Initial Achievement Level Descriptors and College Content-Readiness Policy

Introduction

The Smarter Balanced Assessment Consortium (Smarter Balanced) has developed an interconnected system of initial achievement level descriptors (ALDs) for English language arts/literacy (ELA/literacy) and mathematics that are aligned with the Common Core State Standards (CCSS) and the Smarter Balanced assessment claims (see Definition of Terms). ALDs are commonly used in K–12 statewide assessments to explain the knowledge, skills, and processes that students display at predetermined levels of achievement (e.g., Basic, Proficient, and Advanced). These ALDs are often found on student-level score reports or on state aggregate reports so that stakeholders, such as parents and teachers, can understand the types of knowledge, skills, and processes that students have demonstrated on an assessment.

In its Content Specifications documents, Smarter Balanced defines the assessment claims and articulates how the CCSS would be demonstrated with assessment items and tasks. At a finer level of detail, the Content Specifications also include assessment targets that map the CCSS onto statements of evidence that will be collected through the assessment. The ALDs presented in this document have been developed by referring consistently to the Content Specifications and the CCSS. As a result, the ALDs reflect the depth and rigor of the CCSS as well as the way in which Smarter Balanced intends to assess the CCSS.

The ALDs presented in this document represent a new direction in the focus and purpose of ALDs. In the past, ALDs were developed near the end of the test development cycle and could only summarize student performance. This new approach allows for the development of ALDs at the beginning of the test development cycle so that expectations for student performance may guide the way tests are conceived and produced.

There is an additional unique aspect of these ALDs. Because the CCSS are grounded in expectations for college and career readiness, the Smarter Balanced assessments are being deliberately designed to measure each student's progress toward meeting those expectations. The ALDs presented here are linked to an operational definition of college content-readiness as well as a policy framework to guide score interpretation for high schools and colleges. Smarter Balanced does not yet have a parallel operational definition and framework for career readiness; however, it is working toward this end and will amend this document when those materials are ready for public review.

Definition of Terms

Assessment Claims are broad evidence-based statements about what students know and can do as demonstrated by their performance on the assessments. At each grade level within mathematics and ELA/literacy, there is one overall claim encompassing the entire content area and four specific content claims. Students will receive a score on each overall claim and scores for the specific content claims.

Content Categories are sub-categories that apply to some, but not all, specific assessment claims. For example, within the specific content claim "Reading" there are two content categories: "Informational Text" and "Literary Text."

Assessment Targets connect the CCSS to evidence that will be collected from the assessment. The targets map the standards in the CCSS onto assessment evidence that is required to support the content categories and claims. Assessment targets are used to guide the development of items and tasks that will measure the CCSS.

Standard Setting is the process whereby educators recommend threshold test scores that separate students into achievement levels.

Governing States are member states that have committed to using the Smarter Balanced Assessment System and have voting privileges on Consortium policy.

This document provides an overview of the ALDs including their use and purpose, summarizes the process used to create the ALDs, describes the designation of college and career readiness for Grade 11 students, and provides the proposed ALDs.

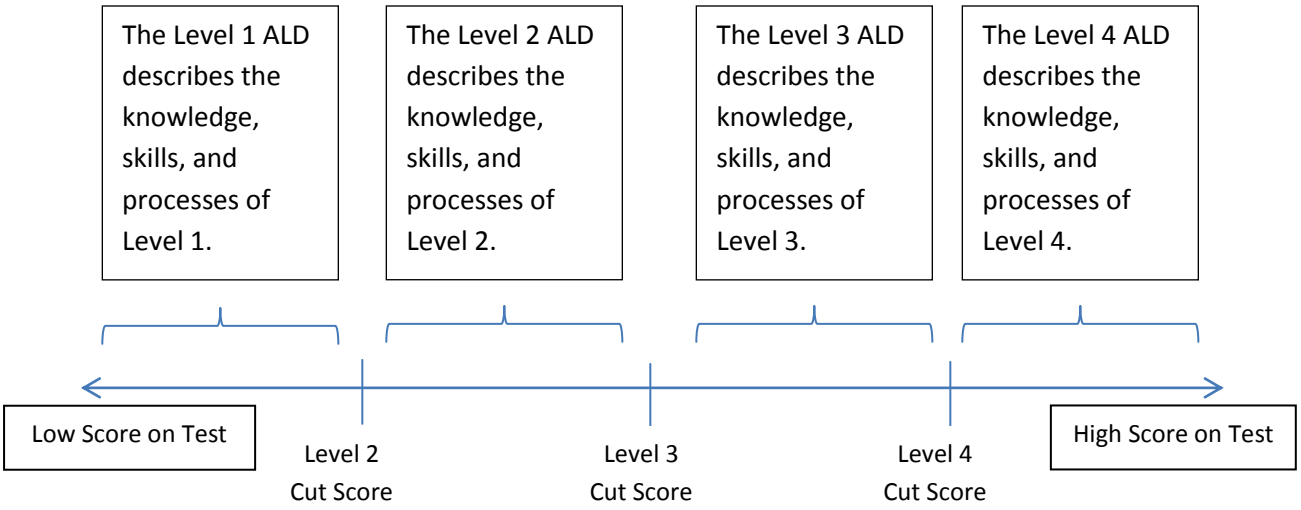

Figure 1. Relationship between Test Scale and ALDs

What Are Achievement Level Descriptors?

Achievement level descriptors (ALDs) are a means of describing performance on a standardized test in terms of levels or categories of performance. For the Smarter Balanced assessments, outcomes will be reported in terms of four levels of achievement: Level 1, Level 2, Level 3, and Level 4. The ALDs are text descriptions of the knowledge, skills, and processes demonstrated by students in each category of performance. The policy, range, and threshold ALDs (see page 3 for definitions of the ALDs) provided with this report are labeled as "initial" because they all will be refined and finally adopted by Smarter Balanced after student performance data are collected through a national field test and after standard setting occurs. In addition, they will be augmented to include the reporting ALDs. This will ensure a seamless integration of the ALDs with student performance measures.[1]

Figure 1 shows the relationship between performance on a standardized assessment and the ALDs. The horizontal line in Figure 1 represents the test scale, which ranges from low test scores to high test scores. Low test scores signify poorer performance on the test than do high test scores. The horizontal line is separated by three cut scores into four levels of achievement. The cut scores represent the test score necessary for a student to move from one level of achievement to the next highest level.

A higher score on the test reflects a greater accumulation of knowledge, skills, and processes. ALDs are cumulative, where the knowledge, skills, and processes of lower level ALDs are assumed by the

[1] The mathematics ALDs arise from the Smarter Balanced Assessment Targets and the closely associated CCSS. In some instances, the CCSS aligned to a particular target do not lend themselves to a range of 4 levels of ALDs as the associated skill requires mastery at the level 3 range. In such cases, there will appear no level 4 range ALD.

higher level ALDs. For example, a Level 3 student is assumed to be able to possess the knowledge, skills, and processes described in Levels 1 and 2.

The most commonly understood use of ALDs is to communicate the meaning of test scores. When ALDs are used for reporting scores, parents, teachers, and other stakeholders are provided summaries of the different levels of performance in terms that can be readily understood. It is important to recognize, however, that there are other purposes for ALDs beyond score reporting, including guidance for policy and standard setting (establishment of cut scores) as well as item development. To address the entire set of purposes, Smarter Balanced has developed a system of interrelated ALDs that support the entire testing program. This system includes four types of ALDs, which are defined below and summarized in Table 1.

