, use, and examine the validity of the converse, inverse, and contrapositive of "if-then" statements. |
| | |
| **Standard 2: Properties of 2-Dimensional Figures** | |
| Standard 2.2 | Line and Angle Relationships |
| | 2.2a Use the angle relationships formed by parallel lines cut by a transversal to solve problems. |
| | 2.2b Use the angle relationships formed by two lines cut by a transversal to determine if the two lines are parallel and verify, using algebraic and deductive proofs. |
| | 2.2c Use relationships between pairs of angles (for example, adjacent, complementary, vertical) to solve problems. |
| Standard 2.3 | Polygons and Other Plane Figures |
| | 2.3a Identify, describe, and analyze polygons (for example, convex, concave, regular, pentagonal, hexagonal, n-gonal). |
| | 2.3b Apply the interior and exterior angle sum of convex polygons to solve problems, and verify using algebraic and deductive proofs. |
| | 2.3c Develop and apply the properties of quadrilaterals to solve problems (for example, rectangles, parallelograms, rhombi, trapezoids, kites). |
| | 2.3d Use properties of 2-dimensional figures and side length, perimeter or circumference, and area to determine unknown values and correctly identify the appropriate unit of measure of each. |
| Standard 2.4 | Similarity |
| | 2.4a Determine and verify the relationships of similarity of triangles, using algebraic and deductive proofs. |
| | 2.4b Use ratios of similar 2-dimensional figures to determine unknown values, such as angles, side lengths, perimeter or circumference, and area. |
| Standard 2.5 | Congruence |
| | 2.5a Determine and verify the relationships of congruency of triangles, using algebraic and deductive proofs. |
| | 2.5b Use the relationships of congruency of 2-dimensional figures to determine unknown values, such as angles, side lengths, perimeter or circumference, and area. |
| Standard 2.6 | Circles |
| | 2.6a Find angle measures and arc measures related to circles. |
| | 2.6b Find angle measures and segment lengths using the relationships among radii, chords, secants, and tangents of a circle. |

| Geometry continued | |
|---|---|
| **Standard 3: Triangles and Trigonometric Ratios** | |
| Standard 3.1 | Use the Pythagorean Theorem and its converse to find missing side lengths and to determine acute, right, and obtuse triangles, and verify using algebraic and deductive proofs. |
| Standard 3.2 | Apply the 45-45-90 and 30-60-90 right triangle relationships to solve problems, and verify using algebraic and deductive proofs. |
| Standard 3.3 | Express the trigonometric functions as ratios and use sine, cosine, and tangent ratios to solve real-world problems. |
| | |
| **Standard 4: Properties of 3-Dimensional Figures** | |
| Standard 4.1 | Polyhedra and Other Solids |
| | 4.1a Identify, describe, and analyze polyhedra (for example, regular, decahedral). |
| | 4.1b Use properties of 3-dimensional figures; side lengths, perimeter or circumference, and area of a face; and volume, lateral area, and surface area to determine unknown values and correctly identify the appropriate unit of measure of each. |
| Standard 4.2 | Similarity and Congruence |
| | 4.2a Use ratios of similar 3-dimensional figures to determine unknown values, such as angles, side lengths, perimeter or circumference of a face, area of a face, and volume. |
| | 4.2b Use the relationships of congruency of 3-dimensional figures to determine unknown values, such as angles, side lengths, perimeter or circumference of a face, area of a face, and volume. |
| 4.3 | Create a model of a 3-dimensional figure from a 2-dimensional drawing and make a 2-dimensional representation of a 3-dimensional object (for example, nets, blueprints, perspective drawings). |
| | |
| **Standard 5: Coordinate Geometry** | |
| Standard 5.1 | Use coordinate geometry to find the distance between two points; the midpoint of a segment; and to calculate the slopes of a parallel, perpendicular, horizontal, and vertical lines. |
| Standard 5.2 | Properties of Figures |
| | 5.2a Given a set of points determine the type of figure formed based on its properties. |
| | 5.2b Use transformations (reflection, rotation, translation)on geometric figures to solve problems within coordinate geometry. |

| Biology I | |
|---|---|
| **PASS Process/Inquiry Standards and Objectives** | |
| **Process 1 Observe and Measure** | |
| P1.1 | Qualitative/quantitative observations and changes |
| P1.2<br>P1.3 | Use appropriate System International (SI) units and tools |
| **Process 2 Classify** | |
| P2.1 | Use observable properties to classify |
| P2.2 | Identify properties of a classification system |
| **Process 3 Experiment** | |
| P3.1 | Evaluate the design of investigations |
| P3.2<br>P3.4 | Identify a testable hypothesis, variables, and control in an experiment |
| P3.3 | Use mathematics to show relationships |
| P3.5 | Identify potential hazards and practice safety procedures in all science activities |
| **Process 4 Interpret and Communicate** | |
| P4.1 | Select predictions based on observed patterns of evidence |
| P4.3 | Interpret line, bar, trend, and circle graphs |
| P4.4 | Accept or reject a hypothesis |
| P4.5 | Make logical conclusions based on experimental data |
| P4.8 | Identify an appropriate graph or chart |
| **Process 5 Model** | |
| P5.1 | Interpret a model which explains a given set of observations |
| P5.2 | Select predictions based on models |
| | |
| **PASS Content Standards** | |
| **Standard 1 The Cell** | |
| 1.1 | Cell structures and functions |
| 1.2 | Differentiation of cells |
| **Standard 2 The Molecular Basis of Heredity** | |
| 2.1 | DNA structure and function in heredity |
| 2.2 | Sorting and recombination of genes |
| **Standard 3 Biological Diversity** | |
| 3.1 | Variation among organisms |
| 3.2 | Natural selection and biological adaptations |
| **Standard 4 The Interdependence of Organisms** | |
| 4.1 | Earth cycles including abiotic and biotic factors |
| 4.2 | Organisms both cooperate and compete |
| 4.3 | Population dynamics |
| **Standard 5 Matter/Energy/Organization in Living Systems** | |
| 5.1 | Complexity and organization used for survival |
| 5.2 | Matter and energy flow in living and nonliving systems |

| Biology I continued | |
|---|---|
| **Standard 6 The Behavior of Organisms** | |
| 6.1 | Specialized cells |
| 6.2 | Behavior patterns can be used to ensure reproductive success |

| English II | |
|---|---|
| **Reading/Literature** | |
| **Standard 1 Vocabulary** | |
| **Standard 2 Comprehension** | |
| 2.1 | Literal Understanding |
| 2.2 | Inferences and Interpretation |
| 2.3 | Summary and Generalization |
| 2.4 | Analysis and Evaluation |
| **Standard 3 Literature** | |
| 3.1 | Literary Genres |
| 3.2 | Literary Elements |
| 3.3 | Figurative Language |
| 3.4 | Literary Works |
| **Standard 4 Research and Information** | |
| | |
| **Writing/Grammar/Usage and Mechanics** | |
| **Standard 1/2 Writing** | |
| | Writing Prompt |
| **Standard 3 Grammar/Usage and Mechanics** | |
| 3.1 | Standard Usage |
| 3.2 | Mechanics and Spelling |
| 3.3 | Sentence Structure |

| English III | |
|---|---|
| **Reading/Literature** | |
| **Standard 1 Vocabulary** | |
| **Standard 2 Comprehension** | |
| 2.1 | Literal Understanding |
| 2.2 | Inference and Interpretation |
| 2.3 | Summary and Generalization |
| 2.4 | Analysis and Evaluation |
| **Standard 3 Literature** | |
| 3.1 | Literary Genres |
| 3.2 | Literary Elements |
| 3.3 | Figurative Language |
| 3.4 | Literary Works |
| **Standard 4 Research and Information** | |
| | |
| **Writing/Grammar/Usage and Mechanics** | |
| **Standard 1/2 Writing** | |
| | Writing Prompt |
| **Standard 3 Grammar/Usage and Mechanics** | |
| 3.1 | Standard English Usage |
| 3.2 | Mechanics and Spelling |
| 3.3 | Sentence Structure |
| 3.4 | Manuscript Conventions |

| U.S. History | |
|---|---|
| Standard 1 | Social Studies Process Skills |
| Standard 2 | Civil War/Reconstruction Era |
| Standard 3 | Immigration/Westward Movement |
| Standard 4 | Industrial Revolution |
| Standard 5 | Imperialism/Isolationism |
| Standard 6 | Twenties Culture/Change |
| Standard 7 | Great Depression |
| Standard 8 | World War II |
| Standard 9 | Post-War Foreign Policy |
| Standard 10 | Post-War Domestic Policy |

# Appendix B

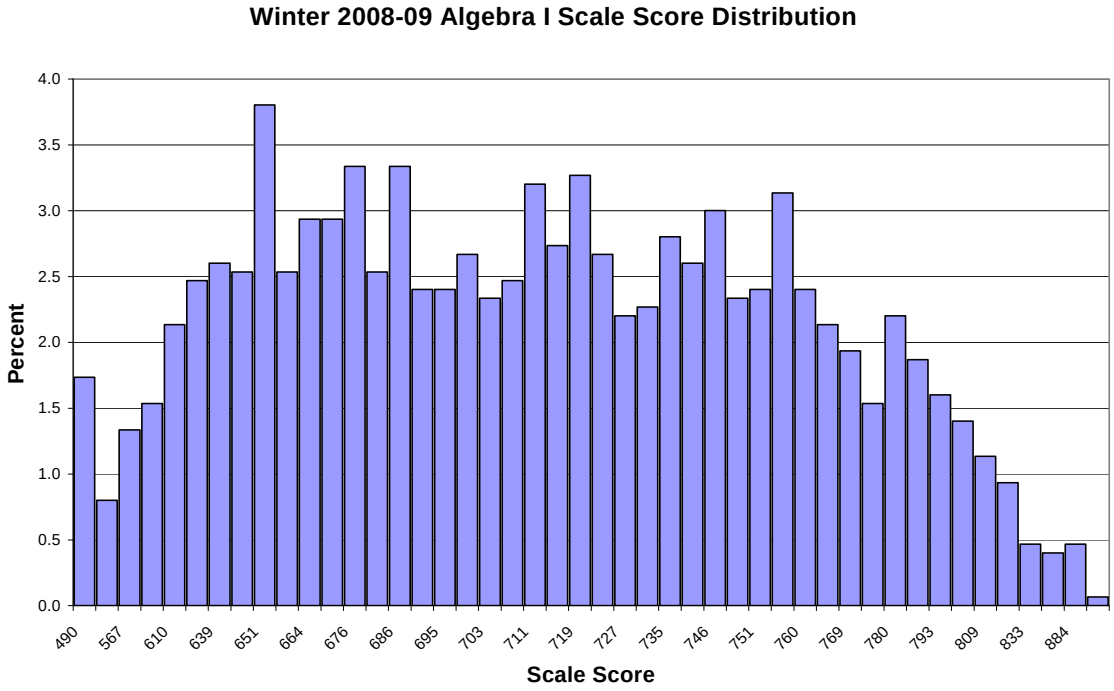
## Scale Score Distributions for Winter/Trimester 2008-2009

