Technical Report

Montana Office of Public Instruction Empirical Standard Setting

December 2017

This technical report will accompany Montana's December 2017 submission for Peer Review as mandated by the U.S. Department of Education. This report will be submitted to provide documentation of procedures used by the Office of Public Instruction through consultation with Dr. Karla Egan to conduct Montana's empirical standard setting study for the ACT.

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Overview

This technical report is divided into six chapters, each describing a different area related to the empirical standard setting validation approach. Chapter 1 provides the context for Montana's high school content standards, the background information that led up to the workshop, and Montana's statutory guidance for performance level descriptors (PLDs) as it relates to the Peer Review requirements. Chapter 2 discusses the empirically-based methodology used to generate cut scores and the crosswalk approach to using the Smarter Balanced Assessment Consortium range performance level descriptors (PLDs) to generate statements of the knowledge, skills, and abilities of students at each performance level. Chapter 3 details the logistic arrangements for the workshop. Chapter 4 provides the methods used to recruit panelists for this workshop and the criteria considered. Chapter 5 describes the materials that were used during the September 21–22 workshop. Chapter 6 overviews the process employed with these materials during the two-day workshop.

Chapter 1. Background

The Montana Office of Public Instruction (MT OPI) invited a statewide representative group of educators and stakeholders to engage in a two-day empirical standard setting workshop. The purpose of this meeting was to review cut scores generated from historical state ACT achievement data and the directly comparable state Smarter Balanced achievement data for high school grade 11 students. In addition to confirming Montana's proposed cut scores for validation, the panel was asked to generate PLDs for the Montana high school English Language Arts (ELA) and mathematics assessments from existing Smarter Balanced range PLDs. The ACT subtests Reading, Writing, and English were used for Montana's ELA composite test and composite cut scores. The traditional ACT mathematics test was used for Montana's cut scores. Montana administers the ACT test with Writing to all grade 11 students and the Writing portion was included in the ELA composite and the state Every Student Succeeds Act (ESSA) accountability plan. In accordance with the administrative rules for Montana, the MT OPI has established that student performance will be reported in one of four performance levels: *Novice (Level 1), Nearing Proficiency (Level 2), Proficient (Level 3), and Advanced (Level 4)*. This technical report describes the standard-setting methods used with the panel on September 21–22, 2017 in Helena, Montana.

Context for the Standard Setting Workshop

In 2011, Montana adopted the Montana Common Core State Standards (MCCS) for ELA and mathematics. Prior to the use of the ACT, Montana administered the Smarter Balanced assessments to high school grade 11 students. The MT OPI continues to administer the summative Smarter Balanced assessments in grades 3–8. The goal of the workshop was to validate and adopt cut scores for the ACT that align with the college- and career-readiness expectations and that are aligned with the performance levels in grades 3–8. In addition, Montana has maintained the use of the same set of content standards for all assessments since its MCCS adoption in 2011.

Montana, like several other states in the nation, shifted to using the ACT assessment for its grade 11 statewide high school assessment rather than a state contracted assessment for

several reasons. Under the administrative rules for Montana, it is the state's obligation to fund all statewide assessments for accountability and this rule may not be construed to require a school district to provide these assessments if the state does not have a current contract with test vendors for provision of these assessments to Montana school districts (Rule: 10.56.101). As such, the ACT assessment was funded through the federal U.S. Department of Education GEAR UP (Gaining Early Awareness & Readiness for Undergraduate Programs) awarded to the Montana Office of Commissioner of Higher Education. This seven-year, $28 million grant through the Montana University System (MUS) provided Montana high school grade 11 students with access to the ACT with Writing at no cost (see **Table 1** for participation trends). For Montana's K–12 accredited schools, the financial burden to administer assessments is entirely placed on the US DOE assessment grant, thus, securing additional financial support for administration of one of the required statewide assessments was appealing given extreme state budgetary constraints. Recently, the funding for GEAR UP was renewed and the ACT with Writing to high school grade 11 students at no cost will continue for the length of the GEAR UP grant.

Another reason the MT OPI pursued the ACT as its statewide high school assessment was that the ACT assessment provides incentive to high school grade 11 students to fully participate since the scores can be used for college-entrance. There is greater student engagement in the test itself and in turn the possibility of increasing interest in the number of students who consider college in their future.

The final reason for pursuing the ACT test for high school accountability was that the ACT assessment, as a longstanding college entrance exam, provides robust predictive research. The ACT has four established college- and career-ready benchmarks to indicate the probability of success in credit-bearing college courses and provides inferences not found in the limited scope of state assessment systems. It is also a well-established program with widespread use across the nation thus allowing achievement comparisons of trend over time across state lines rather than just within the state.

Starting in 2015, Montana began using the ACT to assess high school students in ELA and mathematics for accountability while maintaining the 2011 MCCS. The ACT is administered each spring to all Montana public and accredited schools grade 11 students except for students with significant cognitive disabilities who participate in the Multi-State Alternate Assessment (MSAA) per their Individualized Education Plans (IEPs). The administration of ACT assessments allowed all Montana grade 11 students to take an ACT assessment, while reducing the testing burden, and it fulfilled the requirements of ESSA to test all students once in ELA and once in mathematics in high school. In addition, it has been shown that a census administration of a college entrance test is a cost- effective way of increasing post-secondary attainment (Hyman, 2013; Klaskik, 2013).

The panel's validation of these empirically set cut scores provided the MT OPI with the ability to present achievement data in the school report card dashboard so Montana districts, schools, teachers, parents, and students can understand what proficient means for the ACT assessment. This will further demonstrate the relationship between the ACT scale and achievement related to the state standards. These cut scores will also be used to

comply with US DOE mandated assessment Peer Review requirements for EDFacts reporting (metadata survey), the US DOE mandated State ESSA Plan Peer Review, and the procedures for indexing schools in the Title I Part A annual meaningful differentiation of schools.

The primary charge of the panel was to validate and thus support the adoption of the MT OPI-proposed cut scores based on impact data and comparative analyses, and to define the knowledge, skills, and abilities of students for the ELA and mathematics PLDs. The outcomes of the study will be used for MT OPI's public reporting using the ACT assessment.

Performance Standard Policy Goals

The MT OPI has used three guiding principles for its standards validation procedures and performance-level descriptor procedures. These guiding principles include setting cut scores and related achievement levels that are (1) meaningful, (2) relevant, and (3) understandable for Montana stakeholders (e.g., state education office representatives, state policy makers, local school district staff, school administrators, teachers, parents, and the general public).

Meaningful Performance Levels

The MT OPI intended to set cut scores that were meaningful to various stakeholders, including (but not limited to) school administrators, teachers, higher education officials, business leaders, parents and students. Following the administrative rules of Montana, the MT OPI proposed four performance levels depicting delineating performance. These cut scores were created using the best historical achievement data available from multiple measures and scale scores within the proposed proficient range related to a high probability of student success in college using the ACT's probability research. The panel validated that these performance standards were appropriate to meaningfully describe the knowledge, skills, and abilities of students on the ACT achievement scale.

Relevant Performance Levels

The MT OPI considered a plethora of research and the ACT college- and career-benchmarks to inform its adoption of meaningful cut scores and PLDs. It is important to note that the cut score procedures were empirically driven based on actual Montana student achievement, thus, cut scores that relate to the ACT's college readiness benchmarks were not part of the design. However, using this empirical approach with actual Montana student data, the proposed cut scores aligned well with the predictive research by the ACT. For example, the ACT college readiness benchmark for college algebra is 22 and the ACT college readiness benchmark for English Composition I is 18. The MT OPI proposed a cut score for proficient at 22 in the ACT mathematics test and a cut score for proficient at 19 for ELA.

Easily Understandable Performance Levels

Another goal of the empirical standard setting workshop was for the MT OPI to stay consistent and uniform in the way it reports achievement data to the public. To maintain consistency, the MT OPI proposed to adopt four levels of performance similar to the historical Smarter Balanced and CRT-Science score reporting and in compliance with the administrative rules for Montana. The MT OPI also decided to preserve the traditional ACT

scale score range from 1–36 so interpretations of performance are understandable and translatable to the public. The products of this panel were to help Montana stakeholders and data users know what percentage of students meet set levels of established criteria, such as "proficient," using the ACT mathematics and reading/ELA data from grade 11 students.

ACT's Historical Use in Montana

The table below illustrates Montana's historical administration of the ACT to high school grade 11 students beginning with the 2012-2013 school year (see **Table 1**). In this section, the ACT benchmark scores of English, Mathematics, Reading, and Science have been provided for reference (**Figure 3**). The ACT has a collection of predictive research to suggest the minimum ACT test scores required for students to have a high probability of success in credit-bearing college-level courses. The courses examined in this extensive research are English Composition I, Social Sciences, College Algebra, and Biology. It should be noted that the ACT benchmarks for college readiness were derived from the graduating class data not from the grade 11 students' statewide assessments.

Students who meet a benchmark on the ACT have approximately a 50% chance of earning a B or better and approximately a 75% chance of earning a C or better in the corresponding college course or courses (ACT Technical Manual, 2014). The corresponding college readiness benchmarks by test are shown in **Figure 1** below**.**
 below.

Table 1 - ACT Grade 11 Students Statewide Administration Participation Trends for Montana

School Year	Number of Grade 11 Students Tested	Average ACT Composite
2012-2013	8,924	20.1
2013-2014	8,815	20.0
2014-2015	8,887	19.9
2015-2016	9,281	20.0
2016-2017	9,322	19.7

Source: This information was made available from http://gems.opi.mt.gov/.

Figure 1 - ACT College Readiness Benchmarks

College course or course area	ACT subject area test	ACT Explore Benchmark grade 8	ACT Explore Benchmark grade 9	ACT Plan Benchmark	The ACT Test Benchmark
English Composition I	English	13	14	15	18
Social Sciences	Reading	16	17	18	22
College Algebra	Mathematics	17	18	19	22
Biology	Science	18	19	20	23

Source: http://www.act.org/content/dam/act/unsecured/documents/benchmarks.pdf.
The red box of emphasis shows the cut score to designate college-readiness for each ACT subtest.

Peer Review Requirements

Standard setting and PLD development are routine parts of summative assessments and required by federal statutory requirements. The US DOE requires that summative assessments used for statewide accountability be submitted for federal peer review.

Critical Element 6.2 of the federal peer review requirements states:

> The State used a technically sound method and process that involved panelists with appropriate experience and expertise for setting its academic achievement standards and alternate academic achievement standards to ensure they are valid and reliable.

To meet this requirement, MT OPI held a two-day empirical standard setting for the MT high school assessments. This document describes the method and process that was used for the standard setting workshop. Montana was able to recruit 24 panelists from across the state to participate in the two-day workshop. This experience is described in detail in Chapter 3 of this document.

Critical Element 6.3 of the federal peer review requirements states:

> The State's academic achievement standards are challenging and aligned with the State's academic content standards such that a high school student who scores at the proficient or above level has mastered what students are expected to know and be able to do by the time they graduate from high school in order to succeed in college and the workforce.

Examples of evidence for Critical Element 6.3 include descriptions of the process used to develop academic achievement standards aligned to the "full range of the State's academic content standards for each grade" (p. 51). In addition, it says:

> Evaluation by standard setting panelists or external expert reviewers that the State's academic achievement standards are aligned to the grade-level academic content standards and include subject-specific performance level descriptors that

meaningfully differentiate across performance levels within grades and are vertically articulated across grades (p. 51).

To meet the requirements and expected evidence of Critical Element 6.3, the MT OPI reviewed PLDs that are aligned to the breadth and depth of the Montana content standards. This is described in Chapter 6 of this document.

Chapter 2. Briefing Book Methodology

This section consists of two parts: (1) the methodology for the empirical standard setting procedure and (2) a discussion of PLDs.

Standard Setting Methodology

The MT OPI prepared a book of analyses performed on existing state achievement data for high school grade 11 students using the ACT and Smarter Balanced test data. The panelists were provided with this briefing book including its analyses, interpretations and possible inferences for the MT OPI-recommended cut points (see Appendix A). Some materials included in the briefing book were past historical ACT trends from year-to-year, trends for ACT, and grade 11 Smarter Balanced tested students, Smarter Balanced cumulative distribution functions, impact data for state-recommended cut scores, and additional validation analyses.