- ***Policy ALDs*** are general descriptors that articulate the goals and rigor for the final performance standards. These descriptors set the tone for the subsequent descriptors. These ALDS are very high-level and are most often used by policymakers. For Smarter Balanced, there will be two types of policy ALDs, including the policy ALDs that are aligned to Smarter Balanced's overall claims and the Content ALDs that are aligned to Smarter Balanced's content claims.

- ***Range ALDs*** are grade- and content-specific descriptors that may be used by test developers to guide item writing; these ALDs describe the cognitive and content rigor that is encompassed within particular achievement levels. The range ALDs are developed at the beginning of the testing program. The knowledge, skills, and processes described in the range ALDs are ones that are expected of students; in other words, they are knowledge, skills, and processes that students s*hould* have.

- ***Threshold ALDs*** are created in conjunction with or following range ALDs and are used to guide standard setting. The threshold ALDs are a subset of the range ALDs and use only the information from the range ALDs that defines the minimum performance required for meeting a particular achievement-level expectation. As with the range ALDs, these ALDs also reflect the knowledge, skills, and processes that are expected of students. As stated above, the knowledge, skills, and processes in ALDs are cumulative. For the threshold ALDs, it is important to understand that they reflect the cumulative skills of the range ALDs, not just the threshold ALDs. The student who has achieved the threshold Level 3 is assumed to have the knowledge, skills, and processes of the range Levels 1 and 2 ALDs.

- ***Reporting ALDs*** are the final ALDs that are developed following standard setting. They will provide guidance to stakeholders on how to interpret student performance on the test. These ALDs will be written after the standard setting in summer 2014. An important difference between the reporting ALDs and the range/threshold ALDs is that the reporting ALDs reflect student test performance. As such, they reflect the knowledge, skills, and processes that students *can* do.

These ALDs are not intended to provide guidance to classroom teachers for curriculum or individual student decisions. Such guidance will be provided through the formative assessments.

Table 1. ALDs by Use, Purpose, and Intended Audience

ALD Type	Use	Purpose	Intended Audience
Policy	Test development and conceptualization	Set tone for the rigor of performance standards expected by sponsoring agency	Policymakers
Range	Item-writing guidance	Define content range and limits	Item writers and test developers
Threshold	Cut-score recommendation and standard-setting guidance	Define threshold performance at each achievement level	Standard-setting panelists
Reporting	Test-score interpretation	Describe the knowledge, skills, and processes that test takers demonstrate and indicate the knowledge and skills that must be developed to attain the next level of achievement	Stakeholders, such as parents, students, teachers, K–12 leaders, and higher-education officials

A Note Regarding Mathematics ALDs. As elaborated in the Content Specifications (see pages 16 and 17 in particular), Smarter Balanced aims to assess multiple dimensions of mathematical proficiency. These ALDs should be read and understood accordingly, with student achievement progressing not only in familiar dimensions but in some new ways reflecting the coherence, focus, and rigor of the standards. Familiar dimensions include the number of steps a student can perform to reach a correct solution (e.g., the size of denominators a student can work with in problems involving fractions), while new dimensions include a student's ability to reason and his or her facility with multiple representations (e.g., in making use of functions).

Developing Achievement Level Descriptors for Smarter Balanced

The creation of ALDs was identified as a major work effort in Smarter Balanced's overall work plan. The ALDs and associated materials were developed in partnership with and under the guidance of the developers at CTB/McGraw-Hill. The ALDs associated with this document were created at the ALD-Writing Workshop and have been revised based on feedback from Smarter Balanced staff, work groups and technical advisors; state K–12 and HigherEducation leads; and interested stakeholders from Smarter Balanced Governing States.

ALD-Writing Workshop

Smarter Balanced held a workshop at the beginning of October 2012 to draft its initial policy, range, and threshold ALDs. K–12 and higher-education representatives from each Governing State participated in the workshop. The workshop panelists included K–12 teachers and administrators, as well as faculty from two- and four-year colleges and universities. Individuals who had strong knowledge of the CCSS and/or had participated previously in developing achievement level descriptors or learning outcome statements were nominated by their states' K–12 and Higher-

Education Leads (the primary state representatives to Smarter Balanced) and were selected by Smarter Balanced staff, volunteer leaders, and contractors. Members of the Smarter Balanced Technical Advisory Committee and individuals from Student Achievement Partners who were primary writers of the CCSS all attended the workshop to act as expert advisors. Appendix A lists all workshop panelists as well as workshop facilitators.

To create the ALDs, the workshop panelists examined both the Smarter Balanced Content Specifications (www.smarterbalanced.org/smarter-balanced-assessments/) and the CCSS (www.corestandards.org). For the policy ALDs, the panelists delineated the Smarter Balanced overall claims and content claims described in the Content Specifications into achievement levels. The range and threshold ALDs drew upon the assessment targets in the Smarter Balanced Content Specifications, as well as the specific content standards in the CCSS that underlie the assessment targets.

Review Cycles and Public Feedback

Following the workshop, a series of reviews have taken place. First, an internal review by Smarter Balanced staff was undertaken. This was followed by a public review period where Smarter Balanced collected feedback through an online survey. Following the public review and associated revisions, a final review was conducted by K–12 and Higher Education state leads.

In general, the review provided refinements in a variety of directions. Some particular concerns that were raised and addressed included

- greater distinctions between levels;
- clarity regarding terminology throughout the document, with specific attention focused on the defining phrases;
- consistency of language throughout the document (such as between policy, range, and threshold ALDs);
- clarity regarding the impact of providing a college-readiness statement while a student is in Grade 11;
- clarity of the parameters of college readiness (e.g., is college readiness more than academics?).

The initial ALDs presented in this document reflect the changes that were made as a result of the review process.

College Content-Readiness

Representatives of higher education have been working closely with K–12 colleagues on the development of the Smarter Balanced assessments. This partnership is important because a primary goal of Smarter Balanced is that colleges and universities use student performance on the Grade 11 summative assessments in ELA and mathematics as evidence of readiness for entry-level, transferable, credit-bearing college courses. Connecting student performance to a tangible postsecondary outcome will send a clear signal to students, parents, and schools that the knowledge and skills delineated in the Common Core State Standards (CCSS) matter, providing individual

students with a powerful incentive to do their best work on the assessments and demonstrating the clear link between students' K–12 experience and the demands of higher education.

The CCSS enable the development of policies to more clearly connect K–12 and higher education. The standards were developed by both higher education faculty and K–12 content experts to clearly articulate the knowledge and skills necessary for college readiness in English language arts and mathematics. The Smarter Balanced draft Initial Achievement Level Descriptors and College Content-readiness Policy takes that process a step further by defining the performance standards that students must meet in order to be exempt from developmental coursework (not only what students must learn but to what degree they must master the specified knowledge and skills).[2]

College Content-Readiness Policy

In order to guide colleges, universities, and schools in interpreting student performance, an operational definition of "college content-readiness" and accompanying policy framework were developed by state Higher-Education and K–12 Leads, as well as the faculty and teachers representing their states at the ALD-writing workshop (see Tables 2 and 3). Together, the operational definition and policy framework describe how colleges, universities, and schools should interpret student performance. The definition of college content-readiness, policy framework and related stipulations were developed over the course of several meetings with the state K–12 and Higher Education Leads, as well as discussion with participants at the ALD-writing workshop. After each meeting, the draft was further refined. Like the ALDs, the definition and policy framework represent initial work that will be refined once student performance data are collected and analyzed.