Algebra I Scale Score Distribution for Winter/Trimester 2008-2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 490 | 26 | 1.7 | 26 | 1.7 |
| 507 | 12 | 0.8 | 38 | 2.5 |
| 567 | 20 | 1.3 | 58 | 3.9 |
| 593 | 23 | 1.5 | 81 | 5.4 |
| 610 | 32 | 2.1 | 113 | 7.5 |
| 623 | 37 | 2.5 | 150 | 10.0 |
| 639 | 39 | 2.6 | 189 | 12.6 |
| 643 | 38 | 2.5 | 227 | 15.1 |
| 651 | 57 | 3.8 | 284 | 18.9 |
| 658 | 38 | 2.5 | 322 | 21.5 |
| 664 | 44 | 2.9 | 366 | 24.4 |
| 670 | 44 | 2.9 | 410 | 27.4 |
| 676 | 50 | 3.3 | 460 | 30.7 |
| 684 | 38 | 2.5 | 498 | 33.2 |
| 686 | 50 | 3.3 | 548 | 36.6 |
| 690 | 36 | 2.4 | 584 | 39.0 |
| 695 | 36 | 2.4 | 620 | 41.4 |
| 699 | 40 | 2.7 | 660 | 44.0 |
| 703 | 35 | 2.3 | 695 | 46.4 |
| 707 | 37 | 2.5 | 732 | 48.8 |
| 711 | 48 | 3.2 | 780 | 52.0 |
| 715 | 41 | 2.7 | 821 | 54.8 |
| 719 | 49 | 3.3 | 870 | 58.0 |
| 723 | 40 | 2.7 | 910 | 60.7 |
| 727 | 33 | 2.2 | 943 | 62.9 |
| 731 | 34 | 2.3 | 977 | 65.2 |
| 735 | 42 | 2.8 | 1,019 | 68.0 |
| 739 | 39 | 2.6 | 1,058 | 70.6 |
| 746 | 45 | 3.0 | 1,103 | 73.6 |
| 747 | 35 | 2.3 | 1,138 | 75.9 |
| 751 | 36 | 2.4 | 1,174 | 78.3 |
| 755 | 47 | 3.1 | 1,221 | 81.5 |
| 760 | 36 | 2.4 | 1,257 | 83.9 |
| 764 | 32 | 2.1 | 1,289 | 86.0 |
| 769 | 29 | 1.9 | 1,318 | 87.9 |
| 775 | 23 | 1.5 | 1,341 | 89.5 |
| 780 | 33 | 2.2 | 1,374 | 91.7 |
| 786 | 28 | 1.9 | 1,402 | 93.5 |
| 793 | 24 | 1.6 | 1,426 | 95.1 |
| 800 | 21 | 1.4 | 1,447 | 96.5 |
| 809 | 17 | 1.1 | 1,464 | 97.7 |
| 819 | 14 | 0.9 | 1,478 | 98.6 |
| 833 | 7 | 0.5 | 1,485 | 99.1 |

Algebra I Scale Score Distribution for Winter/Trimester 2008-2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 851 | 6 | 0.4 | 1,491 | 99.5 |
| 884 | 7 | 0.5 | 1,498 | 99.9 |
| 999 | 1 | 0.1 | 1,499 | 100.0 |

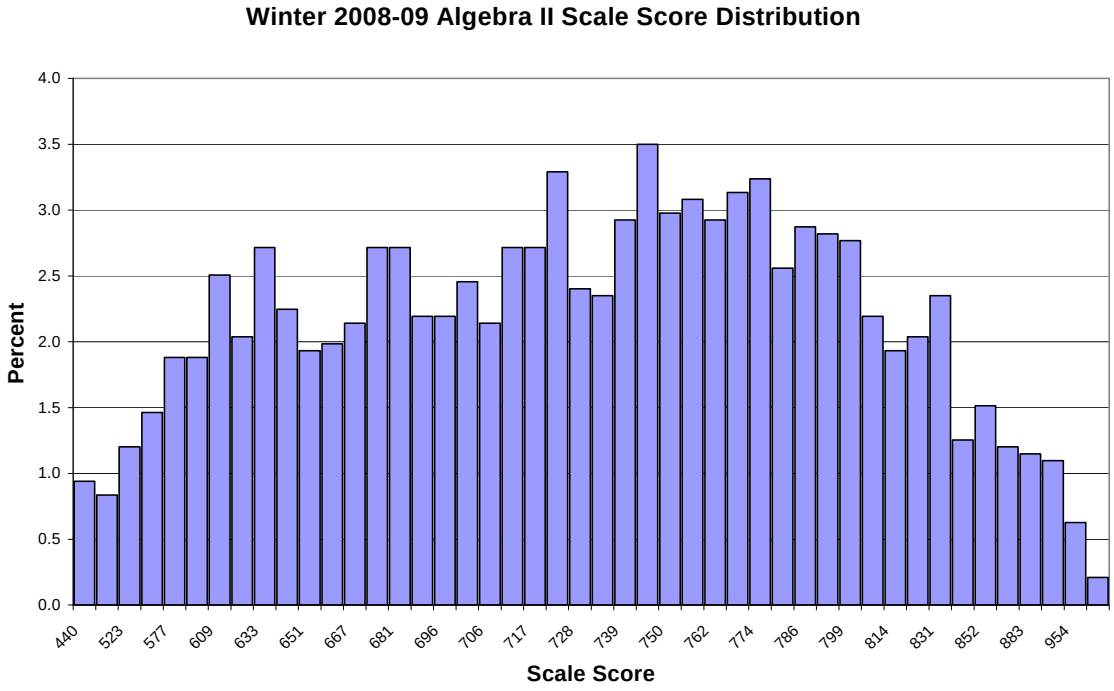


Algebra II Scale Score Distribution for Winter/Trimester 2008-2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 18 | 0.9 | 18 | 0.9 |
| 471 | 16 | 0.8 | 34 | 1.8 |
| 523 | 23 | 1.2 | 57 | 3.0 |
| 555 | 28 | 1.5 | 85 | 4.4 |
| 577 | 36 | 1.9 | 121 | 6.3 |
| 595 | 36 | 1.9 | 157 | 8.2 |
| 609 | 48 | 2.5 | 205 | 10.7 |
| 622 | 39 | 2.0 | 244 | 12.7 |
| 633 | 52 | 2.7 | 296 | 15.5 |
| 643 | 43 | 2.2 | 339 | 17.7 |
| 651 | 37 | 1.9 | 376 | 19.6 |
| 660 | 38 | 2.0 | 414 | 21.6 |
| 667 | 41 | 2.1 | 455 | 23.8 |
| 674 | 52 | 2.7 | 507 | 26.5 |
| 681 | 52 | 2.7 | 559 | 29.2 |
| 688 | 42 | 2.2 | 601 | 31.4 |
| 696 | 42 | 2.2 | 643 | 33.6 |
| 700 | 47 | 2.5 | 690 | 36.0 |
| 706 | 41 | 2.1 | 731 | 38.2 |
| 712 | 52 | 2.7 | 783 | 40.9 |
| 717 | 52 | 2.7 | 835 | 43.6 |
| 723 | 63 | 3.3 | 898 | 46.9 |
| 728 | 46 | 2.4 | 944 | 49.3 |
| 734 | 45 | 2.3 | 989 | 51.6 |
| 739 | 56 | 2.9 | 1,045 | 54.6 |
| 745 | 67 | 3.5 | 1,112 | 58.1 |
| 750 | 57 | 3.0 | 1,169 | 61.0 |
| 756 | 59 | 3.1 | 1,228 | 64.1 |
| 762 | 56 | 2.9 | 1,284 | 67.0 |
| 767 | 60 | 3.1 | 1,344 | 70.2 |
| 774 | 62 | 3.2 | 1,406 | 73.4 |
| 779 | 49 | 2.6 | 1,455 | 76.0 |
| 786 | 55 | 2.9 | 1,510 | 78.9 |
| 792 | 54 | 2.8 | 1,564 | 81.7 |
| 799 | 53 | 2.8 | 1,617 | 84.4 |
| 806 | 42 | 2.2 | 1,659 | 86.6 |
| 814 | 37 | 1.9 | 1,696 | 88.6 |
| 822 | 39 | 2.0 | 1,735 | 90.6 |
| 831 | 45 | 2.3 | 1,780 | 93.0 |
| 841 | 24 | 1.3 | 1,804 | 94.2 |
| 852 | 29 | 1.5 | 1,833 | 95.7 |
| 866 | 23 | 1.2 | 1,856 | 96.9 |

Algebra II Scale Score Distribution for Winter/Trimester 2008-2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 883 | 22 | 1.1 | 1,878 | 98.1 |
| 909 | 21 | 1.1 | 1,899 | 99.2 |
| 954 | 12 | 0.6 | 1,911 | 99.8 |
| 999 | 4 | 0.2 | 1,915 | 100.0 |