MT OPI provided the briefing book to panelists to describe the empirical process used for establishing cut scores for the ACT ELA and mathematics assessments. Traditional standard setting procedures use content-based methods to establish or evaluate cut scores. They also use bookmark methods such as the examination of the expectations of the PLDs to further examine the content associated with the items and to make decisions about the cut score. Traditional methods did not seem appropriate for this workshop given the existing nature of the assessment, the established nature of college readiness benchmarks, and the policy accountability goal to have ACT performance levels that remain congruent and consistent with the grades 3–8 MT OPI Smarter Balanced performance system. Also, Montana adapted methods from the Wyoming Department of Education (WDE) which was recommended by the US DOE as an acceptable proxy given the MT OPI statewide testing assessment conditions.

For these reasons, the MT OPI elected to implement an empirical standard setting validation approach. With this method, the MT OPI established preliminary cut scores that align with the existing cut scores from MT Smarter Balanced administration in grades 3–8 cut scores. Panelists examined the following materials in order to determine final cut scores:

- Mathematics and ELA Cumulative Distribution Function (CDF): Smarter Balanced Relationship to the ACT
- Percent of ACT mathematics and ELA test takers by performance level and year
- Percent of Smarter Balanced mathematics and ELA test takers by performance level and year

- Percent of 2015 Smarter Balanced mathematics and ELA test takers by proposed ACT cuts scores
- ACT-provided probability of students obtaining an A, B, or C or higher in college entry level credit-bearing courses
- Post-secondary percentage of students receiving remediation in Montana public universities by performance level
- Mathematics and ELA Stacked Bar Graph: Smarter Balanced versus ACT
- Mathematics and ELA Year-to-Year Variability in ACT Performance.
- MT OPI Proposed Mathematics and ELA Cut Scores compared to 2016 Grades 3–8 Smarter Balanced Results
- ELA Cut Score Comparison to the ACT Benchmark College Readiness Scores
- Administrative Rules for Montana Performance Descriptor Definitions

Mr. Meredith described the methods used for creating these OPI-proposed cut scores through reviewing and explaining several data tables and charts within the briefing book (Appendix A). For illustration purposes below is the presentation order and brief synopsis used for the math cut scores. The first presentation asked panelists to flip to page 10 in the briefing book to review the math CDF plot as shown in **Figure 2**. Mr. Meredith described the purpose of the CDF plot using the 80% threshold and what each Smarter Balanced performance level meant in regards to the ACT scale (1–36).

Figure 2. Mathematics CDF: Smarter Balanced Relationship to the ACT.
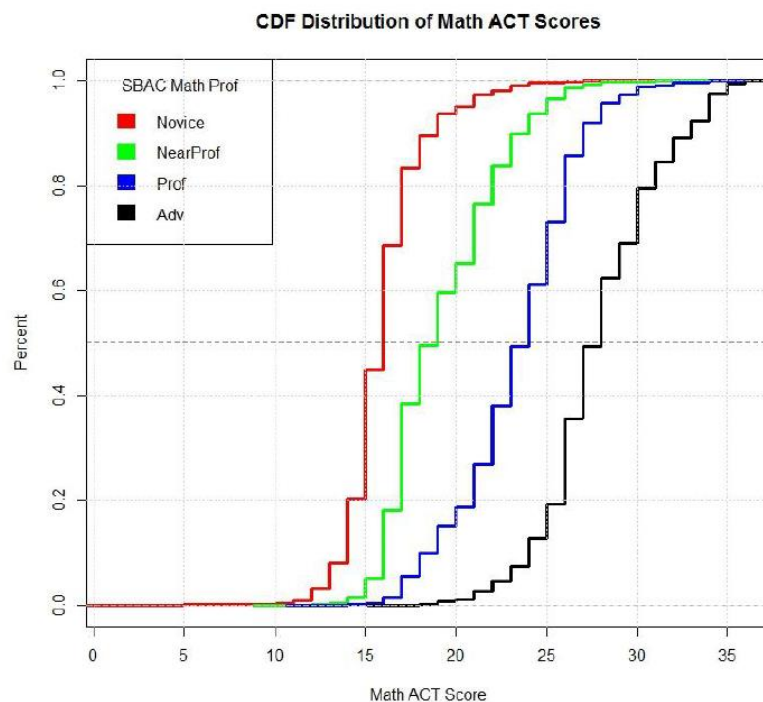
Mr. Meredith described how these findings corresponded to page 6 in the briefing book (Appendix A) and how they remained unchanged as shown in slide 27 (Appendix B). After this guided presentation, Mr. Meredith instructed the panelists to review the data on page 28 (Appendix A) to show the OPI-proposed math cut scores and the percent of students in

each level for the actual ACT test takers in 2016 and for congruence with the grades 3–8 performance system the percent of grades 3–8 Smarter Balanced test takers. Following this presentation, Mr. Meredith described the data shown on page 12 (Appendix A).

The data on page 12 is unique to the MT OPI as it illustrates the performance of students in the spring of 2015 (2014-2015 school year) that took both the Smarter Balanced math test and the ACT. A description of the percent of Smarter Balanced math test takers by proposed ACT cut score was given as well as a description of these tests who tested in the spring and why the MT OPI had grade 11 data for both assessments.

Starting on slide 32 (Appendix B) and page 16 (Appendix A), Mr. Meredith described the probability data provided by the ACT and its meaning for students obtaining grades of a "A, B, or C or higher" in college entry level credit-bearing courses (see **Table 2**).

Table 2 – ACT Probability Table for Mathematics

	Probability of Success			Percentage At/Above			
ACT Score	A prob	B or higher prob	C or higher prob	MT Juniors Census 2017	MT Juniors Census 2016	Census State Juniors 2016	National Juniors 2016
15	0.04	0.20	0.48	89	89	83	89
16	0.05	0.22	0.51	83	84	75	84
16	0.06	0.24	0.53	75	77	67	77
17	0.07	0.26	0.55	67	70	58	71
18	0.07	0.28	0.57	61	65	54	67
18	0.08	0.30	0.59	56	60	49	62
18	0.09	0.32	0.60	53	56	45	59
19	0.10	0.34	0.62	49	52	41	55
19	0.11	0.36	0.64	47	49	38	53
20	0.12	0.38	0.65	44	46	36	50
20	0.13	0.40	0.67	42	44	34	49
21	0.15	0.42	0.68	41	43	33	47
21	0.16	0.44	0.69	40	42	32	46
21	0.17	0.46	0.71	37	40	30	44
22	0.19	0.48	0.72	35	37	29	43
22	0.20	0.50	0.73	33	36	27	41
23	0.22	0.52	0.74	32	35	26	40
23	0.24	0.54	0.76	31	33	25	38
23	0.25	0.56	0.77	29	31	24	36
24	0.27	0.58	0.78	27	29	22	34
24	0.29	0.60	0.79	25	27	20	32
25	0.32	0.62	0.80	22	24	18	30
25	0.34	0.64	0.81	19	21	16	27
25	0.36	0.66	0.82	17	19	14	25
26	0.39	0.68	0.83	15	16	12	23
26	0.42	0.70	0.84	13	13	11	21
27	0.45	0.72	0.85	11	11	9	18
27	0.48	0.74	0.86	9	9	7	16
28	0.51	0.76	0.87	8	8	6	14
28	0.54	0.78	0.88	6	6	5	12
29	0.58	0.80	0.89	5	4	4	10
30	0.62	0.82	0.90	4	3	3	8
30	0.66	0.84	0.91	3	2	2	7
31	0.70	0.86	0.92	2	2	2	5
32	0.74	0.88	0.93	2	2	1	4
33	0.79	0.90	0.94	1	1	1	3
N-count		70.464		9,381	9,300	384,406	1,739,665

To help the panelists understand how these MT OPI-proposed cut scores related to actual post-secondary data for Montana students, Mr. Meredith presented Tables 15–16 in the briefing book on pages 19–20 (Appendix A). These data tables showed the percent of MUS students receiving remediation in Montana public universities by performance level. After this demonstration, Mr. Meredith describe the data and its potential use for validating these OPI-proposed cut scores on pages 21-27 and 29 in the briefing book (Appendix A).

Table 3 shows the information on page 29 (Appendix A) and how the MT OPI-proposed ELA cut score related to the ACT benchmarks for college readiness.

Table 3 – ELA Cut Score Comparison to the ACT Benchmark College Readiness Scores

School Year	ELA Proposed Score (19)	English Score (18)	Reading Score (22)
2014-2015	48.9%	53.0%	37.3%
2015-2016	52.5%	53.0%	42.5%
2016-2017	49.5%	49.5%	38.7%

Table 4 shows the preliminary cut scores for the mathematics and ELA tests that were empirically established from multiple historical data sources.

Table 4 - Preliminary Cut Scores

	Novice	Nearing Proficiency	Proficient	Advanced
	Level 1	*Level 2*	*Level 3*	*Level 4*
Mathematics	Less than 17	17	22	26
ELA	Less than 16	16	19	24

Finding Preliminary Cut Scores

The first comparative analysis the MT OPI performed was to look at the two assessments and their corresponding results using a CDF plot for the mathematics and ELA domain scores on the ACT (see **Figure 2** as an example and pages 10–11 in Appendix A). Each CDF plot had four lines, one for each performance level on the Smarter Balanced assessment. The CDF plot showed four levels of performance on the Smarter Balanced assessment. These performances were compared to the same year's administration of the ACT. We recommended to the panelists that they examine the chart by looking at 80% level on the y-axis which denoted the Smarter Balanced performance. After finding the 80% threshold on the y-axis, we suggested that they compare this to where the ACT scale score (1–36) was on the x-axis and its intersection with the four Smarter Balanced lines.

The reason that the MT OPI used 80% was that this indicated a high degree of confidence in students achieving at each of these levels. In addition, when the ACT developed its college- and career-readiness standards it employed a similar threshold for students who successfully answered the test items correctly. The ACT used this 80% criterion as it offered a high degree of confidence that students scoring in a given score range will most likely be able to demonstrate the skills and knowledge described in that range (ACT Technical Manual). The panelist CDF plot review helped illustrate the relationship between the ACT and Smarter Balanced data and evidence for the MT OPI's empirical standard setting approach.

Panelists were instructed that these CDF plots were used as the initial starting point for where the MT OPI cut scores were set for the four performance levels as they illustrated the reasonable distributions of students in each performance category at the state level. Mr. Meredith described some reasonable interpretations for the CDF plots through the following example: With the 80% approach, it can be said that, "80% of the students that scored that performance level on the Smarter Balanced assessment scored below the corresponding ACT score."

For mathematics, the cut score for Nearing Proficient was determined to be a score of 17. This was the ACT scale score that appeared above the 80% line for the students that scored Novice on the Smarter Balanced assessment. The cut score for Proficient was determined to be 22 and the students that scored Nearing Proficient on the Smarter Balanced test. The cut score of a 22 matched the ACT's college readiness benchmarks for the graduating class, but this was not intentional by design. The MT OPI-proposed level for Proficient was set at 22 through this empirical standard setting approach and it best described the performance data of Montana's grade 11 students. Using the ACT and Smarter Balanced comparative and relational data approach the cut scores and performance levels were determined by the MT OPI for panelist consideration and validation.

The cut scores determined above did not result in the final MT OPI-proposed cut scores for ELA. The MT OPI cut scores were further analyzed by a more in-depth comparison to 2014-2015 Smarter Balanced assessment data. After comparison to existing Smarter Balanced data for the same group of grade 11 students, impact data was created to further document evidence of the MT OPI cut scores. As alluded to in the procedure section of this document, it is advisable for the ACT performance level categories to compare well with the Smarter Balanced performance levels for its use in the statewide accountability process. Smarter Balanced data used to further support the mathematics and ELA cut scores can be found in Appendix A.

Performance Level Descriptors

A system of interrelated PLDs also plays an integral role in the meaningful interpretation of test scores:
- *Policy PLDs* – Policy PLDs articulate policymakers' vision of the goals and rigor for the final performance standards.
- *Range PLDs* – Range PLDs are grade/content specific descriptors that may be used by item writers to describe the cognitive and content rigor that is encompassed within particular performance levels.
- *Reporting PLDs* – Reporting PLDs are also a subset of the Range PLDs. Reporting PLDs are descriptions of the content within each performance level that appear on reports of student performance for a variety of stakeholder groups.