[2] The term developmental coursework refers to non-credit courses designed to instruct students on material that is pre-requisite to entry-level, credit-bearing courses.

College Readiness and College Content-Readiness.

Smarter Balanced recognizes that college readiness encompasses a wide array of knowledge, skills, and dispositions, only some of which will be measured by the Smarter Balanced assessments. As a result, Smarter Balanced narrowed the focus of its "college readiness" definition to "content-readiness" in the core areas of ELA/literacy and mathematics.

Intended Audience. This document is not designed as a communications vehicle for students and parents. Smarter Balanced will continue outreach to higher education (including officials who specialize in student/parent communications such as admission officers and academic advisors) as Reporting ALDs are developed and student score reports are designed. Further, while there will be elements of student/parent communications that are common across the Consortium, the flexibility built into the College Content-readiness Policy will require that each state customize communications based on the policy choices made.

College Content-Readiness Definition

English Language Arts/Literacy[3]	Students who perform at the College Content-Ready level in English language arts/literacy demonstrate reading, writing, listening, and research skills necessary for introductory courses in a variety of disciplines. They also demonstrate subject-area knowledge and skills associated with readiness for entry-level, transferable, credit-bearing English and composition courses.
Mathematics	Students who perform at the College Content-Ready level in mathematics demonstrate foundational mathematical knowledge and quantitative reasoning skills necessary for introductory courses in a variety of disciplines. They also demonstrate subject-area knowledge and skills associated with readiness for entry-level, transferable, credit-bearing mathematics and statistics courses. .

[3] Speaking is an element of the CCSS in English language arts/literacy, but practical and technological constraints do not allow for the assessment of speaking skills on the Smarter Balanced summative assessment. Therefore, at this time the College Content-readiness Policy does not include speaking.

Policy Framework for Grade 11 Achievement Levels

Level	Policy ALD	Description	Implications for Grade 12	Implications for High School Graduates who Immediately Enter Higher Education
4	Student demonstrates thorough understanding of and ability to apply the knowledge and skills associated with college content-readiness.	Student is exempt from developmental course work. (K-12 and higher education officials may jointly set Grade 12 requirements to maintain the exemption.)	Within each state, students may be required to satisfactorily complete Grade 12 English and/or mathematics courses to retain the exemption from developmental course work (higher education and K-12 officials may jointly determine appropriate courses and performance standards). Students are encouraged to take appropriate advanced credit courses leading to college credit while still in high school.	Colleges may evaluate additional data (courses completed, grades, placement test scores, writing samples, etc.) to determine appropriate course placement at or above the initial credit-bearing level.
3	Student demonstrates adequate understanding of and ability to apply the knowledge and skills associated with college content-readiness.	Student is conditionally exempt from developmental course work, *contingent on evidence of sufficient continued learning in Grade 12.*	Within each state, higher education and K–12 officials may jointly determine appropriate evidence of sufficient continued learning (such as courses completed, test scores, grades or portfolios). Students are encouraged to take additional 4th year courses as well as appropriate advanced credit courses leading to college credit while in high school.	For students who demonstrate evidence of sufficient continued learning in Grade 12, colleges may evaluate additional data (courses completed, grades, portfolios, placement test scores, etc.) to determine appropriate course placement at or above the initial credit-bearing level. For students who fail to demonstrate evidence of sufficient continued learning in Grade 12, colleges also may evaluate the same types of additional data to determine placement in developmental or credit-bearing courses.

Level	Policy ALD	Description	Implications for Grade 12	Implications for High School Graduates who Immediately Enter Higher Education
2	Student demonstrates partial understanding of and ability to apply the knowledge and skills associated with college content-readiness.	Student needs support to meet college content-readiness standard.	States/districts/colleges may implement Grade 12 transition courses or other programs for these students. States also may choose to retest these students near the conclusion of Grade 12 (scoring will occur within two weeks, allowing opportunity for colleges to use scores the following fall).	Colleges may evaluate additional data (courses completed, grades, portfolios, placement test scores, etc.) to determine placement in developmental or credit-bearing courses.
1	Student demonstrates minimal understanding of and ability to apply the knowledge and skills associated with college content-readiness.	Student needs substantial support to meet college content-readiness standard.	States/districts/colleges may offer supplemental programs for these students. States also may choose to retest these students near the conclusion of Grade 12.	Colleges may evaluate additional data (courses completed, grades, portfolios, placement test scores, etc.) to determine placement in developmental or credit-bearing courses.

Further Stipulations to the College Content-readiness Policy

- **Establishment of "Cut Scores" Aligned to the Achievement Level Descriptors and College Content-readiness Policy**. In the summer of 2014, after pilot and field tests have been completed, K-12 and higher education representatives across the Consortium will jointly determine recommended cut-scores for each achievement level on the Grade 11 assessments in math and English language arts through a structured standard-setting process. Those recommended cut scores will then be subject to a vote of the Smarter Balanced Governing States. As is the case with regard to approval of the Initial Achievement Level Descriptors and College Content-readiness policy, this vote will require that K-12 and higher education representatives agree on a shared state position.

- **Updates and Revisions to the College Content-Readiness Policy**. This document is subject to revision as student performance data are collected through the pilot and field tests, as validation studies are conducted and as cut scores are established through the standard-setting process. Further, as data are collected and analyzed as a result of operational testing and use of the Smarter Balanced assessment by colleges and universities, the Consortium may choose to revisit and revise this policy.

- **Multiple Measures of Content-Readiness.** Smarter Balanced recognizes the limits of relying on a single test score for making high-stakes decisions and fully supports the use of multiple

measures to determine student course placement. As a result, the policy framework encompasses the evaluation of evidence of Grade 12 learning to determine whether an exemption from developmental course work is warranted for all but the highest-performing students and the use of additional data drawn from placement tests or other sources to determine appropriate course placement in higher education. Furthermore, while this policy is focused on the Smarter Balanced assessment, within states, K–12 and higher education may establish policies that provide rigorous alternate means for students to demonstrate readiness for credit-bearing courses (grades or portfolios, other assessment scores, etc.).

- **Grade 12 Expectations.** Because even the strongest performing students' skills can erode if they do not take challenging math and English courses in Grade 12, the Content-readiness Policy provides states the option of requiring that students who have earned an exemption from developmental course work satisfactorily complete a prescribed course in Grade 12 in order to retain their exemption. At Level 3, students must provide evidence of continued learning in order to earn an exemption from developmental course work. State K–12 and higher education officials may jointly determine the necessary conditions for meeting these requirements.

- **Support for Emerging Approaches to Developmental Education.** A growing movement in higher education encourages liberal placement of students into credit-bearing courses with co-requisite supports to compensate for any knowledge or skill deficits. To clearly communicate high expectations and incentivize schools, teachers, and students, the Content-readiness Policy asks colleges to guarantee students with strong performance that they are exempt from developmental mathematics and English courses. However, it does not preclude colleges from ultimately placing any student into credit-bearing courses; this decision is left to the discretion of individual colleges and universities or college and university systems.