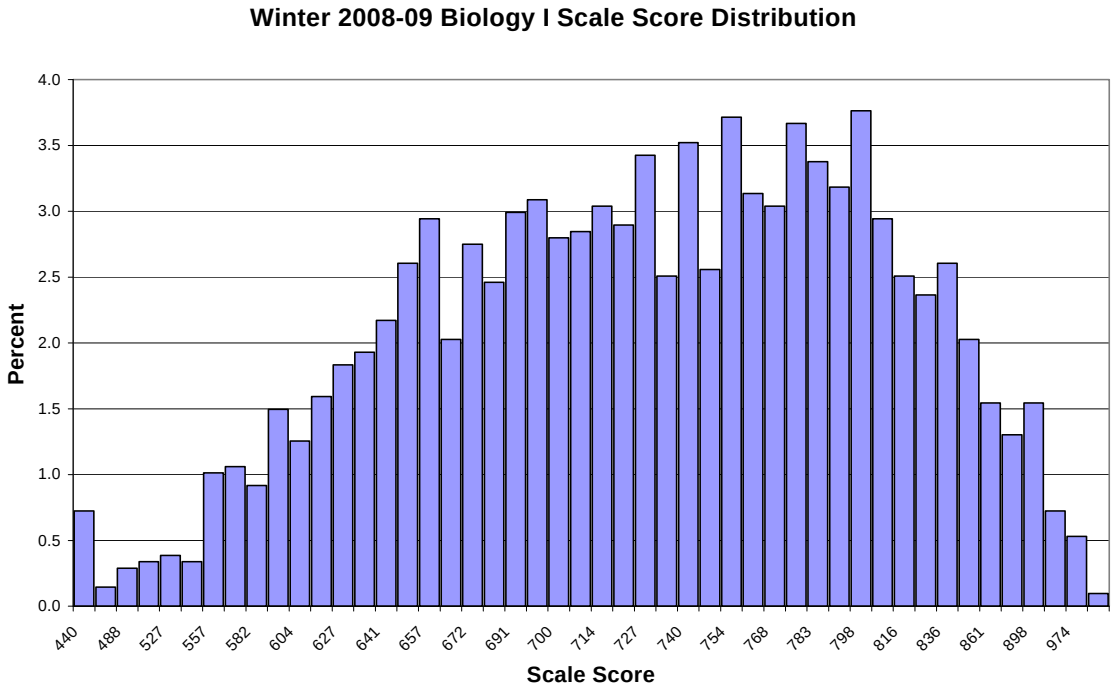


Biology I Scale Score Distribution for Winter/Trimester 2008-2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 15 | 0.7 | 15 | 0.7 |
| 461 | 3 | 0.1 | 18 | 0.9 |
| 488 | 6 | 0.3 | 24 | 1.2 |
| 509 | 7 | 0.3 | 31 | 1.5 |
| 527 | 8 | 0.4 | 39 | 1.9 |
| 542 | 7 | 0.3 | 46 | 2.2 |
| 557 | 21 | 1.0 | 67 | 3.2 |
| 570 | 22 | 1.1 | 89 | 4.3 |
| 582 | 19 | 0.9 | 108 | 5.2 |
| 593 | 31 | 1.5 | 139 | 6.7 |
| 604 | 26 | 1.3 | 165 | 8.0 |
| 614 | 33 | 1.6 | 198 | 9.6 |
| 627 | 38 | 1.8 | 236 | 11.4 |
| 632 | 40 | 1.9 | 276 | 13.3 |
| 641 | 45 | 2.2 | 321 | 15.5 |
| 649 | 54 | 2.6 | 375 | 18.1 |
| 657 | 61 | 2.9 | 436 | 21.0 |
| 665 | 42 | 2.0 | 478 | 23.1 |
| 672 | 57 | 2.7 | 535 | 25.8 |
| 680 | 51 | 2.5 | 586 | 28.3 |
| 691 | 62 | 3.0 | 648 | 31.3 |
| 694 | 64 | 3.1 | 712 | 34.3 |
| 700 | 58 | 2.8 | 770 | 37.1 |
| 707 | 59 | 2.8 | 829 | 40.0 |
| 714 | 63 | 3.0 | 892 | 43.0 |
| 721 | 60 | 2.9 | 952 | 45.9 |
| 727 | 71 | 3.4 | 1,023 | 49.3 |
| 734 | 52 | 2.5 | 1,075 | 51.9 |
| 740 | 73 | 3.5 | 1,148 | 55.4 |
| 747 | 53 | 2.6 | 1,201 | 57.9 |
| 754 | 77 | 3.7 | 1,278 | 61.6 |
| 761 | 65 | 3.1 | 1,343 | 64.8 |
| 768 | 63 | 3.0 | 1,406 | 67.8 |
| 775 | 76 | 3.7 | 1,482 | 71.5 |
| 783 | 70 | 3.4 | 1,552 | 74.9 |
| 790 | 66 | 3.2 | 1,618 | 78.1 |
| 798 | 78 | 3.8 | 1,696 | 81.8 |
| 807 | 61 | 2.9 | 1,757 | 84.8 |
| 816 | 52 | 2.5 | 1,809 | 87.3 |
| 825 | 49 | 2.4 | 1,858 | 89.6 |
| 836 | 54 | 2.6 | 1,912 | 92.2 |
| 848 | 42 | 2.0 | 1,954 | 94.3 |
| 861 | 32 | 1.5 | 1,986 | 95.8 |

Biology I Scale Score Distribution for Winter/Trimester 2008-2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 877 | 27 | 1.3 | 2,013 | 97.1 |
| 898 | 32 | 1.5 | 2,045 | 98.6 |
| 926 | 15 | 0.7 | 2,060 | 99.4 |
| 974 | 11 | 0.5 | 2,071 | 99.9 |
| 999 | 2 | 0.1 | 2,073 | 100.0 |

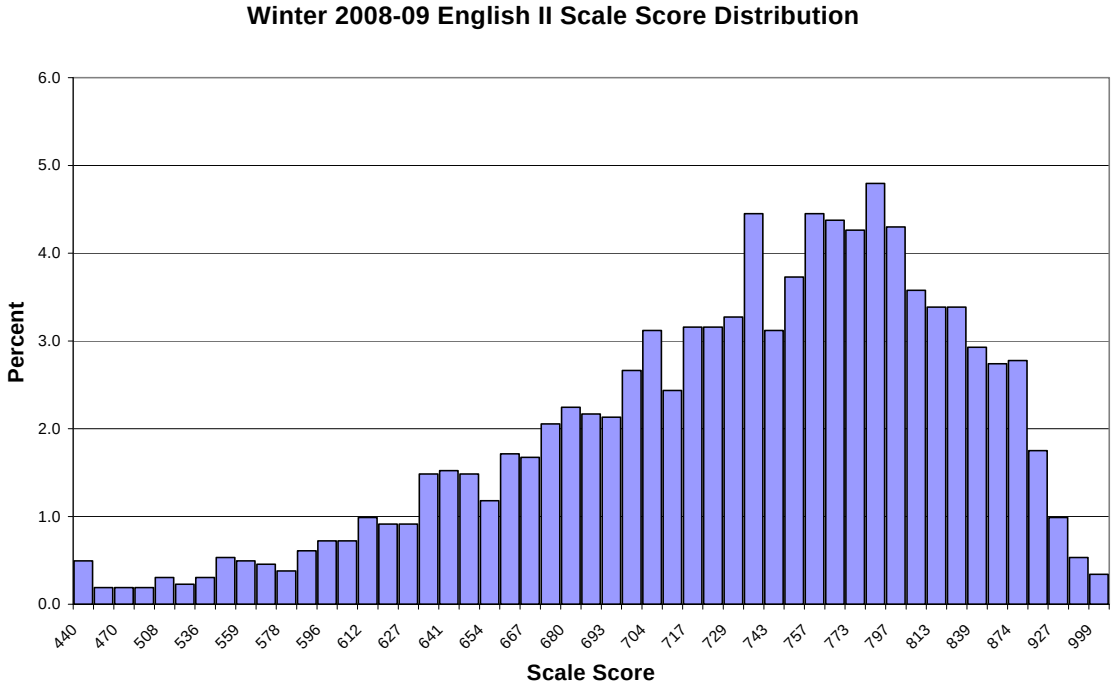


English II Scale Score Distribution for Winter/Trimester 2008-2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 13 | 0.5 | 13 | 0.5 |
| 443 | 5 | 0.2 | 18 | 0.7 |
| 470 | 5 | 0.2 | 23 | 0.9 |
| 490 | 5 | 0.2 | 28 | 1.1 |
| 508 | 8 | 0.3 | 36 | 1.4 |
| 523 | 6 | 0.2 | 42 | 1.6 |
| 536 | 8 | 0.3 | 50 | 1.9 |
| 548 | 14 | 0.5 | 64 | 2.4 |
| 559 | 13 | 0.5 | 77 | 2.9 |
| 569 | 12 | 0.5 | 89 | 3.4 |
| 578 | 10 | 0.4 | 99 | 3.8 |
| 588 | 16 | 0.6 | 115 | 4.4 |
| 596 | 19 | 0.7 | 134 | 5.1 |
| 604 | 19 | 0.7 | 153 | 5.8 |
| 612 | 26 | 1.0 | 179 | 6.8 |
| 619 | 24 | 0.9 | 203 | 7.7 |
| 627 | 24 | 0.9 | 227 | 8.6 |
| 634 | 39 | 1.5 | 266 | 10.1 |
| 641 | 40 | 1.5 | 306 | 11.6 |
| 648 | 39 | 1.5 | 345 | 13.1 |
| 654 | 31 | 1.2 | 376 | 14.3 |
| 661 | 45 | 1.7 | 421 | 16.0 |
| 667 | 44 | 1.7 | 465 | 17.7 |
| 673 | 54 | 2.1 | 519 | 19.7 |
| 680 | 59 | 2.2 | 578 | 22.0 |
| 686 | 57 | 2.2 | 635 | 24.2 |
| 693 | 56 | 2.1 | 691 | 26.3 |
| 698 | 70 | 2.7 | 761 | 29.0 |
| 704 | 82 | 3.1 | 843 | 32.1 |
| 710 | 64 | 2.4 | 907 | 34.5 |
| 717 | 83 | 3.2 | 990 | 37.7 |
| 723 | 83 | 3.2 | 1,073 | 40.8 |
| 729 | 86 | 3.3 | 1,159 | 44.1 |
| 736 | 117 | 4.5 | 1,276 | 48.6 |
| 743 | 82 | 3.1 | 1,358 | 51.7 |
| 750 | 98 | 3.7 | 1,456 | 55.4 |
| 757 | 117 | 4.5 | 1,573 | 59.9 |
| 765 | 115 | 4.4 | 1,688 | 64.2 |
| 773 | 112 | 4.3 | 1,800 | 68.5 |
| 782 | 126 | 4.8 | 1,926 | 73.3 |
| 797 | 113 | 4.3 | 2,039 | 77.6 |
| 802 | 94 | 3.6 | 2,133 | 81.2 |
| 813 | 89 | 3.4 | 2,222 | 84.6 |

English II Scale Score Distribution for Winter/Trimester 2008-2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 825 | 89 | 3.4 | 2,311 | 87.9 |
| 839 | 77 | 2.9 | 2,388 | 90.9 |
| 855 | 72 | 2.7 | 2,460 | 93.6 |
| 874 | 73 | 2.8 | 2,533 | 96.4 |
| 898 | 46 | 1.8 | 2,579 | 98.1 |
| 927 | 26 | 1.0 | 2,605 | 99.1 |
| 969 | 14 | 0.5 | 2,619 | 99.7 |
| 999 | 9 | 0.3 | 2,628 | 100.0 |