Policy PLDs are typically presented to panelists early in the standard setting process to set the tone for the discussion of assessment content and the rigor that should be expected at each performance level. For the Montana empirical standard setting, the Policy PLDs are shown in **Table 5**.

The next step used for the PLD creation was to define the empirical standard setting process to be used with the MT OPI's unique comparative data set to draw on. For this empirical standard setting process the following questions helped guide the analysis directions:

- What are some options for meaningful ACT performance levels?
- What are some options for understandable ACT performance levels?
- What are some options for relevant ACT performance levels?

The Smarter Balanced assessment was used to help evaluate proficiency for Montana's grades 3–8 in ELA and mathematics. For annual meaningful differentiation under the ESSA state plan, the statewide accountability process compared the proficiency rate of high schools to that of schools with grade 8 students and below. For these reasons, it was reasonable to suggest that the ACT assessment include the same number of performance levels as the Smarter Balanced assessment as these rates of proficiency are comparable to one another. In addition, the four levels were used not only to have a congruent K-12 accountability system but also as administrative rules for Montana require four performance levels for accreditation. During the 2014-2015 Smarter Balanced administration, there were approximately 6,000 students who took both the ACT grade 11 assessment and the Smarter Balanced grade 11 assessment. Using the data from that 2014-2015 administration of both tests, and the fact the same students took both tests, the MT OPI developed cut scores for the ACT that correlated well to the Smarter Balanced assessment.

Range PLDs are content-specific and will be developed based on the Montana content standards to which the assessment is aligned. The Smarter Balanced Range PLDs have been repurposed for the Montana Grade 11 assessment. During the workshop, the panelists ensured that the repurposed range PLDs were aligned with the Montana content standards.

Reporting PLDs were derived from a subset of the Range PLDs in congruence with the MT OPI Policy PLDs and to include the probability statements used to help set the performance levels and describe the college-readiness expectations. The MT OPI plans to use these Reporting PLDs to help describe the knowledge, skills, and abilities of students in each of the four categories as it relates to the ACT readiness research. These statements will be used in the ESSA required school report card.

Table 5 - Smarter Balanced Policy PLDs and MT OPI Chapter 54 Policy PLDs

Achievement Level	Policy Level Definitions	Montana Chapter 54 Administrative Rule
Novice (Level 1)	Student demonstrates minimal understanding of and ability to apply the knowledge and skills associated with college content readiness	This level denotes that the student is beginning to attain the prerequisite knowledge and skills that are fundamental for work at each benchmark.
Nearing Proficient (Level 2)	Student demonstrates partial understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes that the student has partial mastery or prerequisite knowledge and skills fundamental for proficient work at each benchmark
Proficient (Level 3)	Student demonstrates adequate understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes solid academic performance for each benchmark. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter.
Advanced (Level 4)	Student demonstrates thorough understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes superior performance.

Chapter 3. Logistics for the Workshop

A two-day meeting with 23 panelists was held September 21–22, 2017 in Helena, Montana. This section details the space requirements and room layout for the workshop.

Space Requirements

MT OPI reserved the following rooms for the two-day workshop:
- Training Room (Meeting Room 002/003): Capacity for a minimum of 40 panelists and observers
- Meeting Room 001: ELA panelists
- Meeting Room 002: Mathematics panelists

Breaks and Lunch

Lunch and refreshments were provided by the MT OPI and panelists were given two breaks. The refreshments were accessible throughout the workshop.

Training Room Capacity and Configuration

The training room had the capacity for all panelists, facilitators, and observers (approximately 40 people). There were various ways to configure the training room, but it was decided that the divider for the two meeting rooms was not necessary to separate the ELA and mathematics content groups. Large rectangular desks were placed in lecture style format for the day one empirical standard setting training and discussion. Each content area had its own rectangular table with seating for the four panelists per table, plus extra seating for the content facilitators. A table for materials including extra paper, highlighters, pens, etc. was provided. The training room included extra seating for additional MT OPI staff and observers.

Breakout Room Capacity and Configuration
Meeting Rooms 001 and 002 had ample capacity for the 12 panelists, staff, and observers.

Equipment/Materials Needs

Each breakout room contained:
- LCD projector
- Projection screen
- Printer/copier (or access to a printer/copier)
- Internet Access

Each table contained:
- Laptop
- Notebooks
- Pens and pencils
- Note cards

Workshop Staff

Table 6 shows the workshop staff who trained panelists and facilitated each breakout room and their respective professional experience.

Table 6 - Staff for the Standard Setting Workshop

Name	Workshop Role	Experience
Dr. Karla Egan, EdMetric LLC	Overall Facilitator, Trainer	Dr. Egan has designed and led over 50 standard setting workshops, and she designed and facilitated multiple workshops to create performance level descriptors.
Jessica Eilertson	Overall Facilitator	Ms. Eilertson is the current State Assessment Director for the Montana OPI. She has worked with a large suite of assessments for state education agencies over the past five years. Prior to her work specializing in assessment, she was a data manager and analyst for multimillion dollar education grants. She is a former secondary high school mathematics teacher.
Dr. Jason Nicholas	Group Facilitator	Dr. Nicholas has been involved in multiple facets of state and national assessments for the past 15 years and has participated in multiple standard setting workshops. Dr. Nicholas brings a wide array of experiences in the education domain to the workshop.
Eric Meredith	Group Facilitator	Mr. Meredith has been a data analyst for the Montana OPI and has worked with various assessment data for the past eight years. He has six years of experience teaching high school and college mathematics courses and currently sits on the psychometrics subcommittee for a nationwide assessment.
Ashley McGrath	Group Facilitator	Ms. McGrath has been a data analyst in large-scale assessment for the Montana OPI for the past five years. She has experience in teaching secondary science and presenting on large-scale assessment topics at the local, regional, and national level.

Chapter 4. Panelist Recruitment

The MT OPI empirical standard setting workshop panel consisted of diverse stakeholders, including (but not limited to) school administrators, teachers, higher education officials, business leaders, and parents from across the state. The MT OPI used a short Key Survey recruitment application (http://app.keysurvey.com/f/1151456/13b4/).

All applicants were considered for inclusion on the panel. The scoring was completed by a team of MT OPI employees. Each candidate had three reviewers and all reviewers independently assessed the application and made recommendations for selections using a scoring rubric. These scores were averaged and the MT OPI selected the highest marked candidates for the panel to meet their representation needs for content area, stakeholder group, and location.

Figure 3 - Statewide Geographic Panelist Representation
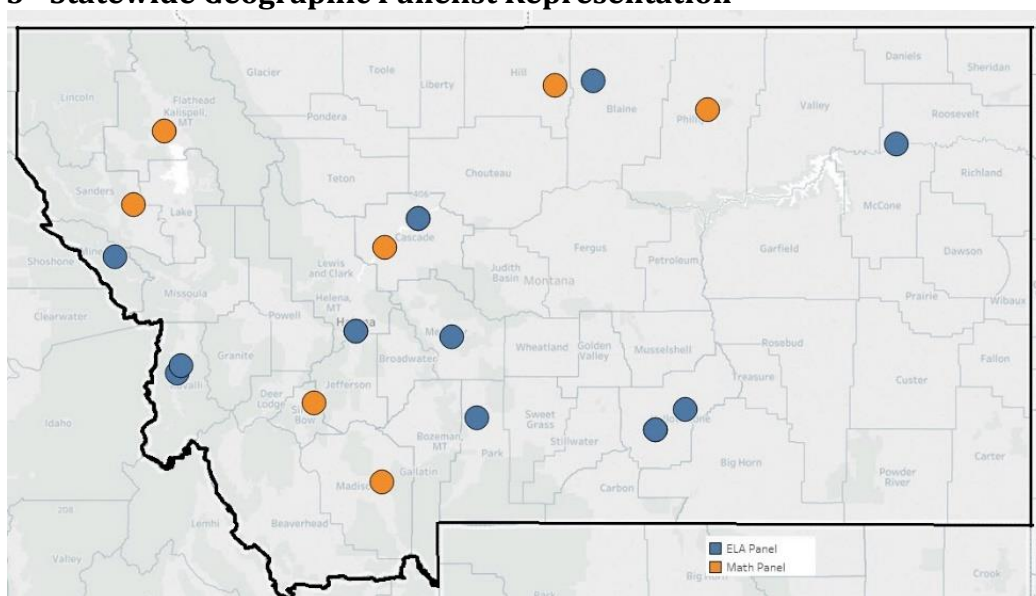
The MT OPI recruited 24 panelists, with 12 panelists in the ELA group and 12 panelists in the mathematics group. The MT OPI empirical standard setting workshop consisted of diverse stakeholders, including (but not limited to) school administrators, teachers, higher education officials, business leaders, and parents from across the state. The MT OPI used a short Key Survey for recruitment and while efforts were made to recruit stakeholders from various categories, the MT OPI was limited to participation by those available and interested in attending. **Table 7** demonstrates the distribution of panelists from each stakeholder group.

Table 7 - Distribution of Panelists Recruited for Each Content Area

Grade Group	ELA	Math
Teachers (General Content Area)	4	4
Teachers (Special Education)	1	1
Teachers (English Language Learners)	1	1
Administrators	1	1
Higher Education Officials	3	3
Business Leaders	1	1
Parents	1	1

Note: A total of 24 panelists were selected (12 per each content area).

Once the opening session activities commenced, one of the ELA selected panelists moved from the ELA group to the mathematics group as this was a better expert fit based on her educational background. In addition to switching groups, one panelist was unable to attend due to a family medical emergency. A total of 23 panelists participated in this workshop.

K–12 Educators
The panelists recruited were primarily experienced educators in each of the content areas. The recruited educators reflected various types of teaching experiences and various demographic groups.

The 12-person panel within each content area should ideally include:

- One panelist with experience teaching special education
- One panelist with experience teaching English language learners

Educators of various demographic groups were recruited for the workshop. Demographic considerations should ideally include:
- Region of the country: panelists should come from different areas of the state (e.g., urban, suburban, rural)
- School socioeconomic status: panelists should come from schools reflecting various levels of socioeconomic status
- Race/ethnicity: to the degree possible, panelists should reflect the diversity of Montana students.

Higher Education Faculty
Because the ACT is used for college placement, it is important to invite higher education staff to participate in the workshop. With this group, the panelists should have experience with introductory courses within ELA or mathematics.

Other Groups
The MT OPI made efforts to recruit at least one member of the business community and at least one member with specific knowledge of the testing needs for special education (SpEd) students and English language learners (ELL) students. However, the only non-educator role filled in this panel was by a parent. For this workshop, it was important panelists were

familiar with the skills needed for career- and college-readiness in order to participate in the conversations throughout the workshop. This requirement may have dissuaded some candidates from these groups from applying. Although industry did not participate in this panel, and no specific SpEd or ELL expert was in attendance, there were several educator panelists with personal knowledge and familiarity of the testing needs and accommodations SpEd and ELL students require.

Chapter 5. Workshop Materials

This chapter describes each of the various materials used during the workshop. Where appropriate, examples of training are presented in an appendix.

Montana Non-Disclosure and Student Confidentiality Agreements
Panelists received an electronic e-mail detailing the required forms for both the MT OPI and the ACT to gain access to secure and confidential test data (see Appendix O).

Opening Session
Panelists received a handout with the slides from the morning session, exemplar materials, and a readiness survey (see Appendix C – Post Opening Readiness Check).

Training Slides: Overview of the Montana High School Assessments
Ms. Eilertson welcomed panelists and presented background information on the Montana High School Assessments shown in the PowerPoint slides 1–9. These slides are provided in Appendix B.

Training Slides: Empirical Standard Setting
Facilitator and trainer Dr. Karla Egan reviewed the materials that were used in the empirical standard setting shown in the PowerPoint slides 10–26. These slides are provided in Appendix B.

Briefing Book
Mr. Meredith discussed how the cut scores were generated and the data that the MT OPI considered shown in the PowerPoint slides 27–30 (see Appendix B). Mr. Meredith walked the panelists through the briefing book page-by-page (see Appendix A).