- **Mathematics Requirements for Advanced Courses.** The CCSS in mathematics were designed to prepare all students for entry-level college mathematics and statistics courses that typically require Algebra II or its equivalent as a prerequisite. The CCSS also include a set of standards for additional mathematics that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics. These standards are typically referred to as the "Plus Standards" because they are designated by a plus symbol (+) in the standards document. Because the Smarter Balanced Summative Assessment only assesses knowledge and skills required of all students, it does not include items and tasks aligned to the Plus Standards. The College Content-readiness Policy assumes that colleges will need to assess additional evidence (grades, placement test scores, admission test scores, etc.) for students seeking to enter more advanced mathematics courses.

- **College Content-Readiness and Admission.** The College Content-readiness Policy operates within the context of existing institutional admission policies; open-admission institutions will serve many students who do not meet the college content-readiness performance benchmark, and selective institutions may not admit students who score at Level 3 or 4 on the assessment, just as they now may not admit students with high college admission test scores or strong grade point averages. In addition, student course-taking decisions in high

school will continue to be influenced by the admission requirements of colleges and universities. For example, students at Level 4 who plan to seek admission to selective institutions will make course choices for Grade 12 that comply with the requirements of those institutions. By identifying students who are either on track or ready for credit-bearing courses, high schools may be better able to advise students on college options and Grade 12 courses. Finally, at their discretion, institutions may choose to include Smarter Balanced scores among the information they consider as they make admission decisions; however, the Smarter Balanced Assessment was not designed for that purpose.

- **Score Expiration.** Consistent with the policy framework, Smarter Balanced recommends that scores only be considered valid for students who matriculate directly from high school to college.

- **Support for Students at Levels 1 and 2.** States and districts will make decisions about support for these students, and may draw from an array of existing resources. There are a number of projects underway (Southern Regional Education Board project on Transition Courses, Carnegie Foundation Quantway/Statway project, etc.) that offer model courses and other types of interventions that schools and colleges can implement to assist students in addressing academic deficiencies before leaving high school. States may choose to adopt and customize existing resources or build their own.

Next Steps

- **Validation.** It will be important to validate the adopted cut scores through an array of studies, including longitudinal studies of students who complete the Smarter Balanced assessments in Grade 11 and subsequently enter higher education as well as studies that allow colleges and universities to compare student performance on the Smarter Balanced assessment to known measures (existing admission and placement tests). As Smarter Balanced develops and implements its comprehensive validity research agenda, the Consortium welcomes input on the best approach and criterion for testing this important element of validity.

- **Institutional Participation.** In recognition that colleges will need to consider the performance standards set in Summer 2014, after the field test and standard setting process are complete, colleges will be asked to commit to implementing the College Content-readiness Policy beginning in January 2015. This timing will allow students who take the Grade 11 summative assessment in Spring 2015 to know which colleges have agreed to use their scores as evidence of readiness for credit-bearing courses, as described in the College Content-readiness Policy. Smarter Balanced will assist colleges in making this determination by providing information on how Smarter Balanced scores compare to scores on commonly used admission and placement assessments as well as sharing results from its validation studies.

  Smarter Balanced recognizes that some colleges that have an expressed interest in participating will need additional time to study student performance data before determining the appropriateness of implementing the College Content-readiness Policy given the institution's particular mission, curriculum, and student population. In addition to the information that Smarter Balanced will provide, state education agencies also may assist

these colleges by arranging for access to needed student data (consistent with state policies on privacy and data sharing). After this study and review period, colleges and universities would decide whether to begin implementing the College Content-readiness Policy. As colleges complete their study and review and make the decision to implement the College Content-readiness Policy, this information will be shared with high schools, students and parents.

- **Career Readiness.** The Smarter Balanced overall claim asserts that a student can demonstrate career readiness in addition to college readiness. Smarter Balanced is committed to providing evidence of student readiness for the array of postsecondary options, as specified by the CCSS. Smarter Balanced is working with experts in career readiness to determine how the assessment can best advise students on their readiness for postsecondary career pursuits. Further information will be made available once it is ready for public review and comment.

Policy ALDs

For both ELA/literacy and mathematics, Smarter Balanced has an overall claim for Grades 3–8 and an overall claim for Grade 11. In addition, there are four specific content claims in each of the two main content areas (ELA/literacy and mathematics). Through these claims, Smarter Balanced has made an assertion about the desired performance of students.

Figure 2 provides a graphic representation of the relationship of the claims to the content categories, assessment targets, and the related standards in the CCSS. Each of these components was important to creating the ALDs. There are policy ALDs associated with both the overall claims and the specific content claims. For the sake of clarity, the ALDs associated with the overall claims will be called "policy ALDs" and the ALDs associated with the specific content claims will be called "Content ALDs."

Policy ALDs. The overall claim was delineated into the following four levels (with the defining phrases[4] bolded):

- The Level 4 student demonstrates **thorough understanding of and ability to apply** the English language arts and literacy (mathematics) knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.
- The Level 3 student demonstrates **adequate understanding of and ability to apply** the English language arts and literacy (mathematics) knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.
- The Level 2 student demonstrates **partial understanding of and ability to apply** the English language arts and literacy (mathematics) knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.
- The Level 1 student demonstrates **minimal understanding of and ability to apply** the English language arts and literacy (mathematics) knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.

[4] Defining phrases provide context for the expectations of the student in each achievement level.

Content ALDs. The specific content claims were delineated into the four achievement levels. According to the current blueprint for the assessment (dated November 2012), students will receive a sub-score for each of the specific content claims, with one exception: in mathematics, because of the close relationship between problem solving and modeling, content claims 2 and 4 will be combined for reporting purposes. Table 4 lists the specific content claims for ELA/literacy followed by the Content ALD for each claim. Table 5 lists the same information for mathematics.

Table 4. Specific Content Claims and Content ALDs for ELA/Literacy

Content Claim	Content ALD Level 1	Content ALD Level 2	Content ALD Level 3	Content ALD Level 4
Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts.	The Level 1 student demonstrates minimal ability to read to comprehend a range of literary and informational texts of low complexity and to use minimal textual evidence to demonstrate thinking.	The Level 2 student demonstrates partial ability to read closely to comprehend a range of literary and informational texts of moderate complexity and to use partial textual evidence that demonstrates critical thinking.	The Level 3 student demonstrates adequate ability to read closely and analytically to comprehend a range of literary and informational texts of moderate–to-high complexity and to use textual evidence to demonstrate critical thinking.	The Level 4 student demonstrates thorough ability to read closely and analytically to comprehend a range of literary and informational texts of unusually high complexity and to use textual evidence effectively to demonstrate complex critical thinking.
Students can produce effective and well-grounded writing for a range of purposes and audiences.	The Level 1 student demonstrates minimal ability to produce writing for a range of purposes and audiences.	The Level 2 student demonstrates partial ability to produce writing for a range of purposes and audiences.	The Level 3 student demonstrates adequate ability to produce effective and well-grounded writing for a range of purposes and audiences.	The Level 4 student demonstrates thorough ability to produce compelling, well-supported writing for a diverse range of purposes and audiences.
Students can employ effective speaking and listening skills for a range of purposes and audiences.	The Level 1 student demonstrates minimal competency in employing listening skills.	The Level 2 student demonstrates partial ability to employ listening skills for a range of purposes with competency.	The Level 3 student demonstrates adequate ability to employ listening skills for a range of purposes with competency.	The Level 4 student demonstrates thorough ability to employ listening skills for a range of purposes with competency.
Students can engage in research and inquiry to investigate topics, and to analyze, integrate, and present information.	The Level 1 student demonstrates minimal ability to use research/inquiry methods to produce an explanation of a topic.	The Level 2 student demonstrates partial ability to use research/inquiry methods to produce an explanation of a topic and analyze or integrate information.	The Level 3 student demonstrates adequate ability to use research/inquiry methods to explore a topic and analyze, integrate, and present information.	The Level 4 student demonstrates a thorough ability to use research/inquiry methods as a way to engage with a topic and then analyze, integrate, and present information in a persuasive and sustained exploration of a topic.