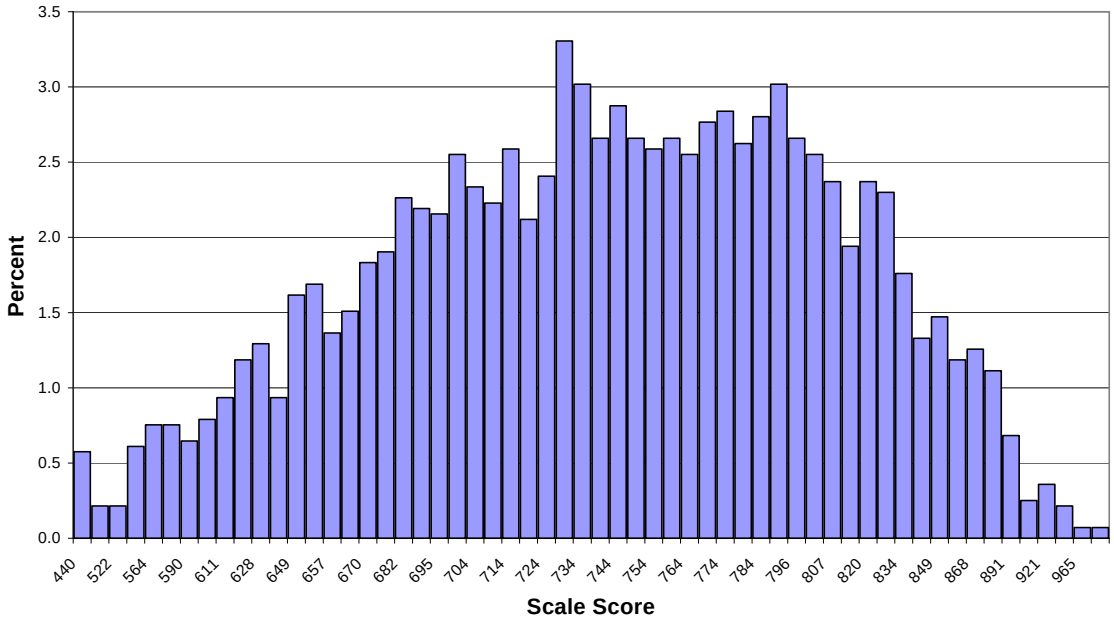


English III Scale Score Distribution for Winter/Trimester 2008-2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 16 | 0.6 | 16 | 0.6 |
| 487 | 6 | 0.2 | 22 | 0.8 |
| 522 | 6 | 0.2 | 28 | 1.0 |
| 546 | 17 | 0.6 | 45 | 1.6 |
| 564 | 21 | 0.8 | 66 | 2.4 |
| 578 | 21 | 0.8 | 87 | 3.1 |
| 590 | 18 | 0.6 | 105 | 3.8 |
| 601 | 22 | 0.8 | 127 | 4.6 |
| 611 | 26 | 0.9 | 153 | 5.5 |
| 619 | 33 | 1.2 | 186 | 6.7 |
| 628 | 36 | 1.3 | 222 | 8.0 |
| 636 | 26 | 0.9 | 248 | 8.9 |
| 649 | 45 | 1.6 | 293 | 10.5 |
| 650 | 47 | 1.7 | 340 | 12.2 |
| 657 | 38 | 1.4 | 378 | 13.6 |
| 663 | 42 | 1.5 | 420 | 15.1 |
| 670 | 51 | 1.8 | 471 | 16.9 |
| 676 | 53 | 1.9 | 524 | 18.8 |
| 682 | 63 | 2.3 | 587 | 21.1 |
| 687 | 61 | 2.2 | 648 | 23.3 |
| 695 | 60 | 2.2 | 708 | 25.4 |
| 698 | 71 | 2.6 | 779 | 28.0 |
| 704 | 65 | 2.3 | 844 | 30.3 |
| 709 | 62 | 2.2 | 906 | 32.6 |
| 714 | 72 | 2.6 | 978 | 35.1 |
| 719 | 59 | 2.1 | 1,037 | 37.3 |
| 724 | 67 | 2.4 | 1,104 | 39.7 |
| 729 | 92 | 3.3 | 1,196 | 43.0 |
| 734 | 84 | 3.0 | 1,280 | 46.0 |
| 739 | 74 | 2.7 | 1,354 | 48.7 |
| 744 | 80 | 2.9 | 1,434 | 51.5 |
| 749 | 74 | 2.7 | 1,508 | 54.2 |
| 754 | 72 | 2.6 | 1,580 | 56.8 |
| 759 | 74 | 2.7 | 1,654 | 59.4 |
| 764 | 71 | 2.6 | 1,725 | 62.0 |
| 769 | 77 | 2.8 | 1,802 | 64.8 |
| 774 | 79 | 2.8 | 1,881 | 67.6 |
| 779 | 73 | 2.6 | 1,954 | 70.2 |
| 784 | 78 | 2.8 | 2,032 | 73.0 |
| 795 | 84 | 3.0 | 2,116 | 76.0 |
| 796 | 74 | 2.7 | 2,190 | 78.7 |
| 801 | 71 | 2.6 | 2,261 | 81.2 |
| 807 | 66 | 2.4 | 2,327 | 83.6 |
| 813 | 54 | 1.9 | 2,381 | 85.6 |
| 820 | 66 | 2.4 | 2,447 | 87.9 |

| | | | | |
|---|---|---|---|---|
| 826 | 64 | 2.3 | 2,511 | 90.2 |
| 834 | 49 | 1.8 | 2,560 | 92.0 |
| 841 | 37 | 1.3 | 2,597 | 93.3 |
| 849 | 41 | 1.5 | 2,638 | 94.8 |
| 858 | 33 | 1.2 | 2,671 | 96.0 |
| 868 | 35 | 1.3 | 2,706 | 97.2 |
| 879 | 31 | 1.1 | 2,737 | 98.3 |
| 891 | 19 | 0.7 | 2,756 | 99.0 |
| 905 | 7 | 0.3 | 2,763 | 99.3 |
| 921 | 10 | 0.4 | 2,773 | 99.6 |
| 940 | 6 | 0.2 | 2,779 | 99.9 |
| 965 | 2 | 0.1 | 2,781 | 99.9 |
| 999 | 2 | 0.1 | 2,783 | 100.0 |

**Winter 2008-09 English III Scale Score Distribution**

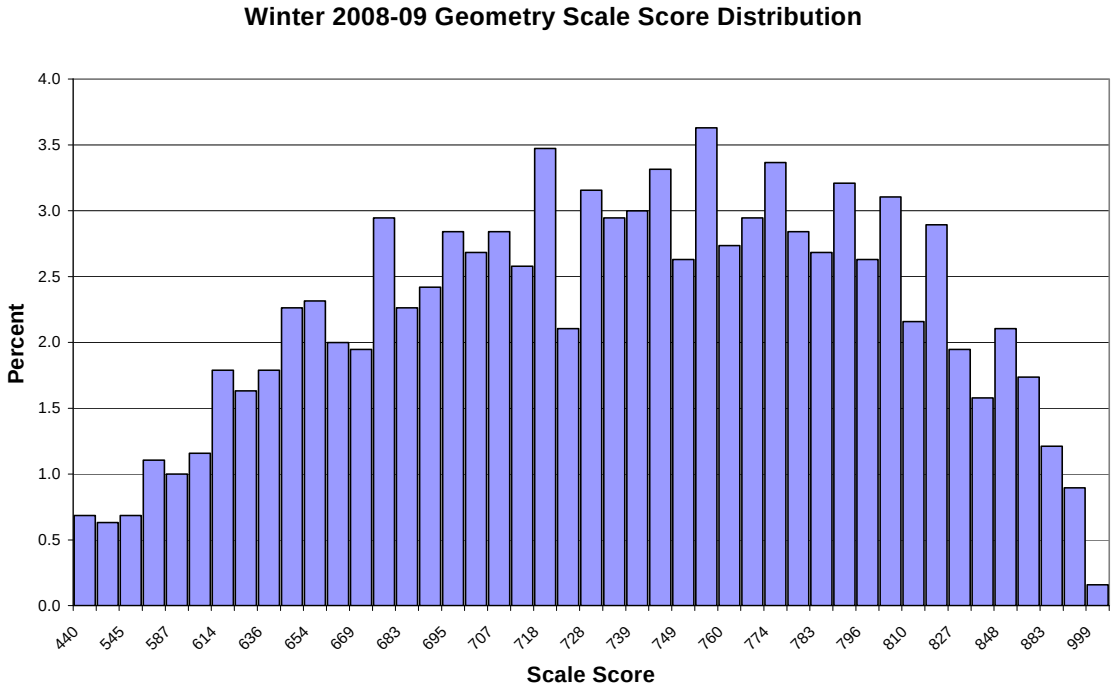


Geometry Scale Score Distribution for Winter/Trimester 2008-2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 13 | 0.7 | 13 | 0.7 |
| 511 | 12 | 0.6 | 25 | 1.3 |
| 545 | 13 | 0.7 | 38 | 2.0 |
| 569 | 21 | 1.1 | 59 | 3.1 |
| 587 | 19 | 1.0 | 78 | 4.1 |
| 602 | 22 | 1.2 | 100 | 5.3 |
| 614 | 34 | 1.8 | 134 | 7.0 |
| 635 | 31 | 1.6 | 165 | 8.7 |
| 636 | 34 | 1.8 | 199 | 10.5 |
| 645 | 43 | 2.3 | 242 | 12.7 |
| 654 | 44 | 2.3 | 286 | 15.0 |
| 662 | 38 | 2.0 | 324 | 17.0 |
| 669 | 37 | 1.9 | 361 | 19.0 |
| 676 | 56 | 2.9 | 417 | 21.9 |
| 683 | 43 | 2.3 | 460 | 24.2 |
| 689 | 46 | 2.4 | 506 | 26.6 |
| 695 | 54 | 2.8 | 560 | 29.5 |
| 701 | 51 | 2.7 | 611 | 32.1 |
| 707 | 54 | 2.8 | 665 | 35.0 |
| 712 | 49 | 2.6 | 714 | 37.6 |
| 718 | 66 | 3.5 | 780 | 41.0 |
| 723 | 40 | 2.1 | 820 | 43.1 |
| 728 | 60 | 3.2 | 880 | 46.3 |
| 734 | 56 | 2.9 | 936 | 49.2 |
| 739 | 57 | 3.0 | 993 | 52.2 |
| 744 | 63 | 3.3 | 1,056 | 55.5 |
| 749 | 50 | 2.6 | 1,106 | 58.2 |
| 754 | 69 | 3.6 | 1,175 | 61.8 |
| 760 | 52 | 2.7 | 1,227 | 64.5 |
| 765 | 56 | 2.9 | 1,283 | 67.5 |
| 774 | 64 | 3.4 | 1,347 | 70.9 |
| 777 | 54 | 2.8 | 1,401 | 73.7 |
| 783 | 51 | 2.7 | 1,452 | 76.4 |
| 789 | 61 | 3.2 | 1,513 | 79.6 |
| 796 | 50 | 2.6 | 1,563 | 82.2 |
| 803 | 59 | 3.1 | 1,622 | 85.3 |
| 810 | 41 | 2.2 | 1,663 | 87.5 |
| 818 | 55 | 2.9 | 1,718 | 90.4 |
| 827 | 37 | 1.9 | 1,755 | 92.3 |
| 837 | 30 | 1.6 | 1,785 | 93.9 |
| 848 | 40 | 2.1 | 1,825 | 96.0 |
| 863 | 33 | 1.7 | 1,858 | 97.7 |

Geometry Scale Score Distribution for Winter/Trimester 2008-2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 883 | 23 | 1.2 | 1,881 | 98.9 |
| 918 | 17 | 0.9 | 1,898 | 99.8 |
| 999 | 3 | 0.2 | 1,901 | 100.0 |