Training Slides: Performance Level Descriptors Day 1
Dr. Karla Egan provided an overview of the family of performance level descriptors shown in slides 40–47. To guide the discussion of cut scores at each level, the panelists were given content specific remediation tables based off of actual Montana student Montana University System data, and facilitators walked the panelists through the meaning of these data in relation to the MT OPI-proposed cut scores (see Appendix L and M).

Training Slides: Performance Level Descriptors Day 2
Dr. Egan continued training on the PLDs for day two with presentation from slides 48–64 where the draft Montana Range PLDs, and descriptions of the process for revising the PLDs were shared. These slides are also in Appendix B.

Draft Montana Range PLDs
Each content area was provided with an online version of the draft Montana Range PLDs in Google Docs. **Figure 4**

Figure *4* shows a portion of the Range PLDs for mathematics (see Appendix J and Appendix K-ELA).

Figure 4 - Portion of the Mathematics Range PLDs

Concepts and Procedures: Domain #1				
Algebra [A-SSE, A-APR, A-CED, A-REI]				
RANGE PLD Interpret the structure of expressions. 1. Interpret expressions that represent a quantity in terms of its context. a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.* 2. Use the structure of an expression to identify ways to rewrite it. *For example, see x4 – y4 as (x²)² – (y²)², thus recognizing it as a difference of squares that can be factored as (x² – y²)(x² + y²).*	Novice students should be able to identify parts of an expression, such as terms, factors, coefficients, exponents, etc.	Nearing Proficiency students should be able to interpret parts of an expression, such as terms, factors, coefficients, exponents, etc., and interpret simple compound expressions by viewing one or more of their parts as a single entity. They should also be able to recognize equivalent forms of linear expressions.	Proficient students should be able to recognize equivalent forms of expressions and use the structure of an expression to identify ways to rewrite it. They should be able to interpret complicated expressions by viewing one or more of their parts as a single entity.	Advanced students should be able to look for and use structure and repeated reasoning to make generalizations about the possible equivalent forms expressions can have, e.g., a quadratic expression can always be represented as the product of two factors containing its roots.

Readiness Survey
At the end of the training session, panelists received a readiness survey. The purpose of this survey was to ascertain and document if panelists understood the training and if they knew their task for the first round. If a panelist felt unready to move onto the first round, a facilitator met with him/her for additional training. If a large number of panelists would have indicated that they were unready to move on, then additional training would have be provided for the entire group. The evaluations were delivered through Google Forms (see Appendix D).

Evaluations
At the end of the workshop, panelists completed evaluations of the workshop. Panelist evaluations are an important component of procedural validity. Panelists were asked to rate different aspects of the workshop, including perceived validity of the process, overall agreement with the cut scores, and overall agreement that the PLDs reflect the knowledge and skills of students in each performance level. The evaluations were delivered through Google Forms (see Appendix G).

Chapter 6. Workshop Implementation

This chapter details the intended implementation plan for the two-day workshop. The workshop began with an opening session and training, the workshop panelists engaged in two activities: (1) review of the MT OPI cut scores using an empirical standard setting and (2) revision of the range PLDs. **Table 6** provides an annotated agenda for the workshop.

Initial Activity

In advance of the workshop, panelists were provided with instruction on the confidentiality procedures to be used in the workshop. An electronic message was sent to all panelists with descriptions of materials to review and remit to the MT OPI before the workshop started on September 21, 2017. These resources and documents are detailed in Appendix O:

- MT OPI Student Records Confidentiality Training Video (14:27 mins)
- MT OPI Student Records Confidentiality Policy document
- MT OPI Resource E – MT OPI Affidavit of Non-Release form
- MT OPI Resource F – Contractor Nondisclosure Statement
- ACT Confidentiality and Nondisclosure Agreement

At the meeting, the workshop facilitators provided instruction on the security requirements to ensure all materials were kept confidential. The panelists were given instruction regarding the use of personal electronic devices such as mobile phones and portable devices (i.e., tablets, laptops, etc.) and regarding what information was and was not shareable with the general public outside of this meeting. All materials that were not shareable outside of this meeting were collected by the MT OPI to adhere to the state and vendor test security and nondisclosure policies. A notary from the MT OPI was provided in the event any panelist had not had their non-disclosure forms previously notarized.

Opening Session

The workshop began at 8:30 am after panelists registered and the MT OPI ensured all panelists had signed the required non-disclosure forms (see Appendix O). All panelists met in a single room throughout the workshop. The panelists sat with their assigned content group.

Jessica Eilertson, Montana State Assessment Director, opened the workshop, welcoming panelists and thanking them for their time. Ms. Eilertson provided an overview of the use of ACT in Montana, the reason for the workshop, and the goals of the workshop:

1. Review the preliminary MT OPI cut scores
2. Create Range PLDs

Training 1. Empirical Standard Setting

Following Ms. Eilertson's presentation, Dr. Karla Egan introduced materials and trained panelists on the procedures of the empirical standard setting. Dr. Egan overviewed the

purpose of standard setting, including the panelists' role in the process. Dr. Egan shared the policy descriptors that would guide the work of the standard setting.

Eric Meredith, MT OPI Data Analyst, instructed the panelists on the way in which preliminary cut scores were determined. He then introduced the Briefing Book and instructed panelists on each piece of information in the Briefing Book (see Appendix A).

At the end of the training, panelists were introduced to the concept of the "borderline" student and were asked to complete a readiness survey to ensure that they are ready to begin discussion.

Table 8 - Survey 1 - Post-Opening Session (Survey Link)

Survey 1	Disagree/ Strongly Disagree	Agree/ Strongly Agree
The orientation session provided a clear overview of the Montana ACT.	1	23
The orientation session provided a clear overview of the standards evaluation process.	0	23
I understand the purpose of the standards evaluation workshop.	0	23
I understand my role in the standards evaluation workshop.	0	23
I understand that I will receive additional training throughout the workshop.	0	23
Before I begin Round 1, I would like additional training on standards evaluation.	1	9
I have additional questions on material presented during the opening session that I would like answered before I begin the next task.	0	10

Note: All 23 panelists responded to this survey. There were 10 responses from the ELA group and 13 responses from the math group.

Round 1. Expectations for Borderline Students, Probability Tables, and Round 1 Evaluation Cut Scores

At the beginning of Round 1, each content area panel was divided into two groups (ELA and mathematics). Each group was instructed to discuss their view of the Borderline Proficient student. The group was reminded of the policy descriptors. The group was instructed to discuss the characteristics of the Borderline Proficient student. The purpose of the activity was to ensure that the group had a similar idea in mind regarding the Borderline Proficient student.

Dr. Egan, Dr. Nicholas, Ms. Eilertson, and Mr. Meredith each facilitated one of the content area tables.

Borderline Proficient
Dr. Egan facilitated discussion with the full group. The overall key traits identified for the Borderline Proficient student. They generated the following list of objectives and used these terms to synthesize bulleted general statements below: procedural, concrete, application, real-world, skills, denotate, confidence, textually-bound, express main ideas, identify, not analyze, credit-bearing.

According to the panelists, students in the Borderline Proficient category should be able to demonstrate the following attributes:
- Tend to be procedural thinkers
- Possess concrete thinking skills
- Can apply skills to real-world problems
- Can identify but not analyze

Following this discussion, the panelists were instructed to consider the probability that the Borderline Proficient student would receive an "A", "B", or "C" in a college introductory course. The group was shown the probabilities associated with the preliminary Proficient cut scores (see Appendix A for the probability tables). The content areas were again divided into their two small panels for discussion. Following discussion, the panel members documented the ACT score associated with the expected probability for a "B."

Borderline Nearing Proficient
After determining their cut scores for the Advanced student, the panels worked to identify the key traits for the Borderline Nearing Proficient student. They generated the following list of objectives, and used these terms to synthesize bulleted general statements below: gap to apply skill, concrete or express idea, level of independence, have not mastered algebraic thinking, not in algebra 2, in geometry or algebra 1, placed minimum, mathematics requirement, no confidence, no test-taking stamina, no perseverance, repetitive rote learning skills, rely on re-teaching and enrichment, few skills and basic grasp, goal for student is independent practice.

According to the panelists, students in the Borderline Nearing Proficient category should be able to demonstrate the following attributes:
- Possess rote, repetitive skills
- Have basic grasp of skills, but cannot put them together
- Can generalize
- Can support claims with evidence
- Can synthesize information from various sources

Following the discussion of the Borderline Nearing Proficient students, the panelists considered the probability that the Borderline Nearing Proficient student would receive an "A", "B", or "C" in a college introductory course. The group was shown the probabilities associated with the preliminary Nearing Proficient cut scores (see Appendix A for the probability tables). The group was divided into their panels for discussion. Once they completed discussion, they wrote down the ACT score associated with the expected probability for a "B" for the Nearing Proficient student.

Borderline Advanced
After determining their cut scores for the Proficient student, the panelists worked to identify the key traits for the Borderline Advanced student. They generated the following list of adjectives and used these to synthesize bulleted general statements below: analyze, infer, confident, good problem solvers, strong content knowledge, makes connections

between concepts, interpretations, creative thinking, curious, synthesize, support claims with evidence, generalize, higher-level thinking, not average, threshold elite.

According to the panelists, students in the Borderline Advanced category should be able to demonstrate the following attributes:
- Possess higher-level thinking skills
- Can generalize
- Can support claims with evidence
- Can synthesize information from various sources

Following the discussion of the Borderline Advanced students, the panelists considered the probability that the Borderline Advanced student would receive "A", "B", or "C" in a college introductory course. The group was shown the probabilities associated with the preliminary Advanced cut scores (see Appendix A for the probability tables). The group was divided into their panels for discussion. Once they completed discussion, they documented the ACT score associated with the expected probability for a "B" for the Advanced student.

Round 1 Cut Scores
Each panelist entered their cut scores into the online documentation system. **Table 7** summarizes the Round 1 cut scores. The panelists were shown the median results for their group.

Overall, this Round 1 evaluation showed 69% of panelists did not want to make a change to the Nearing Proficient score. Of those who wished to change the cut score for Nearing Proficient, evidence to justify this reasoning included the following feedback:
- A score of 15 will likely demonstrate that students are beginning to develop the knowledge of skills required of State Standards. These students will have a gap that can be addressed to apply knowledge that will take them to proficiency.
- The adjustment of the cut score from a 17 to a 16 would more accurately represent the realistic probability of a student's ability to pass their 1st credit bearing class at the post-secondary level.
- I looked at the probability charts and liked the idea of 50% chance of passing their first class as being representative of the cut score for nearing proficiency.
- With similar reasoning, some students in the "nearing proficient" category may actually be proficient in the application of mathematics in the career field. I like the idea that at a score of 16, that roughly 50% of college-bound students have the probability to score a C or higher if they are deemed "nearing proficient".

Overall, this Round 1 evaluation showed 52% of panelists did not want to make a change to the Proficient score. Of those who wished to change the cut score for Proficient, evidence to justify this reasoning included the following feedback:
- I feel the range for proficiency needs to be expanded to incorporate a more accurate sampling of Montana students. There appeared to be a statistical bias in the original score.

- The proficient group should include the largest amount of tested students. The student remediation rate for students with a score of 18 was only 12%. An 18 gives students more of a chance to be successful.
- The ACT readiness benchmark for English is 18. As an assessment for all Juniors 17 takes into consideration career as well as college bound students. It will demonstrate a grasp of Montana State Standards.
- If you assume a student who is at the proficient level and correctly answered 80% of the questions available to them based on the content knowledge available to them, it would be most closely aligned with a 20 on the ACT.
- This demonstrates 80% proficiency on the number of questions students taking at least Geometry should be able to master.
- The branding for the term "proficient" will matter to stakeholders. But overall, I feel more confident that roughly 40% are "proficient" at a score of 21 compared to about 33% that are "proficient" at a score of 22.