Table 5. Specific Content Claims and Content ALDs for Mathematics

Content Claim	Content ALD Level 1	Content ALD Level 2	Content ALD Level 3	Content ALD Level 4
Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.	The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.	The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.	The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.
Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.	The Level 1 student can make sense of and solve simple and familiar well-posed problems in pure and applied mathematics with a high degree of scaffolding, making minimal use of basic problem-solving strategies and given tools.	The Level 2 student can make sense of and solve familiar well-posed problems in pure and applied mathematics with a moderate degree of scaffolding, making partial use of knowledge, basic problem-solving strategies, and tools.	The Level 3 student can make sense of and persevere in solving a range of unfamiliar well-posed problems in pure and applied mathematics with a limited degree of scaffolding, making adequate use of knowledge and appropriate problem-solving strategies and strategic use of appropriate tools.	The Level 4 student can make sense of and persevere in solving a range of complex and unfamiliar well-posed problems in pure and applied mathematics with no scaffolding, making thorough use of knowledge and problem-solving strategies and strategic use of appropriate tools.
Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	The Level 1 student can construct simple viable arguments with minimal clarity and precision to support his or her own reasoning in familiar contexts.	The Level 2 student can construct viable arguments with partial clarity and precision to support his or her own reasoning and to partially critique the reasoning of others in familiar contexts.	The Level 3 student can construct viable arguments with adequate clarity and precision to support his or her own reasoning and to critique the reasoning of others.	The Level 4 student can construct viable arguments with thorough clarity and precision in unfamiliar contexts to support his or her own reasoning and to critique the reasoning of others.
Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.	The Level 1 student can identify familiar real-world scenarios for analysis and can use simple mathematical models and given tools to solve basic problems.	The Level 2 student can reason quantitatively to analyze familiar real-world scenarios and can use mathematical models and given tools to partially interpret and solve basic problems.	The Level 3 student can reason abstractly and quantitatively to analyze complex, real-world scenarios and to construct and use mathematical models and appropriate tools strategically to adequately interpret and solve problems.	The Level 4 student can reason abstractly and quantitatively to analyze unfamiliar complex, real-world scenarios, to construct and use complex mathematical models and appropriate tools strategically to thoroughly interpret and solve problems, and to synthesize results.

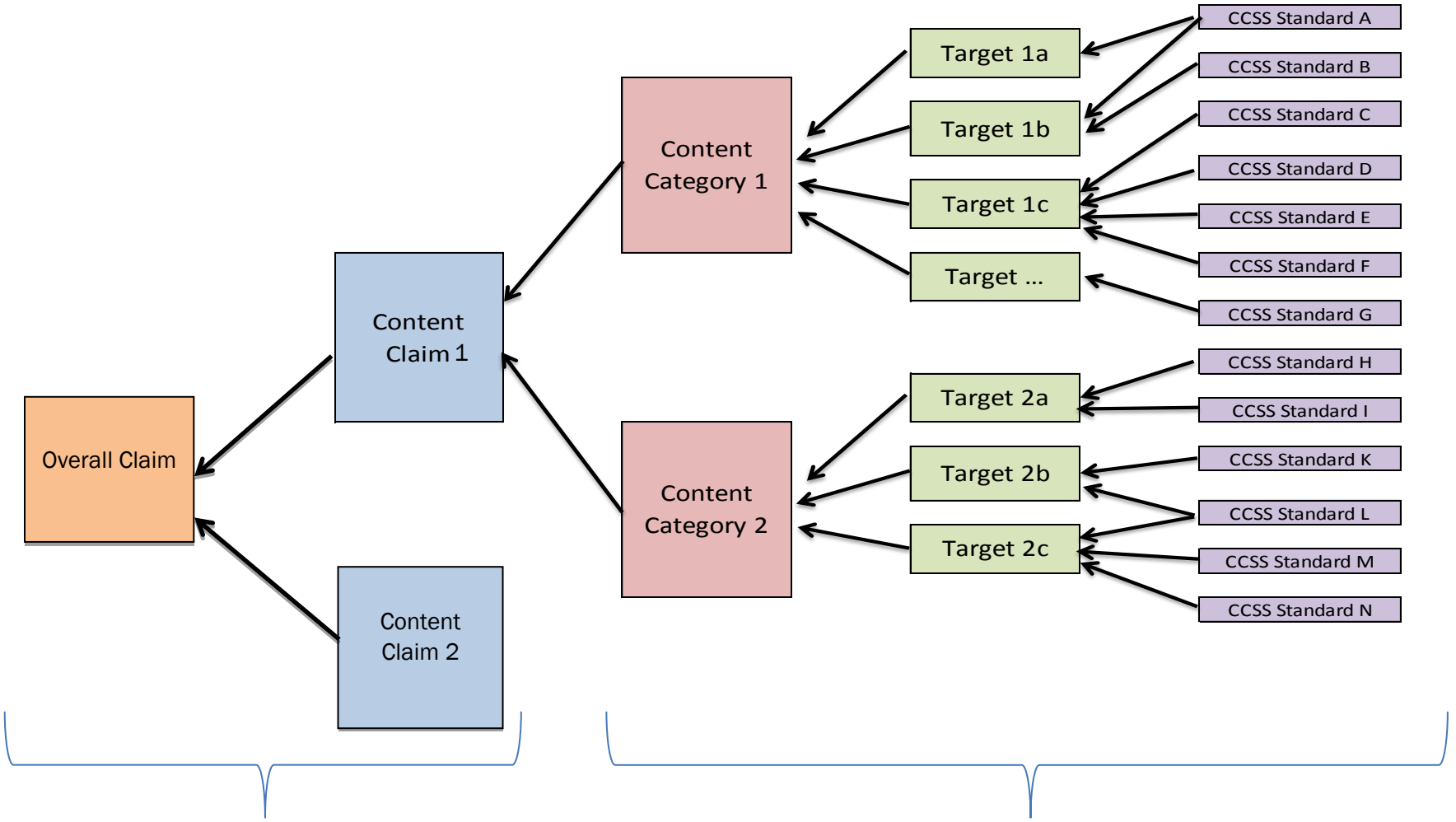

Figure 2. Relationship among Content Claims, Content Categories, Assessment Targets, and Standards

Range and Threshold ALDs

Range ALDs have been created for each assessment target and threshold ALDs for each content category associated with the specific content claims. To create the original draft ALDs, the panelists worked from an abbreviated version of the Smarter Balanced Content Specifications in which the assessment targets were laid out side by side with the related standards from the CCSS. First, the panelists delineated range ALDs for the four achievement levels using both the Smarter Balanced Content Specifications and the CCSS. This method ensured a high level of fidelity to the standards. Once the range ALDs were drafted, the panelists created threshold ALDs by identifying the knowledge, skills, and processes within each range ALD that would be necessary to enter the achievement level.