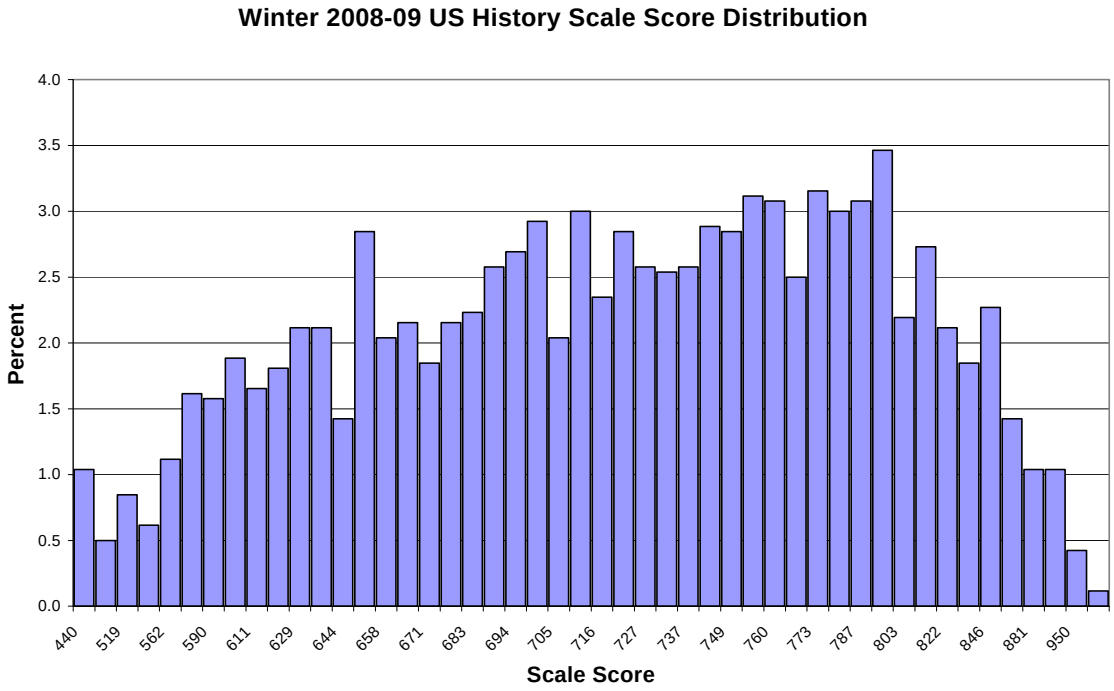


U.S. History Scale Score Distribution for Winter/Trimester 2008-2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 27 | 1.0 | 27 | 1.0 |
| 484 | 13 | 0.5 | 40 | 1.5 |
| 519 | 22 | 0.8 | 62 | 2.4 |
| 544 | 16 | 0.6 | 78 | 3.0 |
| 562 | 29 | 1.1 | 107 | 4.1 |
| 577 | 42 | 1.6 | 149 | 5.7 |
| 590 | 41 | 1.6 | 190 | 7.3 |
| 603 | 49 | 1.9 | 239 | 9.2 |
| 611 | 43 | 1.7 | 282 | 10.8 |
| 620 | 47 | 1.8 | 329 | 12.7 |
| 629 | 55 | 2.1 | 384 | 14.8 |
| 637 | 55 | 2.1 | 439 | 16.9 |
| 644 | 37 | 1.4 | 476 | 18.3 |
| 651 | 74 | 2.8 | 550 | 21.2 |
| 658 | 53 | 2.0 | 603 | 23.2 |
| 665 | 56 | 2.2 | 659 | 25.3 |
| 671 | 48 | 1.8 | 707 | 27.2 |
| 677 | 56 | 2.2 | 763 | 29.3 |
| 683 | 58 | 2.2 | 821 | 31.6 |
| 689 | 67 | 2.6 | 888 | 34.2 |
| 694 | 70 | 2.7 | 958 | 36.8 |
| 700 | 76 | 2.9 | 1,034 | 39.8 |
| 705 | 53 | 2.0 | 1,087 | 41.8 |
| 711 | 78 | 3.0 | 1,165 | 44.8 |
| 716 | 61 | 2.3 | 1,226 | 47.2 |
| 721 | 74 | 2.8 | 1,300 | 50.0 |
| 727 | 67 | 2.6 | 1,367 | 52.6 |
| 732 | 66 | 2.5 | 1,433 | 55.1 |
| 737 | 67 | 2.6 | 1,500 | 57.7 |
| 747 | 75 | 2.9 | 1,575 | 60.6 |
| 749 | 74 | 2.8 | 1,649 | 63.4 |
| 754 | 81 | 3.1 | 1,730 | 66.5 |
| 760 | 80 | 3.1 | 1,810 | 69.6 |
| 767 | 65 | 2.5 | 1,875 | 72.1 |
| 773 | 82 | 3.2 | 1,957 | 75.3 |
| 780 | 78 | 3.0 | 2,035 | 78.3 |
| 787 | 80 | 3.1 | 2,115 | 81.3 |
| 795 | 90 | 3.5 | 2,205 | 84.8 |
| 803 | 57 | 2.2 | 2,262 | 87.0 |
| 812 | 71 | 2.7 | 2,333 | 89.7 |
| 822 | 55 | 2.1 | 2,388 | 91.8 |
| 833 | 48 | 1.8 | 2,436 | 93.7 |
| 846 | 59 | 2.3 | 2,495 | 96.0 |

U.S. History Scale Score Distribution for Winter/Trimester 2008-2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 861 | 37 | 1.4 | 2,532 | 97.4 |
| 881 | 27 | 1.0 | 2,559 | 98.4 |
| 907 | 27 | 1.0 | 2,586 | 99.5 |
| 950 | 11 | 0.4 | 2,597 | 99.9 |
| 999 | 3 | 0.1 | 2,600 | 100.0 |



# Appendix C

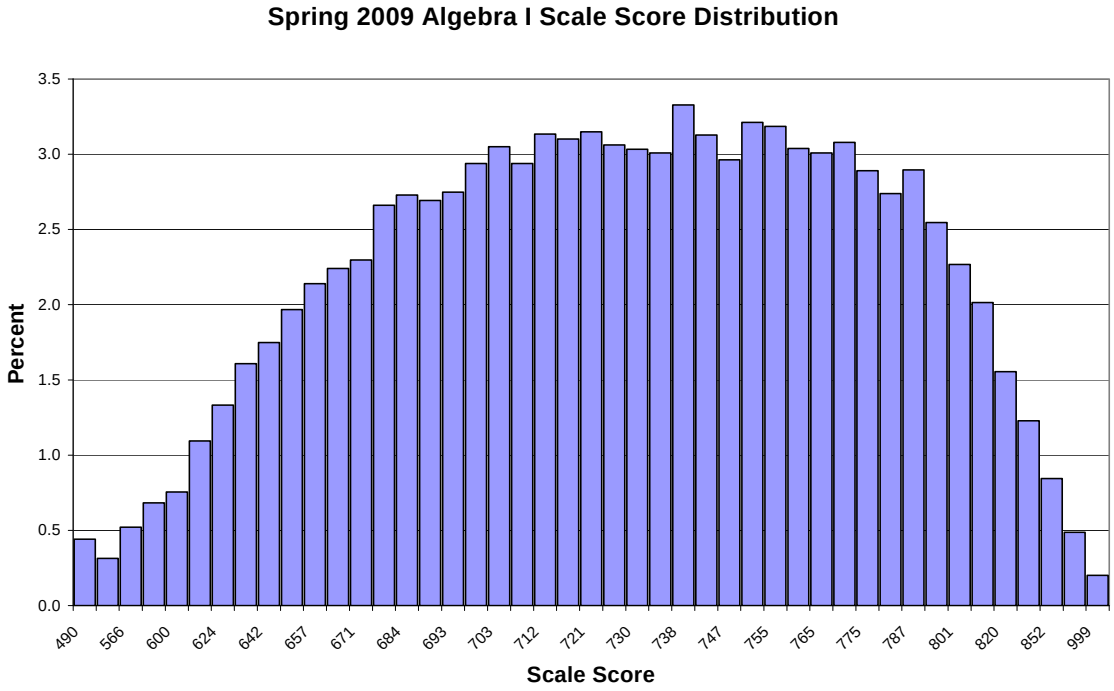
## Scale Score Distributions for Spring 2009

Algebra I Score Distribution for Spring 2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 490 | 158 | 0.4 | 158 | 0.4 |
| 538 | 112 | 0.3 | 270 | 0.8 |
| 566 | 186 | 0.5 | 456 | 1.3 |
| 585 | 244 | 0.7 | 700 | 2.0 |
| 600 | 270 | 0.8 | 970 | 2.7 |
| 613 | 391 | 1.1 | 1,361 | 3.8 |
| 624 | 476 | 1.3 | 1,837 | 5.1 |
| 639 | 575 | 1.6 | 2,412 | 6.7 |
| 642 | 625 | 1.7 | 3,037 | 8.5 |
| 650 | 703 | 2.0 | 3,740 | 10.5 |
| 657 | 765 | 2.1 | 4,505 | 12.6 |
| 664 | 801 | 2.2 | 5,306 | 14.8 |
| 671 | 821 | 2.3 | 6,127 | 17.1 |
| 677 | 951 | 2.7 | 7,078 | 19.8 |
| 684 | 975 | 2.7 | 8,053 | 22.5 |
| 688 | 962 | 2.7 | 9,015 | 25.2 |
| 693 | 982 | 2.7 | 9,997 | 28.0 |
| 698 | 1050 | 2.9 | 11,047 | 30.9 |
| 703 | 1090 | 3.1 | 12,137 | 34.0 |
| 708 | 1050 | 2.9 | 13,187 | 36.9 |
| 712 | 1120 | 3.1 | 14,307 | 40.0 |
| 717 | 1108 | 3.1 | 15,415 | 43.1 |
| 721 | 1125 | 3.1 | 16,540 | 46.3 |
| 726 | 1094 | 3.1 | 17,634 | 49.3 |
| 730 | 1084 | 3.0 | 18,718 | 52.4 |
| 734 | 1075 | 3.0 | 19,793 | 55.4 |
| 738 | 1189 | 3.3 | 20,982 | 58.7 |
| 746 | 1118 | 3.1 | 22,100 | 61.8 |
| 747 | 1059 | 3.0 | 23,159 | 64.8 |
| 751 | 1148 | 3.2 | 24,307 | 68.0 |
| 755 | 1138 | 3.2 | 25,445 | 71.2 |
| 760 | 1086 | 3.0 | 26,531 | 74.2 |
| 765 | 1075 | 3.0 | 27,606 | 77.2 |
| 770 | 1100 | 3.1 | 28,706 | 80.3 |
| 775 | 1033 | 2.9 | 29,739 | 83.2 |
| 780 | 979 | 2.7 | 30,718 | 86.0 |
| 787 | 1035 | 2.9 | 31,753 | 88.9 |
| 793 | 910 | 2.5 | 32,663 | 91.4 |
| 801 | 810 | 2.3 | 33,473 | 93.7 |
| 810 | 720 | 2.0 | 34,193 | 95.7 |
| 820 | 556 | 1.6 | 34,749 | 97.2 |
| 834 | 439 | 1.2 | 35,188 | 98.5 |

Algebra I Score Distribution for Spring 2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 852 | 302 | 0.8 | 35,490 | 99.3 |
| 885 | 174 | 0.5 | 35,664 | 99.8 |
| 999 | 72 | 0.2 | 35,736 | 100.0 |