Overall, this Round 1 evaluation showed 55% of panelists did not want to make a change to the Advanced score. Of those who wished to change the cut score for Advanced, evidence to justify this reasoning included the following feedback:
- The national cut score for the top 13 1/2 students (standard deviation) and the average range of students entering the MUS.
- A higher cut score here will put Montana more in line with national averages. To be advanced should mean an ability to compete on the national stage.
- This represents 80% proficiency on the questions students taking Algebra II/Trig should be able to master.
- The high average for Montana Universities for ACT is 27.
- It would be 80% mastery of the questions you could answer at the algebra trig level so more standards based.

Table 9 below shows a summary of these panelist evaluations for Round 1. These evaluations were normalized before calculating the average, median, and standard deviation for the 12 responses in ELA and 13 responses in math. After panelists were given an opportunity to validate the MT OPI-proposed cut scores, additional impact data was presented and a discussion about the skills and proficiencies that describe borderline nearing proficient students and borderline advanced students was conducted.

Table 9 - Round 1 – Submit Agreement or Disagreement with Initial MT OPI cut scores (Survey Link)

Mathematics	Nearing Proficiency	Proficient	Advanced
Mean	16	20	25
Median	16	20	25
SD	0.00	0.52	0.50
N	13	13	13
ELA	Nearing Proficiency	Proficient	Advanced
Mean	14	18	27
Median	14	18	27
SD	1.41	0.50	0.00

| N | 10 | 10 | 10 |

Note: All 23 panelists responded to this survey.

<u>Training 2. Impact Data</u>

The Round 1 cut scores were presented at the beginning of this round of training. Dr. Egan and Mr. Meredith trained panelists on the impact data and on the remediation data that were provided in the Briefing Book.

At the end of training, panelists completed a readiness survey before beginning the second round.

To help support the idea of students grouped into these four performance categories, the MT OPI provided additional impact data to show grade 11 test takers from 2013, 2014, and 2015 combined. For those students enrolled in an MUS university, actual enrollment and remediation outcomes for the full range of ACT scores were provided (see Appendix L and M).

Table 10 - Survey 2 - Round 2 Readiness Survey (<u>Survey Link</u>)

Survey 2	Disagree/ Strongly Disagree	Agree/ Strongly Agree
I understand that the impact data represent how Montana students performed on the ACT tests.	0	21
I understand the college participation data represent Montana students' performance in college.	1	20
I understand the purpose of Round 2.	2	19
Before I begin Round 2, I would like additional training on the Round 2 tasks.	2	13
I have additional questions on material presented during the Round 2 Orientation that I would like answered before I begin the Round 2 tasks.	1	14

Note: Twenty-one panelists responded to this survey. There were 10 responses from ELA and 11 from the math group.

<u>Round 2. Review of Impact Data</u>

Within their content areas, the ELA and mathematics groups discussed the impact data and the remediation data. Dr. Nicholas facilitated discussion with the mathematics group. Dr. Egan facilitated discussion with the ELA group. Mr. Meredith provided support for both groups to explain the remediation data.

At the end of Round 2, panelists recommended their second set of cut scores. These cut scores are summarized in **Table 11**.

Overall, this Round 2 evaluation showed 92% of panelists did not want to make a change to the Nearing Proficient score. Of those who wished to change the cut score for Nearing Proficient, evidence to justify this reasoning included the following feedback:
- A score of 16 more accurately represents skills and abilities of students.

Overall, this Round 2 evaluation showed 84% of panelists did not want to make a change to the Proficient score. Of those who wished to change the cut score for "Proficient" evidence to justify this reasoning included:

- In assessing the standards for a proficient student, the ACT mathematics score that most closely aligns with proficiency based on the Montana State Standards is a 20.
- 80% of students taking Geometry should be able to master enough questions to get a 20.

Overall, this Round 2 evaluation showed 62% of panelists did not want to make a change to the Advanced score. Of those who wished to change the cut score for Advanced, evidence to justify this reasoning included the following feedback:

- 80% of students taking Algebra II should be able to master the questions required to score a 25.
- The high average for all MUS schools is 27.
- To come up with some kind of norm, we thought 10 percent of students should be advanced.
- A 25 based on the numbers conversation.
- So that Montana better aligns with the National levels, we should desire achievement scores that more reflect ability to compete on the national stage.

Table 11 below shows a summary of these panelist evaluations for Round 2. These evaluations were normalized before calculating the average, median, and standard deviation for the 12 responses in ELA and 13 responses in math. The majority of agreement, group discussion and group summary activity, helped the MT OPI validate the proposed cut scores for performance standard adoption of the following:

- Mathematics – Nearing Proficient cut score at 17, Proficient cut score at 22, Advanced at cut score at 26.
- ELA– Nearing Proficient cut score at 16, Proficient cut score at 19, Advanced at cut score at 24.

Table 11 - Round 2 - Submit Agreement or Disagreement with Initial MT OPI cut scores (Survey Link)

Mathematics	Nearing Proficiency	Proficient	Advanced
Mean	17	22	26
Median	17	22	26
SD	0.28	0.88	0.28
N	13	13	13
ELA	Nearing Proficiency	Proficient	Advanced
Mean	16	19	25
Median	16	19	25
SD	0.00	0.00	0.00
N	10	10	10

Note: All 23 panelists responded to this survey.

Evaluation

Once the panelists set their cut scores, they completed an evaluation of Day 1 of the workshop. The results of this evaluation are summarized in **Table 12**.

Table 12 - Survey 3 - Standards Evaluation (Survey Link)

Standards Evaluation Survey Day 1	ELA		Mathematics	
	Disagree/ Strongly Disagree	Agree/ Strongly Agree	Disagree/ Strongly Disagree	Agree/ Strongly Agree
I felt that this procedure was fair and allowed me to recommend cut scores that reflected my thinking.	3	7	0	13
My group shared a common understanding of the Borderline Students.	1	9	0	13
During Round 1, I placed my cut scores independently.	0	10	0	13
I understood how to place my cut scores.	1	9	0	13
I had enough time to consider the placement of my cut scores.	2	8	1	12
I feel the recommended cut scores that resulted from this process are reasonable.	2	8	1	12
I would be able to defend the panel's recommended Level 2 cut scores against criticism that they are too high.	1	9	0	13
I would be able to defend the panel's recommended Level 2 cut scores against criticism that they are too low.	1	9	0	13
I would be able to defend the panel's recommended Level 3 cut scores against criticism that they are too high.	2	8	1	12
Standards Evaluation Survey Day 1 Cont...	ELA		Mathematics	
	Disagree/ Strongly Disagree	Agree/ Strongly Agree	Disagree/ Strongly Disagree	Agree/ Strongly Agree
I would be able to defend the panel's recommended Level 3 cut scores against criticism that they are too low.	1	9	1	12
I would be able to defend the panel's recommended Level 4 cut scores against criticism that they are too high.	2	8	0	13
I would be able to defend the panel's recommended Level 4 cut scores against criticism that they are too low.	2	8	0	13
Overall, I believe that my opinions were considered and valued by my group.	2	8	4	9

Note: All 23 panelists responded to this survey.

Table 13 - Workshop Agenda for Montana Empirical Standard setting Approach

Time	Task
7:30 – 8:30 am	**Registration and Breakfast** ● Panelists will sign into the workshop. They will receive name badges and non-disclosure forms.

8:30 – 9:00 am	**Opening Session**
	● A member of the MT OPI staff welcomes panelists to workshop. The staff member should:
	    ○ Discuss the transition from Smarter Balanced to ACT
	    ○ Discuss the continuity of the MT content standards
	    ○ Introduce Smarter Balanced PLDs
	    ○ Discuss the use of ACT in the state
	    ○ Address reasons for the workshop and the goals for the workshop
	    ○ Provide the preliminary cut scores and explain how they were derived.

9:00 – 9:30 am	**Training 1: Empirical Standard Setting** ● Panelists are introduced to the first activity: examining borderline students in terms of probability ***Materials:*** *Readiness Survey for Round 1*
9:30 – 10:30 am	**Round 1: Large Group Discussion of Borderline Achievement** ● Facilitate cross-group discussion of the expectations of the Borderline student ● Discuss the expectations associated with the preliminary cut scores ***Materials:*** *Tables with Probabilities and Test Scores*
10:30 – 10:45 am	**Break**
10:45 am – 12:00 pm	**Round 1 Continued** ● During this Round, MT OPI staff should be prepared to facilitate discussions within the content area. ● Panelists individually make a decision regarding the cut score. ***Materials:*** *Tables with Probabilities and Test Scores* *Rating Form (Suggest setting this up in Google Forms along with the evaluations)*
12:00 – 1:00 pm	**Lunch**
1:00 – 1:30 pm	**Training 2: Introduction to Comparative & Impact Evidence** ● Panelists be introduced to the materials for Round 2: Impact data; Postsecondary enrollment & remediation by performance level ***Materials:*** *Readiness Survey for Round 2*
1:30 – 3:30 pm	**Round 2: Comparative & Impact Evidence** ● Panelists go to their breakout rooms ● The group facilitators lead discussion of the impact data and the post-secondary enrollment & remediation results. ● Panelists make Round 2 ratings ***Materials:*** *Post-secondary enrollment & remediation results* *Impact data* *Evaluation for Cut Score Evaluation*
3:30 – 3:45 pm	**Break**
3:45 – 5:00 pm	**Training 3: PLD Training (Large Training Room)** ● Panelists will be introduced to the types of performance level descriptors, and they will be trained on the activities of Day 2.

	Materials: Readiness Survey for PLDs
8:30 am – 12:00 pm	**PLD Activity 1** ● Panelists will study the Montana Range PLDs *(these are the Smarter Balanced Range PLDs repurposed for MT)* ● Panelists will consider if the content standards are adequately covered ● Mathematics group will be split into two teams ● ELA group will be split into two teams. *Materials: Montana Range PLDs, Copies of Montana Content Standards*
10:00 – 10:15 am	**Break**
12:00 – 1:00 pm	**Lunch**
1:00 – 5:00 pm	**PLD Activity 2** ● Panelists will share work across teams. They will examine PLDs for consistency of language and expectations. ● Panelists will suggest revisions to the MT Range PLDs. ● Panelists will revise MT Range PLDs *Materials: Montana Range PLDs, Copies of Montana Content Standards*
3:00 – 3:15 pm	**Break**
4:45 – 5:00 pm	**Final Evaluation & Dismissal**

Day 2. Range Performance Level Descriptors

On Day 2, the workshop started with a welcome from MT OPI Deputy Superintendent Dr. Tim Tharp, who thanked the panelists for their time. Ms. Eilertson answered questions regarding the use of the cut scores. Dr. Egan provided training on Range PLDs. Susie Hedalen, Director of Education Services, was also in attendance as an observer.

Training 3. Range Performance Level Descriptors

This training opened with background information on the different types of PLDs (see Chapter 2 of this document). Dr. Egan defined PLDs for the panelists and trained panelists on the procedures that will be used to revise the Range PLDs.

The panelists were divided into three teams within each content area. **Table 12** shows the areas that each team considered. Panelists were allowed to choose the team on which they wanted to work.

Table 14 - Standards to be Revised by Team and Content Area

Team	Mathematics Standards	ELA Standards
Team 1	Algebra	Informational
Team 2	Functions, Statistics	Literary
Team 3	Quantities, SRT	Writing

Table 15 - Survey 4 – PLD Readiness Survey (<u>Survey Link</u>)

Survey 4	Disagree/ Strongly Disagree	Agree/ Strongly Agree
I understand the purpose of the Range PLDs.	0	17
The explanation provided by the facilitator was clear.	0	17
The training on performance level descriptors was helpful to me.	0	17
I understand the steps necessary to begin revising the Range PLDs.	0	17
Before I begin revising Range PLDs, I would like additional training on performance level descriptors.	0	17
I have additional questions on material presented during the PLD orientation session that I would like answered before I begin the next task.	0	17

Note: Seventeen panelists responded to this survey. All 13 panelists from the math group responded and four panelists from the ELA group responded to this survey.

Draft 1
Within their teams, panelists first considered the content standards and the draft range PLDs. The panelists reviewed the range PLDs for:
● Clarity of wording and expression;
● Clarity of progression of knowledge and skills across the performance levels;
● Completeness of coverage
The panels identified missing standards, and they created Range PLDs to address those standards. In particular, the ELA panels addressed the Montana standards for Indian Education for All. The mathematics panels added geometry standards.