Presentation of ALDs

Table 6 shows generic versions of the policy, range, and threshold ALDs as they appear in the following ALD matrices for ELA/Literacy, and Table 7 shows the same information for mathematics. The ALDs are presented in matrices to emphasize the way in which all types of ALDs work together to create a comprehensive final product. There are separate matrices for ELA/literacy and mathematics at each grade level.

English Language Arts/Literacy ALDs

Within each matrix, the policy ALDs for the overall claim are shown on the top row (in blue). The second row displays policy ALDs for one of the four specific content claims. Under the policy ALDs, the range ALDs for each specific content claim are clustered by content category (in red). The range ALDs are presented for each assessment target within a given content category (in green). At the end of each content category, the threshold ALDs are presented. The threshold ALDs are presented at the level of the content category, while the range ALDs are presented at the level of the assessment target. The rows then repeat for each set of content categories under each specific content claim.

Table 6. Example of Policy, Range, and Threshold ALD Matrix for ELA/Literacy

Title: ELA/Literacy, Grade Level				
Overall Claim (e.g., Grade 11 ELA/literacy)	**Policy ALD for Level 1**	**Policy ALD for Level 2**	**Policy ALD for Level 3**	**Policy ALD for Level 4**
Specific Content Claim 1 (e.g., "Reading")	Content ALD Level 1 based on Claim 1	Content ALD Level 2 based on Claim 1	Content ALD Level 3 based on Claim 1	Content ALD Level 4 based on Claim 1
Content Category 1 for Specific Content Claim 1 (e.g., "Reading: Literary Texts")				
RANGE ALD for Assessment Target 1 (e.g., "Key Details")	Range ALD for Level 1 based on Assessment Target 1 and CCSS standards that underlie Target 1	Range ALD for Level 2 based on Assessment Target 1 and CCSS standards that underlie Target 1	Range ALD for Level 3 based on Assessment Target 1 and CCSS standards that underlie Target 1 .	Range ALD for Level 4 based on Assessment Target 1 and CCSS standards that underlie Target 1
Assessment Target 2 (e.g., "Central Ideas")	Range ALD for Level 1 …	Range ALD for Level 2 …	Range ALD for Level 3 …	Range ALD for Level 4 …
⋮	⋮	⋮	⋮	⋮
Threshold ALD for the Content Category		Threshold ALD for Level 2 student derived from range ALDs for Content Category 1	Threshold ALD for Level 3 student derived from range ALDs for Content Category 1	Threshold ALD for Level 4 student derived from range ALDs for Content Category 1
Content Category 2 for Specific Content Claim 1 (e.g., "Informational Text")				
RANGE ALD for Assessment Target 1	Range ALD for Level 1 …	Range ALD for Level 2 …	Range ALD for Level 3 …	Range ALD for Level 4 …

Mathematics

Within each matrix, the policy ALDs for the overall claim are shown on the top row (in blue). The second row displays policy ALDs for one of the four specific content claims. Under the policy ALDs, the range ALDs for each specific content claim are clustered by content category (in red). For mathematics, the content categories are either Domain #1 or Domain #2, which represents the major or supporting targets, respectively, as indicated by the Smarter Balanced Summative Blueprint and the Smarter Balanced Content Specifications. The range ALDs are presented for each assessment target within a given content category (in green), and they are further divided according to their CCSS domain. At the end of each CCSS domain, the threshold ALDs are presented. The threshold ALDs are presented at the level of the domain, while the range ALDs are presented at the

level of the assessment target. The rows then repeat for each set of content categories under each specific domain.

Table 7. Example of Policy, Range, and Threshold ALD Matrix for Mathematics

Title: Mathematics, Grade Level				
Overall Claim (e.g., Grade 11 Mathematics)	**Policy ALD for Level 1**	**Policy ALD for Level 2**	**Policy ALD for Level 3**	**Policy ALD for Level 4**
Specific Content Claim 1 (e.g., "Explain and Apply"	Content ALD Level 1 based on Claim 1	Content ALD Level 2 based on Claim 1	Content ALD Level 3 based on Claim 1	Content ALD Level 4 based on Claim 1
Content Category: Domain #1				
Expressions and Equations				
RANGE ALD for Assessment Target 1 (e.g., "Key Details")	Range ALD for Level 1 based on Assessment Target 1 and CCSS standards that underlie Target 1	Range ALD for Level 2 based on Assessment Target 1 and CCSS standards that underlie Target 1	Range ALD for Level 3 based on Assessment Target 1 and CCSS standards that underlie Target 1 .	Range ALD for Level 4 based on Assessment Target 1 and CCSS standards that underlie Target 1
Assessment Target 2 (e.g., "Central Ideas")	Range ALD for Level 1 …	Range ALD for Level 2 …	Range ALD for Level 3 …	Range ALD for Level 4 …
⋮	⋮	⋮	⋮	⋮
Threshold ALD for all Assessment Targets within Domain		Threshold ALD for Level 2 student derived from range ALDs for Content Category 1	Threshold ALD for Level 3 student derived from range ALDs for Content Category 1	Threshold ALD for Level 4 student derived from range ALDs for Content Category 1
Functions				
RANGE ALD for Assessment Target 3	Range ALD for Level 1 …	Range ALD for Level 2 …	Range ALD for Level 3 …	Range ALD for Level 4 …

Next Steps

The purpose of the ALD-writing workshop was to create drafts of the policy, range, and threshold ALDs and to finalize the draft college content-readiness definition and policy framework that would be reviewed and revised by a wider audience from the Smarter Balanced member states. The first public review provided an opportunity for a wide array of constituents to provide feedback to Smarter Balanced. The second review provided a final opportunity for member-state constituents to provide feedback. The next step is review by the Smarter Balanced Executive Team and the vote by the Governing States in mid-March to approve the initial ALDs and College Content-readiness Policy.

The following Achievement Level Descriptors were approved by state vote on March 20th 2013 and will inform Smarter Balanced in their ongoing development activities.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Operations and Algebraic Thinking				
RANGE ALD **Target A:** Represent and solve problems involving multiplication and division.	Level 1 students should be able to represent multiplication and division problems within 100 involving equal groups of objects.	Level 2 students should be able to use multiplication and division within 100 to solve one-step problems using arrays, to interpret the meaning of multiplication of two whole numbers, and to determine the unknown number in a multiplication equation relating three whole numbers.	Level 3 students should be able to select the appropriate operation (multiplication or division) within 100 to solve one-step problems involving measurement quantities of single-digit whole numbers and determine the unknown number in a division equation relating three whole numbers. They should be able to interpret the meaning of whole number quotients of whole numbers.	Level 4 students should be able to use multiplication and division within 100 to solve one-step problems involving measurement quantities.
RANGE ALD **Target B:** Understand properties of multiplication and the relationship between multiplication and division.		Level 2 students should be able to apply the commutative property of multiplication to mathematical problems with one-digit factors.	Level 3 students should be able to apply the commutative and associative properties of multiplication and the distributive property within 100. They should be able to understand the relationship between multiplication and division when solving an unknown factor problem.	Level 4 students should be able to communicate a deep understanding of the commutative and associative properties of multiplication and the relationship between multiplication and division.
RANGE ALD **Target C:** Multiply and divide within 100.	Level 1 students should be able to multiply a one-digit number by 1, 2, and 5.	Level 2 students should be able to to recall from memory all products of two one-digit numbers.	Level 3 students should be able to apply relevant strategies to fluently multiply and divide within 100 and recognize division as an unknown factor problem.	Level 4 students should be able to use relevant procedures to multiply or divide in a wide range of contexts.
RANGE ALD **Target D:** Solve problems involving the four operations and identify and explain patterns in arithmetic.	Level 1 students should be able to represent and solve one-step problems using addition and subtraction within 100 and multiplication and division within the 10 by 10 multiplication table.	Level 2 students should be able to solve two-step problems using addition and subtraction with numbers larger than 100 and solutions within 1,000; assess the reasonableness of an answer; and identify patterns in the addition table.	Level 3 students should be able to solve two-step problems using multiplication and division within the 10 by 10 multiplication table. They should be able to represent the problem using equations with a letter or symbol to represent an unknown quantity. They should also be able to explain patterns in the multiplication table.	Level 4 students should be able to use the properties of operations to explain arithmetic patterns (including patterns in the addition and multiplication tables).