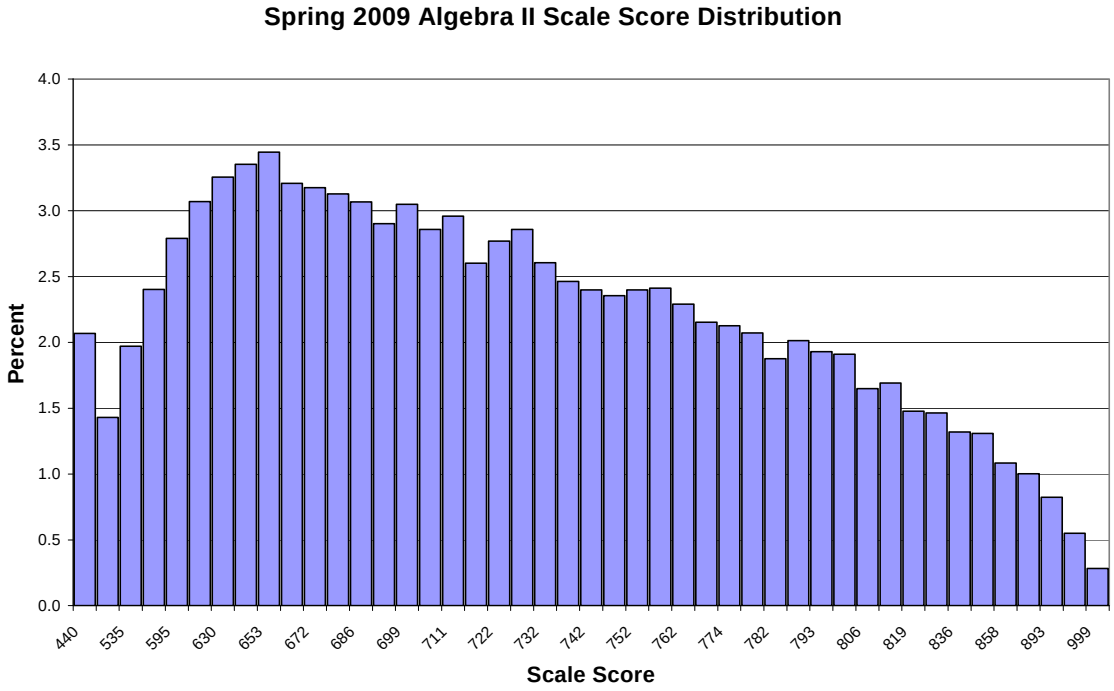


Algebra II Score Distribution for Spring 2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 613 | 2.1 | 613 | 2.1 |
| 475 | 424 | 1.4 | 1,037 | 3.5 |
| 535 | 584 | 2.0 | 1,621 | 5.5 |
| 570 | 712 | 2.4 | 2,333 | 7.9 |
| 595 | 827 | 2.8 | 3,160 | 10.7 |
| 614 | 910 | 3.1 | 4,070 | 13.7 |
| 630 | 965 | 3.3 | 5,035 | 17.0 |
| 651 | 994 | 3.4 | 6,029 | 20.3 |
| 653 | 1021 | 3.4 | 7,050 | 23.8 |
| 663 | 951 | 3.2 | 8,001 | 27.0 |
| 672 | 941 | 3.2 | 8,942 | 30.2 |
| 679 | 927 | 3.1 | 9,869 | 33.3 |
| 686 | 909 | 3.1 | 10,778 | 36.4 |
| 696 | 860 | 2.9 | 11,638 | 39.3 |
| 699 | 904 | 3.0 | 12,542 | 42.3 |
| 705 | 847 | 2.9 | 13,389 | 45.2 |
| 711 | 877 | 3.0 | 14,266 | 48.1 |
| 716 | 771 | 2.6 | 15,037 | 50.7 |
| 722 | 821 | 2.8 | 15,858 | 53.5 |
| 727 | 847 | 2.9 | 16,705 | 56.4 |
| 732 | 772 | 2.6 | 17,477 | 59.0 |
| 737 | 730 | 2.5 | 18,207 | 61.4 |
| 742 | 711 | 2.4 | 18,918 | 63.8 |
| 747 | 698 | 2.4 | 19,616 | 66.2 |
| 752 | 711 | 2.4 | 20,327 | 68.6 |
| 757 | 715 | 2.4 | 21,042 | 71.0 |
| 762 | 679 | 2.3 | 21,721 | 73.3 |
| 767 | 638 | 2.2 | 22,359 | 75.4 |
| 774 | 630 | 2.1 | 22,989 | 77.6 |
| 777 | 614 | 2.1 | 23,603 | 79.6 |
| 782 | 556 | 1.9 | 24,159 | 81.5 |
| 788 | 597 | 2.0 | 24,756 | 83.5 |
| 793 | 572 | 1.9 | 25,328 | 85.4 |
| 799 | 566 | 1.9 | 25,894 | 87.3 |
| 806 | 489 | 1.6 | 26,383 | 89.0 |
| 812 | 501 | 1.7 | 26,884 | 90.7 |
| 819 | 438 | 1.5 | 27,322 | 92.2 |
| 827 | 434 | 1.5 | 27,756 | 93.6 |
| 836 | 391 | 1.3 | 28,147 | 95.0 |
| 846 | 388 | 1.3 | 28,535 | 96.3 |
| 858 | 321 | 1.1 | 28,856 | 97.3 |
| 873 | 297 | 1.0 | 29,153 | 98.3 |

Algebra II Score Distribution for Spring 2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 893 | 244 | 0.8 | 29,397 | 99.2 |
| 929 | 163 | 0.5 | 29,560 | 99.7 |
| 999 | 84 | 0.3 | 29,644 | 100.0 |

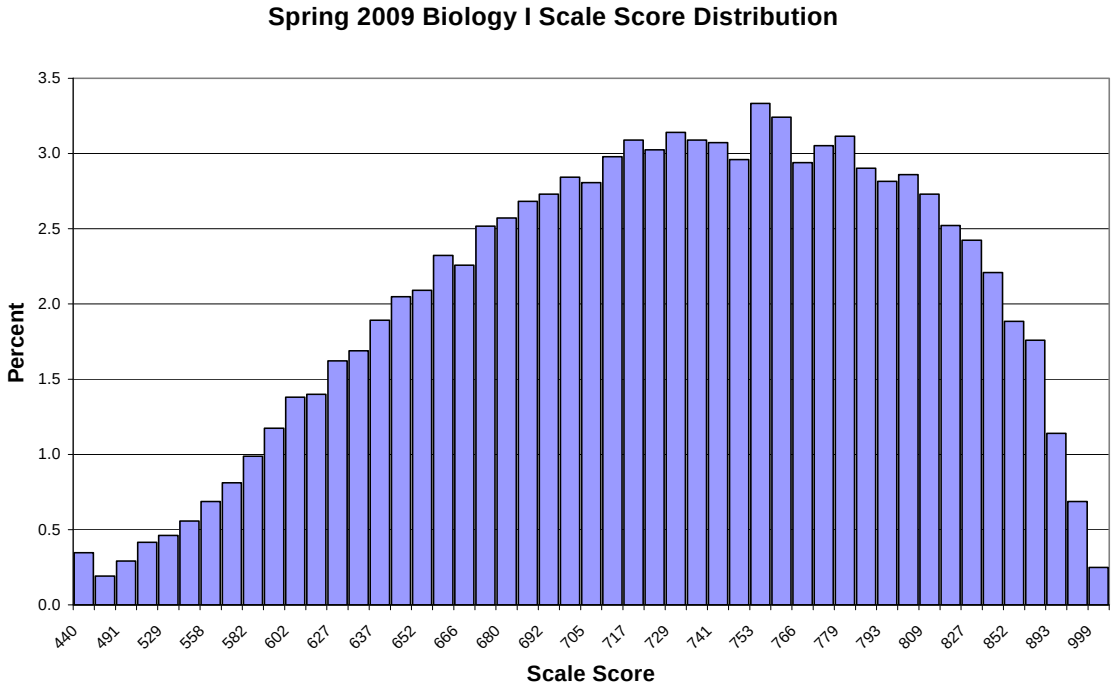


Biology I Score Distribution for Spring 2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 123 | 0.3 | 123 | 0.3 |
| 466 | 68 | 0.2 | 191 | 0.5 |
| 491 | 103 | 0.3 | 294 | 0.8 |
| 512 | 147 | 0.4 | 441 | 1.2 |
| 529 | 163 | 0.5 | 604 | 1.7 |
| 544 | 197 | 0.6 | 801 | 2.3 |
| 558 | 243 | 0.7 | 1,044 | 3.0 |
| 570 | 287 | 0.8 | 1,331 | 3.8 |
| 582 | 349 | 1.0 | 1,680 | 4.8 |
| 592 | 415 | 1.2 | 2,095 | 5.9 |
| 602 | 488 | 1.4 | 2,583 | 7.3 |
| 612 | 495 | 1.4 | 3,078 | 8.7 |
| 627 | 573 | 1.6 | 3,651 | 10.3 |
| 629 | 597 | 1.7 | 4,248 | 12.0 |
| 637 | 669 | 1.9 | 4,917 | 13.9 |
| 645 | 724 | 2.0 | 5,641 | 16.0 |
| 652 | 739 | 2.1 | 6,380 | 18.0 |
| 659 | 821 | 2.3 | 7,201 | 20.4 |
| 666 | 798 | 2.3 | 7,999 | 22.6 |
| 673 | 890 | 2.5 | 8,889 | 25.1 |
| 680 | 909 | 2.6 | 9,798 | 27.7 |
| 691 | 948 | 2.7 | 10,746 | 30.4 |
| 692 | 965 | 2.7 | 11,711 | 33.1 |
| 699 | 1005 | 2.8 | 12,716 | 36.0 |
| 705 | 992 | 2.8 | 13,708 | 38.8 |
| 711 | 1053 | 3.0 | 14,761 | 41.8 |
| 717 | 1092 | 3.1 | 15,853 | 44.8 |
| 723 | 1069 | 3.0 | 16,922 | 47.9 |
| 729 | 1110 | 3.1 | 18,032 | 51.0 |
| 735 | 1092 | 3.1 | 19,124 | 54.1 |
| 741 | 1086 | 3.1 | 20,210 | 57.2 |
| 747 | 1046 | 3.0 | 21,256 | 60.1 |
| 753 | 1178 | 3.3 | 22,434 | 63.5 |
| 759 | 1146 | 3.2 | 23,580 | 66.7 |
| 766 | 1039 | 2.9 | 24,619 | 69.6 |
| 775 | 1079 | 3.1 | 25,698 | 72.7 |
| 779 | 1101 | 3.1 | 26,799 | 75.8 |
| 786 | 1026 | 2.9 | 27,825 | 78.7 |
| 793 | 995 | 2.8 | 28,820 | 81.5 |
| 800 | 1011 | 2.9 | 29,831 | 84.4 |
| 809 | 965 | 2.7 | 30,796 | 87.1 |
| 817 | 891 | 2.5 | 31,687 | 89.6 |