PLD Group Activity Crosswalk ([ELA PLD Template Link](#)) ([Math PLD Template Link](#)).

Draft 2
During this round, the panels reconstituted the groups so that each team was represented across three panels. The panels reviewed the range PLDs from each group within their content area. They provided feedback for:

● Clarity of wording and expression;
● Clarity of progression of knowledge and skills across the achievement levels;
● Completeness of coverage

PLD Group Activity Crosswalk ([ELA PLD Template Link](#)) ([Math PLD Template Link](#)).

MT OPI Content Area Staff Review PLDs for Reporting

At the workshop on day one, the MT OPI Mathematics Instructional Coordinator Marissa Franklin, and the MT OPI English Language Arts & Literacy Instructional Coordinator, Christy Mock-Stutz were present to help facilitate conversations about performance levels with panelists.

Following the conclusion of the workshop, the MT OPI made plans to review the revisions and modifications made to the Smarter Balanced Range PLDs with support from actual

secure ACT items. The ACT provided the OPI with access to secure items from September 15, 2017, to October 8, 2017. The MT OPI was originally granted a larger timeframe to work with these secure ACT items for the creation of an ordered item booklet; however, due to Montana legal concerns about the language included in the ACT nondisclosure and confidentiality agreement, the items were suspended from MT OPI access until an updated ACT nondisclosure form was secured from all parties with access to the secure items (see Appendix Q). The three weeks given to access the items was too narrow for the content specialists to review the panelists' edits with actual ACT items. The Range PLDs can be found in Appendix P).

In the fall of 2017, a team of MT OPI staff reviewed the methodologies used by the WDE for public Reporting PLDs and information obtained from the panelists on day two of the workshop. Since the ACT college-readiness benchmarks were established from the graduating class, the MT OPI decided to use the "C or higher" category from the ACT generated probabilities to describe the percent of students at or below these ACT scale score (1–36) levels.

The MT OPI proficient cuts in mathematics describes the probability of 55% of students or higher who will obtain a "C or higher" in credit-bearing college algebra. The MT OPI proficient cuts in ELA describes the probability of 67% of students or higher who will obtain a "C or higher" in credit-bearing college English Composition I.

In 2016, the MT OPI convened a group of stakeholders to define college- and career-readiness for every graduating student. These four categories describe the high school graduate expectations for students to be prepared to succeed in college, the military or the workforce (see Appendix O).
1. Academic and Technical Knowledge and Skills
2. Employability Knowledge and Skills
3. Work Ethic and Professionalism
4. Measure for Career Readiness

With an emphasis for the academic skills to ensure a college- and career-ready student is prepared to complete a freshman level postsecondary course of study without remediation, the MT OPI included its MUS three-year remediation data in its Reporting PLD (see Appendix L and M).

The MT OPI proficient cut in mathematics at 17 describes the probability that 46% of students or less will be remediated in the credit-bearing entry level mathematics courses in the MUS system. The MT OPI proficient cut in ELA at 16 describes the probability that 27% of students or less will be remediated in the credit-bearing entry level writing courses in the MUS system (see

Table *16* and

Table *17*). Using this empirical standard setting approach based on actual Montana student data, the MT Policy PLDs, and the borderline definitions described by panelists, the MT OPI believes these four performance levels are appropriate for adoption in Montana.

Table 16 - Mathematics Reporting PLDs

Achievement Level	Policy Level Definitions	Montana Chapter 54 Administrative Rule	Reporting PLD
Novice (Level 1)	Student demonstrates minimal understanding of and ability to apply the knowledge and skills associated with college content readiness	This level denotes that the student is beginning to attain the prerequisite knowledge and skills that are fundamental for work at each benchmark.	Less than 17 Students meeting the Novice standard in mathematics have less than 55% probability of earning a "C or higher" first-year credit-bearing college Algebra course, and at least 51% of students who achieve at this level are likely to be remediated in college level mathematics.
Nearing Proficient (Level 2)	Student demonstrates partial understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes that the student has partial mastery or prerequisite knowledge and skills fundamental for proficient work at each benchmark	17 Students meeting the Nearing Proficient standard in mathematics have a 55% probability of earning a "C or higher" first-year credit-bearing college Algebra course, and fewer than 46% of students who achieve at this level are likely to be remediated in college level mathematics.
Proficient (Level 3)	Student demonstrates adequate understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes solid academic performance for each benchmark. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter.	22 Students meeting the Proficient standard in mathematics have a 73% probability of earning a "C or higher" first-year credit-bearing college Algebra course, and fewer than 12% of students who achieve at this level are likely to be remediated in college level mathematics.
Advanced (Level 4)	Student demonstrates thorough understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes superior performance.	26 or higher Students meeting the Advanced standard in mathematics have a 84% probability of earning a "C or higher" first-year credit-bearing college Algebra course, and fewer than 1% of students who achieve at this level are likely to be remediated in college level mathematics.

Table 17 – ELA Reporting PLDs

Achievement Level	Policy Level Definitions	Montana Chapter 54 Administrative Rule	Reporting PLD
Novice (Level 1)	Student demonstrates minimal understanding of and ability to apply the knowledge and skills associated with college content readiness	This level denotes that the student is beginning to attain the prerequisite knowledge and skills that are fundamental for work at each benchmark.	Less than 16 Students meeting the Novice standard in ELA have less than a 67% probability of earning a "C or higher" first-year credit-bearing college English composition I course, and at least 32% of students who achieve at this level are likely to be remediated in college level writing.
Nearing Proficient (Level 2)	Student demonstrates partial understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes that the student has partial mastery or prerequisite knowledge and skills fundamental for proficient work at each benchmark	16 Students meeting the Nearing Proficient standard in ELA have a 67% probability of earning a "C or higher" first-year credit-bearing college English composition I course, and fewer than 27% of students who achieve at this level are likely to be remediated in college level writing.
Proficient (Level 3)	Student demonstrates adequate understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes solid academic performance for each benchmark. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter.	19 Students meeting the Proficient standard in ELA have a 75% probability of earning a "C or higher" first-year credit-bearing college English composition I course, and fewer than 5% of students who achieve at this level are likely to be remediated in college level writing.
Advanced (Level 4)	Student demonstrates thorough understanding of and ability to apply the knowledge and skills associated with college content readiness.	This level denotes superior performance.	24 or higher Students meeting the Advanced standard in ELA have a 85% probability of earning a "C or higher" first-year credit-bearing college English composition I course, and fewer than 1% of students who achieve at this level are likely to be remediated in college level writing.

At the end of the workshop, the panelists completed a final evaluation. The results can be found in **Table 14**.

Table 18 - Survey 5 - Overall Evaluation of the Workshop (<u>Survey Link</u>)

Overall Evaluation of Workshop	ELA		Mathematics	
	Disagree/ Strongly Disagree	Agree/ Strongly Agree	Disagree/ Strongly Disagree	Agree/ Strongly Agree
I understood the preliminary Range PLDs.	0	10	0	13
My group had enough time to revise the Range PLDs.	2	8	0	13
My group used the information from the ACT to revise the Range PLDs.	0	10	0	13
I agreed with the majority of revisions made by my group.	0	10	0	13
I am satisfied with our revise Range PLDs.	0	17	0	17
I am confident that the revised Range PLDs are valid.	0	17	0	17
Other educators will find the Range PLDs useful.	0	8	0	13
Participating in the workshop increased my understanding of the Montana ACT assessments.	1	9	0	13
The food and service at the facility met my expectations.	0	10	0	13
The work space had accommodations appropriate to facilitate our work.	2	8	0	13
The workshop was well organized.	2	8	0	13

Note: All 23 panelists responded to this survey.

Overall, this final evaluation showed an understanding of the process used in the empirical standard setting and that panelists were in agreement with the methods used by the MT OPI for setting performance standards and developing performance level descriptors for these four levels. Some comments from the panel to support the final evaluation of the workshop and give some takeaways from this experience include:

- Upon completion of this workshop, I believe there must be a campaign to inform the public and families on what the terminology of novice, near proficient, proficient and advanced indicates. The panel used the idea that proficient is the ability to go into a college level course with a high probability of success. This contrasts with the idea that proficient is meeting the requirements of high school. Seeing proficiency levels in the 30% range and not understanding what it means can create a negative view of schools.
- This was a difficult task but well worth the investment of my time.
- I thought this was very well put together. I would be happy to serve on a similar panel again. Very knowledgeable facilitators and staff. Thank you!!

References

Hyman, J. M. (2013). Three Essays on the Economics of Education.

Klasik, D. (2013). The act of enrollment: The college enrollment effects of state-required

college entrance exam testing. Educational Researcher, 42(3), 151-160.

doi:10.3102/0013189X12474065

Appendix

Pages 41 through 57 detail Appendices A – Q.

Appendix A. Montana Panelist Briefing Book

Putting Montana's Students First

**Montana's
Office of Public Instruction**

**Standards Validation and
Performance Level Descriptors**

Statewide High School Assessment for
Mathematics and
Reading/English Language Arts (ELA)

OFFICE OF PUBLIC INSTRUCTION

A+

ELSIE ARNTZEN, STATE SUPERINTENDENT

September 21–22, 2017
Helena, Montana
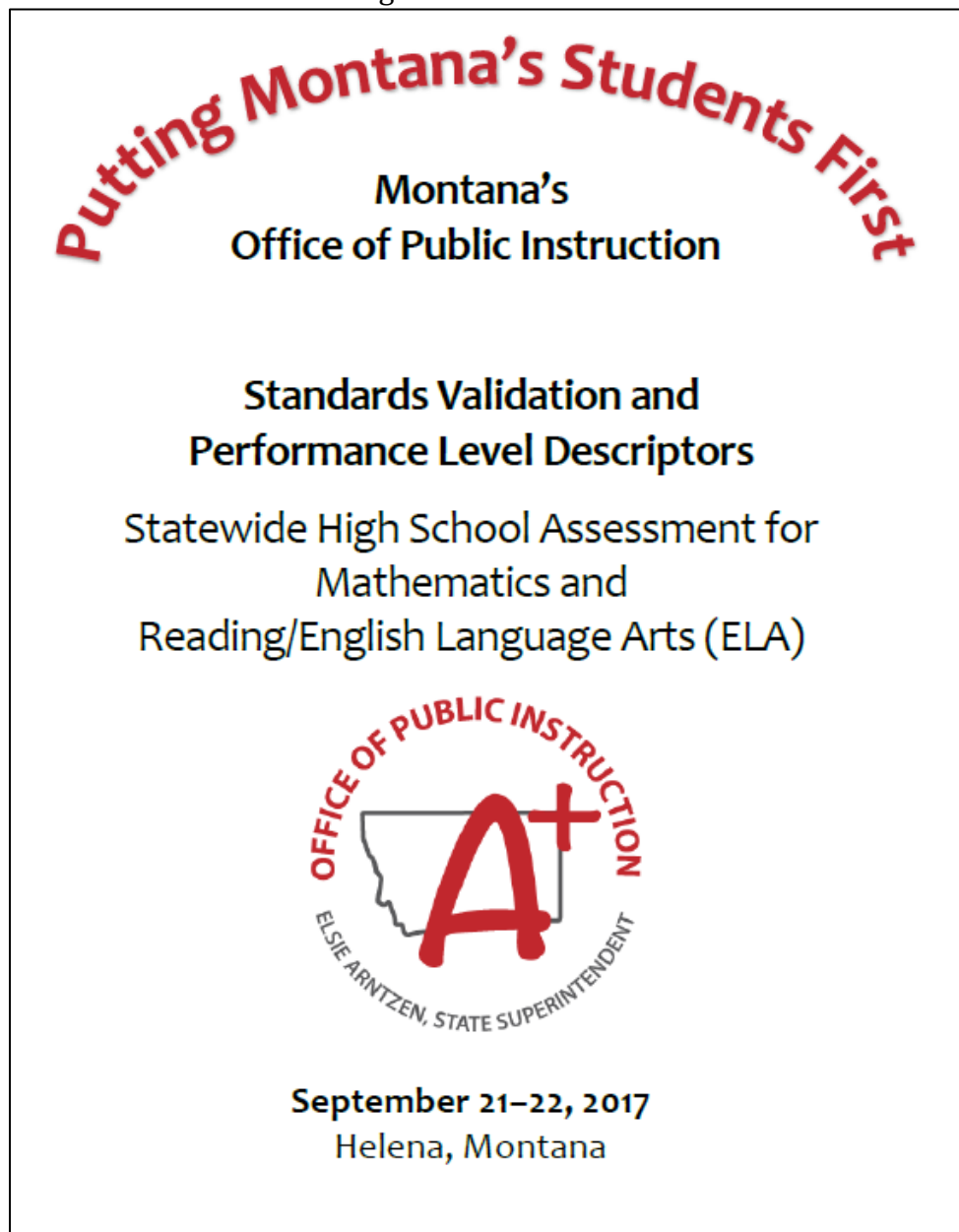
All of the questions for this survey can be accessed with the Montana Panelist Briefing Book link.