THRESHOLD ALD **Operations and Algebraic Thinking Targets A, B, C, and D**		The student who just enters Level 2 should be able to: • Use multiplication and division within 100 to solve one-step mathematical problems involving arrays. • Determine the unknown number in a multiplication equation relating three whole numbers. • Apply the Commutative property of multiplication to mathematical problems with one-digit factors. • Recall from memory all products of two one-digit numbers. • Solve one- and two-step problems using all four operations with one- and two-digit numbers. • Identify patterns in the addition table.	The student who just enters Level 3 should be able to: • Select the appropriate operation to solve one-step problems involving equal groups and arrays. • Use the properties of operations to multiply within the 10 by 10 multiplication table. • Fluently multiply within 100. • Solve two-step problems using addition and subtraction with numbers larger than 100 and solutions within 1,000.	The student who just enters Level 4 should be able to: • Use multiplication and division within 100 to solve one-step problems involving measurement quantities of two- or three-digit whole numbers. • Apply strategies in multiplication. • Use relevant ideas or procedures to multiply. • Explain arithmetic patterns.
Number and Operations – Fractions				
RANGE ALD **Target F:** Develop understanding of fractions as numbers.	Level 1 students should be able to identify a fraction as a number and identify a fraction on a number line when the increments are equal to the denominator.	Level 2 students should be able to understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; recognize simple equivalent fractions; express whole numbers as fractions; and recognize that comparisons are valid only when the two fractions refer to the same whole.	Level 3 students should be able to understand a fraction a/b as the quantity formed by a parts of size $1/b$; represent a fraction on a number line with partitioning; generate simple equivalent fractions and recognize when they are equal to whole numbers; and compare two fractions with the same numerator or the same denominator by reasoning about their size.	Level 4 students should be able to explain why two fractions are equivalent and approximate the location of a fraction on a number line with no partitioning.
THRESHOLD ALD **Number and Operations – Fractions Target F**		The student who just enters Level 2 should be able to: • Identify a fraction on a number line.	The student who just enters Level 3 should be able to: • Represent a fraction on a number line with partitioning.	The student who just enters Level 4 should be able to: • Represent a fraction approximately on a number line with no partitioning.
Measurement and Data				
RANGE ALD **Target G:** Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	Level 1 students should be able to tell and write time to the nearest five-minute interval and solve addition and subtraction problems involving fifteen-minute time intervals.	Level 2 students should be able to tell and write time to the nearest minute and solve one-step addition problems involving five-minute time intervals. They should be able to measure liquid volumes using liters and masses of objects using grams and kilograms and add or subtract to solve one-step word problems involving masses or liquid volumes that are given in the same units.	Level 3 students should be able to solve one-step addition and subtraction problems involving time intervals in minutes. They should be able to multiply or divide to solve one-step problems involving masses or volumes that are given in the same units.	Level 4 students should be able to solve one-step addition or subtraction problems involving all time intervals from hours to minutes.
RANGE ALD **Target I:** Geometric measurement: understand the concepts of area and relate area to multiplication and to addition.	Level 1 students should be able to recognize area as an attribute of plane figures and recognize that a square with side lengths of one unit is called a unit square.	Level 2 students should be able to find the area of a rectilinear figure by counting unit squares.	Level 3 students should be able to find the area of a rectilinear figure by multiplying side lengths and by decomposing a rectilinear figure into non-overlapping rectangles and adding them together.	Level 4 students should be able to find the area of a rectilinear figure in a word problem.
THRESHOLD ALD **Measurement and Data Targets G and I**		The student who just enters Level 2 should be able to: • Tell and write time to the nearest minute and measure liquid volumes and masses of objects using metric units of liters, grams, and kilograms. • Count unit squares to find the area of rectilinear figures.	The student who just enters Level 3 should be able to: • Estimate liquid volumes and masses of objects using standard units of grams, kilograms, and liters. • Find the area of a rectilinear figure by multiplying side lengths and by decomposing a rectilinear figure into non-overlapping rectangles and adding them together.	The student who just enters Level 4 should be able to: • Solve one-step addition problems involving all time intervals from hours to minutes. • Find the area of a rectilinear figure in a word problem.

Concepts and Procedures: Domain #2				
Number and Operations – Base Ten				
RANGE ALD **Target E:** Use place value understanding and properties of arithmetic to perform multi-digit arithmetic.	Level 1 students should be able to add and subtract within 100, using strategies and algorithms based on place value understanding. They should be able to round two-digit whole numbers to the nearest 10.	Level 2 students should be able to add and subtract within 1,000, using strategies and algorithms based on the relationship between addition and subtraction. They should be able to round whole numbers to the nearest 100 and multiply one-digit whole numbers by multiples of 10 in the range of 10–90.	Level 3 students should be able to fluently add and subtract within 1,000, using strategies or algorithms based on place value understanding, properties of arithmetic, and/or the relationship between addition and subtraction.	Level 4 students should be able to use multiple strategies to fluently add and subtract within 1,000.
THRESHOLD ALD **Number and Operations – Base Ten Target E**		The student who just enters Level 2 should be able to: • Round whole numbers to the nearest 10 or 100.	The student who just enters Level 3 should be able to: • Fluently add within 1,000, using strategies or algorithms based on place value understanding, properties of arithmetic, and/or the relationship between addition and subtraction.	The student who just enters Level 4 should be able to: • Use multiple strategies to fluently add within 1,000.
Measurement and Data				
RANGE ALD **Target H:** Represent and interpret data.	Level 1 students should be able to draw a picture graph and a bar graph to represent a data set with up to four categories; generate measurement data by measuring length using rulers marked with one-inch intervals; and create a line plot to represent a data set where the horizontal scale is marked in whole unit intervals.	Level 2 students should be able to solve one-step "how many more?" and "how many less?" problems using information presented in picture and bar graphs; generate measurement data by measuring lengths using rulers marked with half-inch intervals; and represent measurement data on a line plot with a horizontal scale marked in half-unit intervals.	Level 3 students should be able to draw a scaled picture graph and a scaled bar graph to represent a data set; solve two-step "how many more?" and "how many less?" problems using information presented in a scaled bar graph; generate measurement data by measuring length using rulers marked with quarter-inch intervals; and create a line plot with a horizontal scale marked in quarter-unit intervals.	
RANGE ALD **Target J:** Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	Level 1 students should be able to find the perimeter of polygons when given all side lengths in problems.	Level 2 students should be able to solve for an unknown side length of a polygon when given the perimeter in problems.	Level 3 students should be able to identify rectangles with the same perimeter and different areas or with the same area and different perimeters.	
THRESHOLD ALD **Measurement and Data Targets H and J**		The student who just enters Level 2 should be able to: • Generate measurement data by measuring lengths using rulers marked with half-inch intervals. • Solve mathematical problems involving perimeters of polygons, including finding an unknown side length given the perimeter.	The student who just enters Level 3 should be able to: • Generate measurement data by measuring length using rulers marked with quarter-inch intervals and represent the data on a line plot marked with quarter-inch intervals. • Solve word problems involving perimeters of polygons.	