Biology I Score Distribution for Spring 2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 827 | 857 | 2.4 | 32,544 | 92.1 |
| 839 | 781 | 2.2 | 33,325 | 94.3 |
| 852 | 666 | 1.9 | 33,991 | 96.2 |
| 869 | 622 | 1.8 | 34,613 | 97.9 |
| 893 | 403 | 1.1 | 35,016 | 99.1 |
| 933 | 243 | 0.7 | 35,259 | 99.8 |
| 999 | 88 | 0.2 | 35,347 | 100.0 |

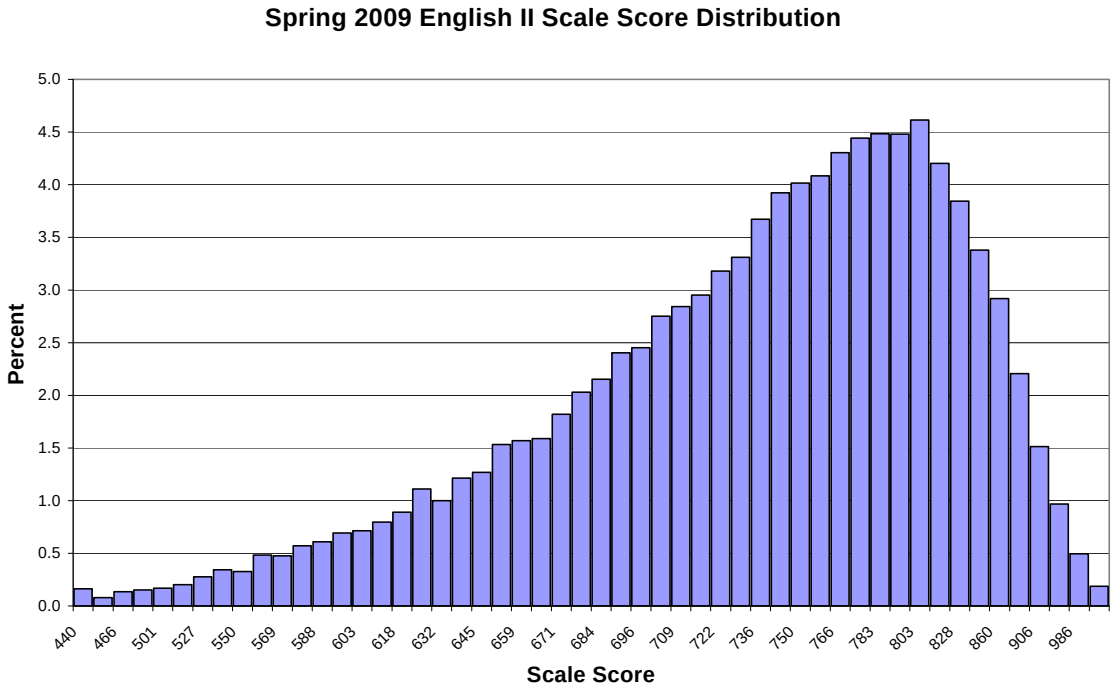


English II Score Distribution for Spring 2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 57 | 0.2 | 57 | 0.2 |
| 444 | 28 | 0.1 | 85 | 0.2 |
| 466 | 47 | 0.1 | 132 | 0.4 |
| 485 | 53 | 0.2 | 185 | 0.5 |
| 501 | 59 | 0.2 | 244 | 0.7 |
| 515 | 70 | 0.2 | 314 | 0.9 |
| 527 | 97 | 0.3 | 411 | 1.2 |
| 539 | 120 | 0.3 | 531 | 1.5 |
| 550 | 114 | 0.3 | 645 | 1.9 |
| 560 | 168 | 0.5 | 813 | 2.3 |
| 569 | 166 | 0.5 | 979 | 2.8 |
| 578 | 199 | 0.6 | 1,178 | 3.4 |
| 588 | 212 | 0.6 | 1,390 | 4.0 |
| 595 | 241 | 0.7 | 1,631 | 4.7 |
| 603 | 249 | 0.7 | 1,880 | 5.4 |
| 610 | 277 | 0.8 | 2,157 | 6.2 |
| 618 | 310 | 0.9 | 2,467 | 7.1 |
| 625 | 387 | 1.1 | 2,854 | 8.2 |
| 632 | 348 | 1.0 | 3,202 | 9.2 |
| 639 | 423 | 1.2 | 3,625 | 10.4 |
| 645 | 442 | 1.3 | 4,067 | 11.7 |
| 652 | 534 | 1.5 | 4,601 | 13.2 |
| 659 | 547 | 1.6 | 5,148 | 14.8 |
| 665 | 553 | 1.6 | 5,701 | 16.4 |
| 671 | 634 | 1.8 | 6,335 | 18.2 |
| 678 | 707 | 2.0 | 7,042 | 20.2 |
| 684 | 750 | 2.2 | 7,792 | 22.4 |
| 693 | 837 | 2.4 | 8,629 | 24.8 |
| 696 | 854 | 2.5 | 9,483 | 27.2 |
| 703 | 958 | 2.8 | 10,441 | 30.0 |
| 709 | 990 | 2.8 | 11,431 | 32.8 |
| 716 | 1028 | 3.0 | 12,459 | 35.8 |
| 722 | 1107 | 3.2 | 13,566 | 39.0 |
| 729 | 1153 | 3.3 | 14,719 | 42.3 |
| 736 | 1279 | 3.7 | 15,998 | 45.9 |
| 743 | 1366 | 3.9 | 17,364 | 49.9 |
| 750 | 1398 | 4.0 | 18,762 | 53.9 |
| 758 | 1422 | 4.1 | 20,184 | 58.0 |
| 766 | 1499 | 4.3 | 21,683 | 62.3 |
| 774 | 1547 | 4.4 | 23,230 | 66.7 |
| 783 | 1561 | 4.5 | 24,791 | 71.2 |
| 797 | 1560 | 4.5 | 26,351 | 75.7 |

English II Score Distribution for Spring 2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 803 | 1607 | 4.6 | 27,958 | 80.3 |
| 815 | 1463 | 4.2 | 29,421 | 84.5 |
| 828 | 1339 | 3.8 | 30,760 | 88.3 |
| 843 | 1177 | 3.4 | 31,937 | 91.7 |
| 860 | 1016 | 2.9 | 32,953 | 94.6 |
| 881 | 768 | 2.2 | 33,721 | 96.8 |
| 906 | 527 | 1.5 | 34,248 | 98.3 |
| 940 | 337 | 1.0 | 34,585 | 99.3 |
| 986 | 173 | 0.5 | 34,758 | 99.8 |
| 999 | 65 | 0.2 | 34,823 | 100.0 |



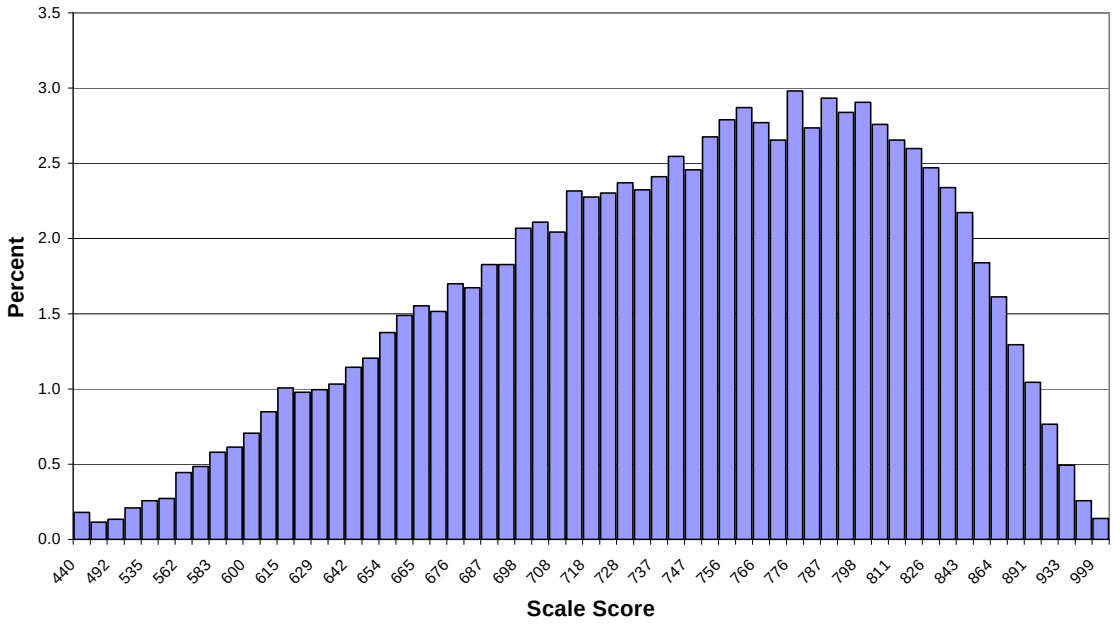
English III Score Distribution for Spring 2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 63 | 0.2 | 63 | 0.2 |
| 451 | 40 | 0.1 | 103 | 0.3 |
| 492 | 47 | 0.1 | 150 | 0.4 |
| 517 | 73 | 0.2 | 223 | 0.6 |
| 535 | 90 | 0.3 | 313 | 0.9 |
| 550 | 95 | 0.3 | 408 | 1.2 |
| 562 | 155 | 0.4 | 563 | 1.6 |
| 573 | 169 | 0.5 | 732 | 2.1 |
| 583 | 202 | 0.6 | 934 | 2.7 |
| 592 | 214 | 0.6 | 1,148 | 3.3 |
| 600 | 246 | 0.7 | 1,394 | 4.0 |
| 608 | 296 | 0.8 | 1,690 | 4.9 |
| 615 | 351 | 1.0 | 2,041 | 5.9 |
| 623 | 341 | 1.0 | 2,382 | 6.8 |
| 629 | 347 | 1.0 | 2,729 | 7.8 |
| 636 | 360 | 1.0 | 3,089 | 8.9 |
| 642 | 399 | 1.1 | 3,488 | 10.0 |
| 649 | 420 | 1.2 | 3,908 | 11.2 |
| 654 | 479 | 1.4 | 4,387 | 12.6 |
| 660 | 519 | 1.5 | 4,906 | 14.1 |
| 665 | 541 | 1.6 | 5,447 | 15.6 |
| 671 | 528 | 1.5 | 5,975 | 17.1 |
| 676 | 592 | 1.7 | 6,567 | 18.8 |
| 682 | 583 | 1.7 | 7,150 | 20.5 |
| 687 | 637 | 1.8 | 7,787 | 22.3 |
| 695 | 637 | 1.8 | 8,424 | 24.2 |
| 698 | 721 | 2.1 | 9,145 | 26.2 |
| 703 | 735 | 2.1 | 9,880 | 28.4 |
| 708 | 712 | 2.0 | 10,592 | 30.4 |
| 713 | 807 | 2.3 | 11,399 | 32.7 |
| 718 | 793 | 2.3 | 12,192 | 35.0 |
| 723 | 802 | 2.3 | 12,994 | 37.3 |
| 728 | 826 | 2.4 | 13,820 | 39.7 |
| 733 | 810 | 2.3 | 14,630 | 42.0 |
| 737 | 840 | 2.4 | 15,470 | 44.4 |
| 742 | 887 | 2.5 | 16,357 | 46.9 |
| 747 | 856 | 2.5 | 17,213 | 49.4 |
| 752 | 932 | 2.7 | 18,145 | 52.1 |
| 756 | 972 | 2.8 | 19,117 | 54.9 |
| 761 | 1000 | 2.9 | 20,117 | 57.7 |
| 766 | 965 | 2.8 | 21,082 | 60.5 |