Appendix B. PowerPoint Training Slides
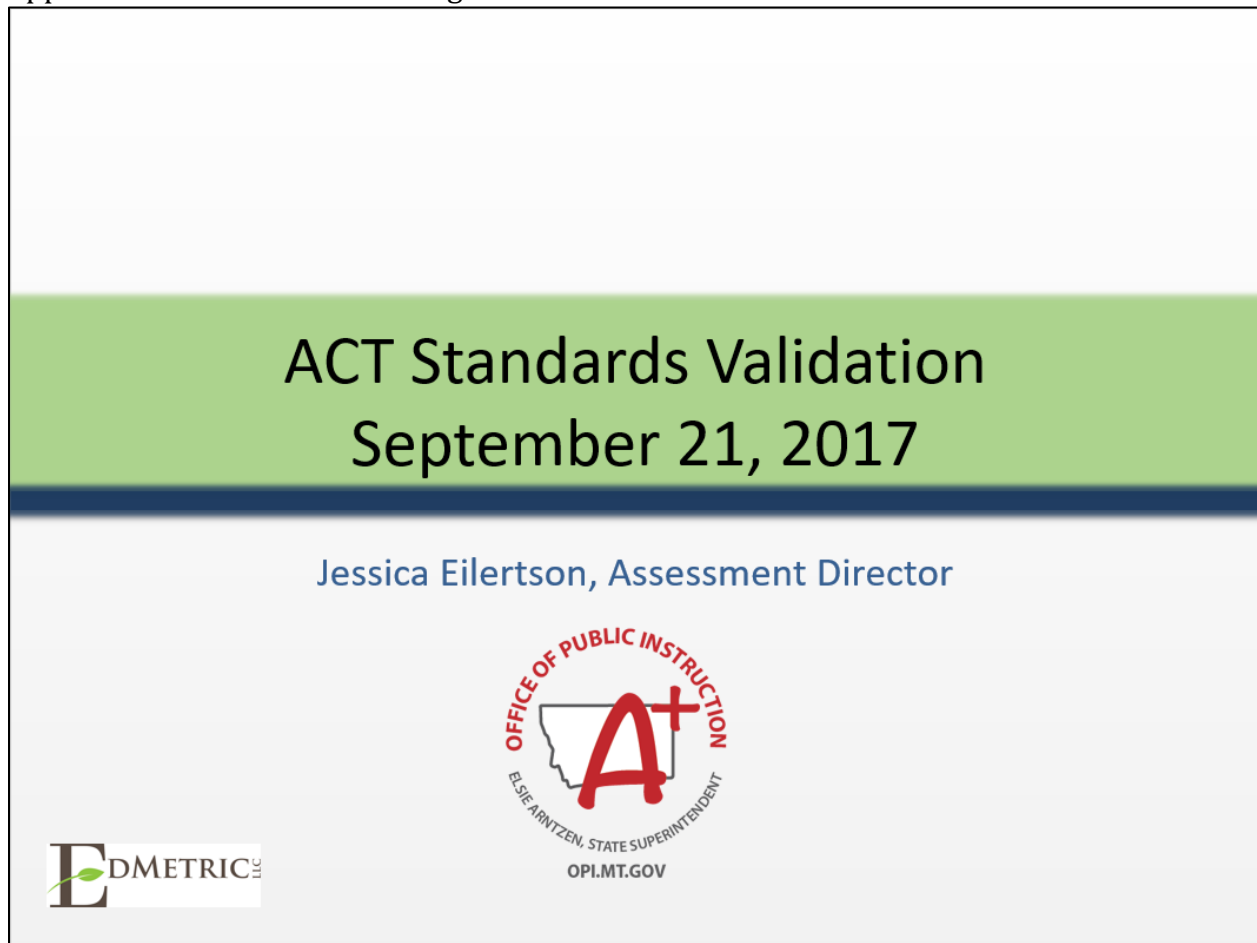
All of the questions for this survey can be accessed with the PowerPoint Training Slides link.

Appendix C. Evaluation Post Opening Session Readiness Check

Post-Opening Session Readiness Survey

Survey 1

* Required

Please consider each statement below. Choose the level of agreement or disagreement you have with each statement.

1.
   The orientation session provided a clear overview of the Montana ACT. *
   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

2.
   The orientation session provided a clear overview of the standards evaluation process. *
   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

3.
   I understand the purpose of the standards evaluation workshop. *
   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

All of the questions for this survey can be accessed with the Post-Opening Session Readiness Survey link.

Appendix D. Round 2 Readiness Survey

Round 2 Readiness Survey

Survey 2

* Required

Please consider each statement below. Choose the level of agreement or disagreement you have with each statement.

1.
   I understand that the impact data represent how Montana students performed on the ACT tests. *

   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

2.
   I understand the college participation data represent Montana students' performance in college. *

   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

3.
   I understand the purpose of Round 2. *

   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

All of the questions for this survey can be accessed with the Round Two Readiness Survey link.

Appendix E. Evaluation Cut Score Overall Standards Evaluation Questions

Standards Evaluation

Survey 3

This evaluation should reflect the cut scores you just recommended in Mathematics and ELA

* Required

Please consider the statements below and choose the level of agreement or disagreement you have with each statement.

1.
   I felt that this procedure was fair and allowed me to recommend cut scores that reflected my thinking. *
   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

2.
   My group shared a common understanding of the Borderline Students. *
   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

3.
   During Round 1, I placed my cut scores independently. *
   Mark only one oval.

   ◯ Strongly Agree

   ◯ Agree

   ◯ Disagree

   ◯ Strongly Disagree

All of the questions for this survey can be accessed with the Evaluation Cut Score Overall Standards Evaluation link.

Appendix F. Evaluation Four MT PLD Readiness Survey

PLD Readiness Survey

Survey 4

* Required

Please consider each statement below. Choose the level of agreement or disagreement you have with each statement.

1.
I understand the purpose of the Range PLDs. *
Mark only one oval.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree

2.
The explanation provided by the facilitator was clear. *
Mark only one oval.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree

3.
The training on performance level descriptors was helpful to me. *
Mark only one oval.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly Disagree

All of the questions for this survey can be accessed with the Evaluation Four MT PLD Readiness Survey link.

Appendix G. Overall Evaluation of Workshop Survey Questions

Overall Evaluation of the Workshop
Survey 5

This should reflect the work that you have completed on Day 1 and Day 2.

* Required

Please consider the statements below and choose the level of agreement or disagreement you have with each statement.

1.
   I understood the preliminary Range PLDs. *
   Mark only one oval.

   ◯ Strongly Agree
   ◯ Agree
   ◯ Disagree
   ◯ Strongly Disagree

2.
   My group had enough time to revise the Range PLDs. *
   Mark only one oval.

   ◯ Strongly Agree
   ◯ Agree
   ◯ Disagree
   ◯ Strongly Disagree

3.
   My group used the information from the ACT to revise the Range PLDs. *
   Mark only one oval.

   ◯ Strongly Agree
   ◯ Agree
   ◯ Disagree
   ◯ Strongly Disagree

All of the questions for this survey can be accessed with the Overall Evaluation of the Workshop link.

Appendix H. Rating Form, Round One Questions

Rating Form, Round 1
* Required

1.

   Please indicate your content area.
   Mark only one oval.

   ⬭ Mathematics

   ⬭ ELA

2.

   I want to change the preliminary cut core for Proficient *
   Mark only one oval.

   ⬭ Yes   *Skip to question 3.*

   ⬭ No   *Skip to question 5.*

Proficient Cut Score

All of the questions for this survey can be accessed with the Rating Form, Round One Questions link.

Appendix I. Rating Form, Round Two Questions

Rating Form, Round 2
* Required

1.
Please indicate your content area.
Mark only one oval.

- ( ) Math
- ( ) ELA

2.
I want to change the preliminary cut core for Proficient *
Mark only one oval.

- ( ) Yes   *Skip to question 3.*
- ( ) No   *Skip to question 5.*

Proficient Cut Score

All of the questions for this survey can be accessed with the Rating Form, Round Two Questions link.

Appendix J. Mathematics Performance Level Descriptor Guiding Template

Concepts and Procedures: Domain #1				
Algebra [A-SSE, A-APR, A-CED, A-REI]				

RANGE PLD
Interpret the structure of expressions.
  1. Interpret expressions that represent a quantity in terms of its context.
    a) Interpret parts of an expression, such as terms, factors, and coefficients.
    b) Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)n$ as the product of P and a factor not depending on P.*
 	
  2. Use the structure of an expression to identify ways to rewrite it. *For example, see $x4 - y4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
	Novice students should be able to identify parts of an expression, such as terms, factors, coefficients, exponents, etc.	Nearing Proficiency students should be able to interpret parts of an expression, such as terms, factors, coefficients, exponents, etc., and interpret simple compound expressions by viewing one or more of their parts as a single entity. They should also be able to recognize equivalent forms of linear expressions.	Proficient students should be able to recognize equivalent forms of expressions and use the structure of an expression to identify ways to rewrite it. They should be able to interpret complicated expressions by viewing one or more of their parts as a single entity.	Advanced students should be able to look for and use structure and repeated reasoning to make generalizations about the possible equivalent forms expressions can have, e.g., a quadratic expression can always be represented as the product of two factors containing its roots.

RANGE PLD Write expressions in equivalent forms to solve problems. 3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	Novice students should be able to write a quadratic expression with integer coefficients and a leading coefficient of 1 in an equivalent form by factoring. They should be able to use properties of exponents to expand a single variable (coefficient of 1) with a positive integer exponent into an equivalent form and vice versa, e.g., $x^3 = xxx$.	Nearing Proficiency students should be able write a quadratic expression with integer coefficients in an equivalent form by factoring or by completing the square. They should be able to use properties of exponents to expand a repeated single variable (coefficient of 1) with a nonnegative integer exponent into an equivalent form and vice versa, e.g., $x^0x^2x^3 = xxxxx = x^{2+3}$.	Proficient students should be able to write a quadratic expression with rational coefficients in an equivalent form by factoring and by completing the square. They should be able to identify and use the zeros to solve or explain familiar problems, and they should be able to use properties of exponents to write equivalent forms of exponential functions with one or more variables, integer coefficients, and nonnegative rational exponents involving operations of addition, subtraction, and multiplication, including distributing an exponent across terms within parentheses.	Advanced students should be able to find the maximum or minimum values of a quadratic function. They should be able to choose an appropriate equivalent form of an expression in order to reveal a property of interest when solving problems.

All mathematics range PLDs can be accessed with the [Math Performance Level Descriptor Guiding Template](#) link. To support these grade 11 range PLDs, the [Smarter Balanced Initial Achievement Level Descriptors and College Content-Readiness Policy document](#) link.