English III Score Distribution for Spring 2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 771 | 925 | 2.7 | 22,007 | 63.2 |
| 776 | 1039 | 3.0 | 23,046 | 66.1 |
| 781 | 953 | 2.7 | 23,999 | 68.9 |
| 787 | 1022 | 2.9 | 25,021 | 71.8 |
| 795 | 989 | 2.8 | 26,010 | 74.7 |
| 798 | 1012 | 2.9 | 27,022 | 77.6 |
| 805 | 961 | 2.8 | 27,983 | 80.3 |
| 811 | 925 | 2.7 | 28,908 | 83.0 |
| 818 | 905 | 2.6 | 29,813 | 85.6 |
| 826 | 861 | 2.5 | 30,674 | 88.0 |
| 834 | 815 | 2.3 | 31,489 | 90.4 |
| 843 | 757 | 2.2 | 32,246 | 92.5 |
| 853 | 641 | 1.8 | 32,887 | 94.4 |
| 864 | 562 | 1.6 | 33,449 | 96.0 |
| 876 | 451 | 1.3 | 33,900 | 97.3 |
| 891 | 364 | 1.0 | 34,264 | 98.3 |
| 909 | 267 | 0.8 | 34,531 | 99.1 |
| 933 | 172 | 0.5 | 34,703 | 99.6 |
| 968 | 90 | 0.3 | 34,793 | 99.9 |
| 999 | 49 | 0.1 | 34,842 | 100.0 |

**Spring 2009 English III Scale Score Distribution**

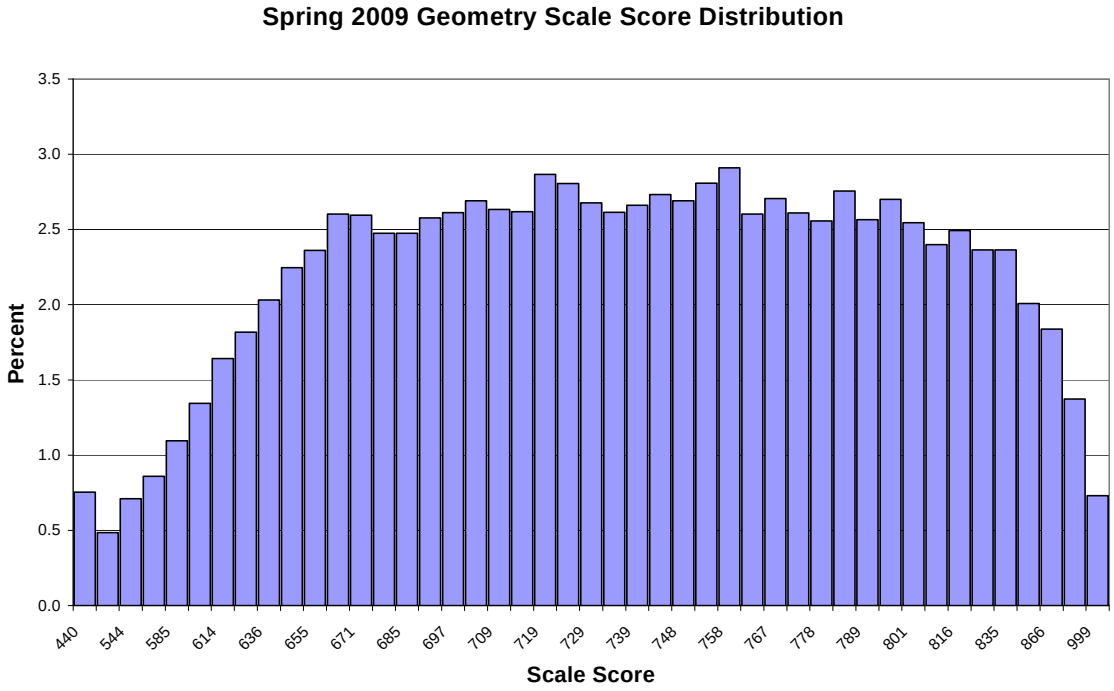


Geometry Score Distribution for Spring 2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 258 | 0.8 | 258 | 0.8 |
| 508 | 166 | 0.5 | 424 | 1.2 |
| 544 | 243 | 0.7 | 667 | 1.9 |
| 567 | 294 | 0.9 | 961 | 2.8 |
| 585 | 375 | 1.1 | 1,336 | 3.9 |
| 601 | 460 | 1.3 | 1,796 | 5.2 |
| 614 | 562 | 1.6 | 2,358 | 6.9 |
| 635 | 622 | 1.8 | 2,980 | 8.7 |
| 636 | 695 | 2.0 | 3,675 | 10.7 |
| 646 | 769 | 2.2 | 4,444 | 13.0 |
| 655 | 808 | 2.4 | 5,252 | 15.3 |
| 663 | 891 | 2.6 | 6,143 | 17.9 |
| 671 | 888 | 2.6 | 7,031 | 20.5 |
| 678 | 847 | 2.5 | 7,878 | 23.0 |
| 685 | 847 | 2.5 | 8,725 | 25.5 |
| 695 | 882 | 2.6 | 9,607 | 28.1 |
| 697 | 894 | 2.6 | 10,501 | 30.7 |
| 703 | 921 | 2.7 | 11,422 | 33.4 |
| 709 | 901 | 2.6 | 12,323 | 36.0 |
| 714 | 896 | 2.6 | 13,219 | 38.6 |
| 719 | 981 | 2.9 | 14,200 | 41.5 |
| 724 | 960 | 2.8 | 15,160 | 44.3 |
| 729 | 916 | 2.7 | 16,076 | 47.0 |
| 734 | 895 | 2.6 | 16,971 | 49.6 |
| 739 | 911 | 2.7 | 17,882 | 52.2 |
| 743 | 935 | 2.7 | 18,817 | 55.0 |
| 748 | 921 | 2.7 | 19,738 | 57.7 |
| 753 | 961 | 2.8 | 20,699 | 60.5 |
| 758 | 996 | 2.9 | 21,695 | 63.4 |
| 762 | 891 | 2.6 | 22,586 | 66.0 |
| 767 | 926 | 2.7 | 23,512 | 68.7 |
| 774 | 893 | 2.6 | 24,405 | 71.3 |
| 778 | 875 | 2.6 | 25,280 | 73.9 |
| 783 | 943 | 2.8 | 26,223 | 76.6 |
| 789 | 878 | 2.6 | 27,101 | 79.2 |
| 795 | 924 | 2.7 | 28,025 | 81.9 |
| 801 | 871 | 2.5 | 28,896 | 84.4 |
| 808 | 821 | 2.4 | 29,717 | 86.8 |
| 816 | 853 | 2.5 | 30,570 | 89.3 |
| 825 | 809 | 2.4 | 31,379 | 91.7 |
| 835 | 809 | 2.4 | 32,188 | 94.1 |
| 848 | 687 | 2.0 | 32,875 | 96.1 |

Geometry Score Distribution for Spring 2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 866 | 629 | 1.8 | 33,504 | 97.9 |
| 896 | 470 | 1.4 | 33,974 | 99.3 |
| 999 | 250 | 0.7 | 34,224 | 100.0 |



U.S. History Score Distribution for Spring 2009

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 440 | 140 | 0.4 | 140 | 0.4 |
| 452 | 91 | 0.3 | 231 | 0.7 |
| 486 | 115 | 0.4 | 346 | 1.1 |
| 512 | 173 | 0.5 | 519 | 1.6 |
| 533 | 228 | 0.7 | 747 | 2.3 |
| 551 | 254 | 0.8 | 1,001 | 3.1 |
| 566 | 321 | 1.0 | 1,322 | 4.1 |
| 580 | 349 | 1.1 | 1,671 | 5.2 |
| 592 | 420 | 1.3 | 2,091 | 6.5 |
| 603 | 518 | 1.6 | 2,609 | 8.1 |
| 613 | 549 | 1.7 | 3,158 | 9.8 |
| 622 | 562 | 1.7 | 3,720 | 11.5 |
| 631 | 635 | 2.0 | 4,355 | 13.5 |
| 639 | 652 | 2.0 | 5,007 | 15.5 |
| 647 | 681 | 2.1 | 5,688 | 17.6 |
| 654 | 711 | 2.2 | 6,399 | 19.8 |
| 661 | 740 | 2.3 | 7,139 | 22.1 |
| 668 | 788 | 2.4 | 7,927 | 24.6 |
| 674 | 846 | 2.6 | 8,773 | 27.2 |
| 681 | 821 | 2.5 | 9,594 | 29.7 |
| 689 | 804 | 2.5 | 10,398 | 32.2 |
| 693 | 883 | 2.7 | 11,281 | 35.0 |
| 699 | 923 | 2.9 | 12,204 | 37.8 |
| 705 | 902 | 2.8 | 13,106 | 40.6 |
| 711 | 922 | 2.9 | 14,028 | 43.5 |
| 716 | 978 | 3.0 | 15,006 | 46.5 |
| 722 | 967 | 3.0 | 15,973 | 49.5 |
| 728 | 939 | 2.9 | 16,912 | 52.4 |
| 734 | 978 | 3.0 | 17,890 | 55.4 |
| 740 | 1014 | 3.1 | 18,904 | 58.6 |
| 747 | 979 | 3.0 | 19,883 | 61.6 |
| 752 | 1020 | 3.2 | 20,903 | 64.8 |
| 758 | 1035 | 3.2 | 21,938 | 68.0 |
| 765 | 1089 | 3.4 | 23,027 | 71.3 |
| 772 | 1040 | 3.2 | 24,067 | 74.6 |
| 779 | 1022 | 3.2 | 25,089 | 77.7 |
| 787 | 941 | 2.9 | 26,030 | 80.6 |
| 795 | 998 | 3.1 | 27,028 | 83.7 |
| 804 | 869 | 2.7 | 27,897 | 86.4 |
| 814 | 902 | 2.8 | 28,799 | 89.2 |
| 824 | 765 | 2.4 | 29,564 | 91.6 |
| 836 | 719 | 2.2 | 30,283 | 93.8 |

U.S. History Score Distribution for Spring 2009 continued

| Scale Score | Frequency | Percent | Cumulative Frequency | Cumulative Percent |
|---|---|---|---|---|
| 850 | 631 | 2.0 | 30,914 | 95.8 |
| 866 | 489 | 1.5 | 31,403 | 97.3 |
| 886 | 405 | 1.3 | 31,808 | 98.5 |
| 914 | 273 | 0.8 | 32,081 | 99.4 |
| 967 | 143 | 0.4 | 32,224 | 99.8 |
| 999 | 53 | 0.2 | 32,277 | 100.0 |