Appendix K. ELA Performance Level Descriptor Guiding Template

Reading: Literary Texts				
RANGE PLD **Key Details** RL-1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.	Level 1 students should be able to identify textual evidence that minimally supports simple inferences made or conclusions drawn about texts of low complexity.	Level 2 students should be able to identify textual evidence that partially supports inferences made or conclusions drawn about texts of moderate complexity.	Level 3 students should be able to identify and explain sufficient and relevant textual evidence that adequately supports inferences made or conclusions drawn about texts of moderate-to-high complexity.	Level 4 students should be able to identify and analyze substantial and relevant textual evidence that thoroughly supports inferences made or conclusions drawn about texts of unusually high complexity.
RANGE PLD **Central Ideas** RL-1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain. RL-2 Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.	Level 1 students should be able to use explicit details to minimally summarize central ideas or key events.	Level 2 students should be able to partially summarize central ideas, themes, and key events using limited supporting ideas or relevant details.	Level 3 students should be able to summarize central ideas, themes, and key events over the course of the text using adequate support and relevant details.	Level 4 students should be able to thoroughly summarize central ideas, themes, and key events and provide an insightful analysis of thematic development over the course of the text, using supporting ideas and relevant, well-chosen details.
RANGE PLD **Word Meanings** RL-1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain. RL-4 Determine the meaning of words and phrases as they are used in the text, analyze the impact of specific word choices on meaning including figurative and connotative meanings; and tone, including words with multiple meanings or language that is particularly fresh, engaging, or	Level 1 students should be able to determine, with guided support (e.g., pointing to words in context), the intended meanings of words including some academic and domain-specific words and connotation/denotation, using some context and limited strategies or resources, with a primary focus on the academic vocabulary common to texts of low complexity across disciplines.	Level 2 students should be able to determine, with some support (e.g., limiting context), intended meanings of words including academic words, domain-specific words, and connotation/denotation, using some word analysis strategies or resources, with a primary focus on the academic vocabulary common to texts of moderate complexity across disciplines.	Level 3 students should be able to adequately determine intended or precise meanings of words including academic words, domain-specific words, and connotation/denotation using context and multiple-word analysis strategies or resources effectively, with a primary focus on the academic vocabulary common to texts of moderate-to-high complexity across disciplines.	Level 4 students should be able to thoroughly determine intended, precise, and nuanced meanings of words including academic words, domain-specific words, and connotation/denotation using multiple-word analysis strategies or resources thoroughly and accurately, with primary focus on the academic vocabulary common to texts of unusually high complexity across disciplines.

All ELA range PLDs can be accessed with the ELA Performance Level Descriptor Guiding Template link. To support these grade 11 range PLDs, the Smarter Balanced Initial Achievement Level Descriptors and College Content-Readiness Policy document link.

Appendix L. Mathematics Remediation Montana University System MUS Data Table

Proposed Proficiency Level	ACT Math Score	Total Count	MUS Enrollment Count	MUS Enrollment Rate	Math Remediation Count	Math Remediation Rate
Novice	1	*	*	*	*	*
	5	*	*	*	*	*
	6	*	*	*	*	*
	8	*	*	*	*	*
	9	*	*	*	*	*
	10	10	*	*	*	*
	11	55	*	*	*	*
	12	126	15	12%	*	*
	13	349	49	14%	24	49%
	14	1056	188	18%	104	55%
	15	2543	624	25%	330	53%
	16	3209	979	31%	499	51%
Nearing Proficient	17	2931	1140	39%	530	46%
	18	1640	682	42%	266	39%
	19	1573	679	43%	223	33%
	20	1268	617	49%	185	30%
	21	1323	597	45%	180	30%
Proficient	22	1250	648	52%	78	12%
	23	1364	724	53%	28	4%
	24	1706	990	58%	21	2%
	25	1141	659	58%	11	2%
Advanced	26	1492	873	59%	*	*
	27	845	503	60%	*	*
	28	713	410	58%	*	*
	29	354	192	54%	*	*
	30	407	242	59%	*	*
	31	151	81	54%	*	*
	32	129	69	53%	*	*
	33	105	52	50%	*	*
	34	157	88	56%	*	*
	35	53	21	40%	*	*
	36	19	12	63%	*	*
	Total	25978	11140	43%	2500	22%

Appendix M. ELA Remediation Montana University System MUS Data Table

Proposed Proficiency Level	ACT ELA Score	Total Count	MUS Enrollment Count	MUS Enrollment Rate	Writing Remediation Count	Writing Remediation Rate
Novice	2	*	*	*	*	*
	3	*	*	*	*	*
	4	*	*	*	*	*
	5	18	*	*	*	*
	6	56	*	*	*	*
	7	173	12	7%	*	*
	8	300	33	11%	10	30%
	9	313	50	16%	21	42%
	10	454	72	16%	19	26%
	11	699	108	15%	44	41%
	12	903	184	20%	71	39%
	13	1119	264	24%	108	41%
	14	1368	387	28%	136	35%
	15	1535	484	32%	157	32%
Nearing Proficient	16	1734	667	38%	177	27%
	17	1827	773	42%	155	20%
	18	1962	876	45%	106	12%
Proficient	19	1871	903	48%	49	5%
	20	1810	948	52%	48	5%
	21	1721	903	52%	13	1%
	22	1589	873	55%	*	*
	23	1420	796	56%	*	*
Advanced	24	1199	674	56%	*	*
	25	956	552	58%	*	*
	26	800	442	55%	*	*
	27	639	349	55%	*	*
	28	458	262	57%	*	*
	29	378	195	52%	*	*
	30	274	148	54%	*	*
	31	173	85	49%	*	*
	32	102	44	43%	*	*
	33	77	34	44%	*	*
	34	39	12	31%	*	*
	35	*	*	*	*	*
	36	*	*	*	*	*
	Total	25985	11140	43%	1134	10%

Appendix N. Montana OPI and ACT Confidentiality and Nondisclosure Requirements

Subject: Confidentiality Packet and Instructions for ACT Panelist Materials

Dear Panelist,

The Montana Office of Public Instruction (OPI) has established procedures and responsibilities under federal and state laws governing the access, use, and dissemination of confidential, sensitive, and/or restricted student information. Due to the confidential nature of ACT achievement data and test security, the OPI will require panelists for the ACT with Writing meeting to complete the following steps before receiving and/or accessing the ACT panel meeting materials.

> Please complete the following actions and remit your signed copies to **Marcy Fortner at mfortner@mt.gov** by Thursday, September 14th. (Materials will be released after this date).

Note: You cannot view any meeting materials ahead of the meeting without sending "Resource E", "Resource F", and the "ACT Confidentiality and Nondisclosure Agreement" to the OPI. Reviewing these panelist materials ahead of the meeting will be important for you to orient yourself with the standard validation process, the ACT impact data, federal and state meeting goals, and understanding your role as a panelist.

COMPLETE THESE CONFIDENTIALITY PACKET STEPS FOR THE RELEASE OF PANEL MATERIALS

Step 1) Watch the OPI Student Records Confidentiality Training Video (14:27 mins).

Step 2) Familiarize yourself with OPI Student Records Confidentiality Policy document.

Step 3) Complete the "Resource E – OPI Affidavit of Non-Release" form. Please print, sign, date, and send a scanned copy back to the OPI by September 14th in order to receive your panel materials. (Should you be unable to get this document notarized before the meeting commences on Thursday, September 21st the OPI will have a notary on site and available first thing on the 21st.

Step 4) Complete the "Resource F – Contractor Nondisclosure Statement" form. Please print, sign, date, and send a scanned copy back to the OPI by September 14th in order to receive your panel materials.

Step 5) Complete the "ACT Confidentiality and Nondisclosure Agreement" form. The vendor requires its own non-disclosure agreement to view any proprietary test information. Please print, sign, date, and send a scanned copy back to the OPI by September 14th in order to receive your panel materials.

Note: the OPI cannot send or provide you with access to the panel materials until the "Resource E", "Resource F" and the "ACT Confidentiality Nondisclosure Agreement" forms are on file with the OPI. We will collect your original signed documents at the meeting for our recordkeeping needs.

Step 6) At the Meeting – The OPI will provide instruction on the security requirements to ensure all materials are kept confidential. Instruction regarding the use of personal electronic devices such as mobile phones and portable devices (i.e., tablets, laptops, etc.) will be given as these devices will not be permitted during the meeting.

Step 7) After the Meeting – The OPI will provide training on what information is and is not shareable with the general public outside of this meeting. Materials that are not shareable outside of this meeting will be collected by the OPI to adhere to the state and vendor test security and nondisclosure policies.

All documents can be accessed with the Montana OPI and ACT Confidentiality and Nondisclosure Requirements link.

Montana College and Career Readiness

The goal of the Office of Public Instruction is to ensure that every student graduates from high school prepared to succeed in college, the military or the workforce. A college and career ready student has the following:

Academic and Technical Knowledge and Skills	Employability Knowledge and Skills
A college and career ready student is prepared to complete a freshman level postsecondary course of study without remediation as demonstrated by: • Completion of a rigorous high school curriculum; • Participation in college preparation and college level courses; • Participation in career preparation programs; and • An understanding of college and career planning and the admissions and financial aid process	A college and career ready student is prepared to connect their education to employment opportunities, as demonstrated by: • Goal setting and planning; • Clear and effective communication skills; • Critical thinking and problem solving skills; • Working independently and in teams; • Effective knowledge and use of technology; and • Ability to work with diverse groups
Work Ethic and Professionalism	Measures for Career Readiness
A college and career ready student understands the expectations of the workplace as demonstrated by: • Attendance and punctuality expected by the workplace • Workplace appearance appropriate for position and duties • Motivation and taking initiative, taking projects from initiation to completion • Understanding workplace culture, policy and safety, and respecting confidentiality and workplace ethics	A student is career ready if they have identified a career pathway and have completed three or more of the following benchmarks while in high school: • 90 percent attendance • 25 hours of community service • Industry credential or certificate • Career pathway course with college credit • Work-based learning experience • Two or more organized co-curricular activities such as a Career and Technical Student Organization (CTSO) • An understanding of career choices based on employment and labor market statistics • An ability to analyze the cost of college as it relates to a variety of careers and occupations

Document can be accessed with the Montana College and Career Readiness Definitions link.

Appendix P. Initial Panelist Range PLDs Crosswalk

Mathematics Range PLD Domains	ELA Range PLD Domains
Algebra	Writing
Quantities	Literary
Functions	Informational

Follow the links above to see the panelists' edits to the Smarter Balanced Range PLDs for repurposing with the ACT assessment.

CONFIDENTIALITY AND NONDISCLOSURE AGREEMENT

THIS CONFIDENTIALITY AND NONDISCLOSURE AGREEMENT (this "Agreement") is entered into on the _____ day of September, 2017, between ACT, Inc., an Iowa nonprofit corporation, with a principal place of business and post office address at 500 ACT Drive, PO Box 168, Iowa City, Iowa 52243-0168 ("ACT"), and _____, a(n) individual, with a principal place of business and mailing address at _____ ("Recipient").

BACKGROUND

Subject to the terms and conditions set forth in this Agreement, ACT desires to provide, and Recipient desires to receive, certain confidential and proprietary information for the limited purpose(s) described herein. Prior to providing such information, ACT requires Recipient to sign a confidentiality and nondisclosure agreement.

AGREEMENT

In order to induce ACT to disclose such confidential and proprietary information to Recipient, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties do hereby agree as follows:

1) The term "Confidential Information" shall mean any proprietary or trade secret information, including, but not limited to, all materials listed in Appendix A, computer software (including, but not limited to, any programs, source or object codes, data bases, specifications, techniques, know-how and other related information), login information, passwords, methods, processes, procedures, products, computer hardware, data, prototypes, specifications, contracts, client lists, or other financial, business or technical information disclosed in written, oral, or visual form by ACT to Recipient. Confidential Information may either be the property of ACT or information provided to ACT by a third party.

2) ACT agrees to disclose to Recipient the Confidential Information, for the following limited purpose(s) (the "Business Purpose(s)"): The development of Performance Level Descriptors for the ACT to support federal accountability requirements as part of ESSA. Access to ACT materials will be needed from September 14 - September 28, 2017.

3) Recipient acknowledges the economic value to ACT of all Confidential Information. With respect to Confidential Information, Recipient agrees to:

   a) use the Confidential Information only for the specific Business Purpose(s) set forth herein;

   b) refrain from distributing, disclosuring or disseminating Confidential Information to anyone except its employees and agents with a need to know and who, in each case, have been informed of the confidential nature of the Confidential Information and have agreed to be bound by the terms of this Agreement.

   For purposes of this Agreement only, a "need to know" means that the employee requires the Confidential Information in order to perform his or her responsibilities in connection with the Business Purpose described herein;

Document can be accessed with the Revised ACT Confidentiality and Nondisclosure Agreement link.