Geometry				
RANGE ALD **Target K:** Reason with shapes and their attributes.	Level 1 students should be able to recognize rhombuses, rectangles, and squares.	Level 2 students should be able to reason with the attributes of quadrilaterals to recognize rhombuses, rectangles, and squares as examples of quadrilaterals and reason with shapes to partition them into parts with equal areas.	Level 3 students should be able to draw examples of quadrilaterals that do not belong to given subcategories by reasoning about their attributes; partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole; and understand that shapes in different categories may share attributes and that the shared attributes can define a larger category.	
THRESHOLD ALD **Geometry Target K**		The student who just enters Level 2 should be able to: • Partition shapes into parts with equal areas.	The student who just enters Level 3 should be able to: • Draw examples of quadrilaterals that do not belong to given subcategories by reasoning about their attributes.	

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Operations and Algebraic Thinking				
RANGE ALD **Target A:** Use the four operations with whole numbers to solve problems.	Level 1 students should be able to use the four operations (add, subtract, multiply, and divide) to solve one-step problems involving equal groups and arrays.	Level 2 students should be able to use the four operations to solve one-step problems involving an unknown number. They should be able to realize that it is appropriate to multiply or divide in order to solve familiar multiplicative comparison problems.	Level 3 students should be able to use the four operations (add, subtract, multiply, and divide) to solve one-step problems involving equal groups and arrays, including problems where the remainder must be interpreted. They should be able to find an unknown number and represent problems using equations with a symbol representing the unknown quantity.	Level 4 students should be able to assess the reasonableness of answers using mental computation and estimation strategies, including rounding.
THRESHOLD ALD **Operations and Algebraic Thinking Target A**		The student who just enters Level 2 should be able to: • Add and subtract to solve one-step problems involving an unknown number.	The student who just enters Level 3 should be able to: • Multiply and divide to solve one-step problems involving equal groups or arrays.	The student who just enters Level 4 should be able to: • Assess the reasonableness of answers using mental computation and estimation strategies, including rounding.
Number and Operations – Base Ten				
RANGE ALD **Target D:** Generalize place value understanding for multi-digit whole numbers.	Level 1 students should be able to read and write multi-digit whole numbers less than or equal to 1,000 using base-ten numerals, number names, and expanded form; compare multi-digit numbers up to 1,000 using <, >, and =; and round multi-digit whole numbers up to 1,000 to any place.	Level 2 students should look for and use repeated reasoning to generalize place value understanding to be able to read and write multi-digit whole numbers less than or equal to 100,000 using base-ten numerals, number names, and expanded form; compare multi-digit numbers up to 100,000 using <, >, and =; and round multi-digit whole numbers up to 100,000 to any place.	Level 3 students should look for and use repeated reasoning to generalize place value understanding to be able to read and write multi-digit whole numbers less than or equal to 1,000,000 using base-ten numerals, number names, and expanded form; compare multi-digit numbers up to 1,000,000 using <, >, and =; round multi-digit whole numbers up to 1,000,000 to any place; and recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	.

RANGE ALD **Target E:** Use place value understanding and properties of operations to perform multi-digit arithmetic.	Level 1 students should be able to add and subtract one- and two-digit whole numbers using strategies based on place value; multiply two one-digit whole numbers based on place value and properties of operations; and find whole-number quotients with no remainders with up to two-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.	Level 2 students should be able to use place value understanding to add and subtract two- and three-digit whole numbers using a standard algorithm; multiply whole numbers up to and including four digits by one digit based on place value and properties of operations; find whole-number quotients and remainders with up to two-digit dividends and one-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division; and illustrate multiplication and division by using equations, arrays, and/or area models.	Level 3 students should be able to fluently add and subtract multi-digit whole numbers using the standard algorithm; multiply whole numbers including two digits by two digits based on place value and properties of operations; find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors using strategies based on place value understanding, the properties of operations, and/or the relationship between multiplication and division; and explain multiplication and division using equations, arrays, and/or area models.	
THRESHOLD ALD **Number and Operations – Base Ten Targets D and E**		The student who just enters Level 2 should be able to: • Look for and use repeated reasoning to generalize place value understanding in order to read and write multi-digit whole numbers less than or equal to 100,000 using base-ten numerals and number names. • Use place value understanding to add and subtract two- and three-digit whole numbers using a standard algorithm.	The student who just enters Level 3 should be able to: • Read and write multi-digit whole numbers less than or equal to 1,000,000 using base-ten numerals, number names, and expanded form. • Multiply four-digit whole numbers by a one-digit number.	
Number and Operations – Fractions				
RANGE ALD **Target F:** Extend understanding of fraction equivalence and ordering.	Level 1 students should be able to recognize that fraction comparisons are valid only when the two fractions are referring to the same whole.	Level 2 students should be able to compare two fractions with different numerators and different denominators using <, >, and = by comparing to a benchmark fraction such as 1/2 and recognize equivalent fractions using visual models.	Level 3 students should be able to extend understanding to compare two fractions with different numerators and different denominators using <, >, and = by creating common denominators or numerators and recognize and generate equivalent fractions using visual models.	Level 4 students should be able to extend understanding to compare two fractions with different numerators and different denominators using <, >, and = and justify the conclusions using a visual fraction model.
RANGE ALD **Target G:** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.	Level 1 students should be able to understand that a fraction a/b with $a > 1$ is the sum of its unit fractional parts by extending previous understandings of addition on whole numbers. They should be able to identify fractions using visual models.	Level 2 students should be able to understand that a fraction a/b is a multiple of $1/b$ by extending previous understanding of multiplication on whole numbers; solve one-step problems involving addition and subtraction of fractions referring to the same whole with like denominators; and use visual fraction models and/or equations to represent the problem.	Level 3 students should be able to identify and generate equivalent forms of a fraction including mixed numbers with like denominators and solve one-step problems involving multiplication of a fraction by a whole number.	
RANGE ALD **Target H:** Understand decimal notation for fractions, and compare decimal fractions.		Level 2 students should be able to express a fraction with denominator 10 as an equivalent fraction with denominator 100 and express those fractions as decimals.	Level 3 students should be able to add two fractions with respective denominators 10 and 100 by first converting to two fractions with like denominators; compare two decimals to the hundredths using >, <, =, or on a number line; and compare decimals by reasoning about their size.	Level 4 students should be able to compare two decimals to the hundredths using <, >, and = and justify the conclusions by using visual models.

THRESHOLD ALD **Number and Operations – Fractions Targets F, G, and H**		The student who just enters Level 2 should be able to: • Recognize equivalent fractions using visual models. • Use visual fraction models to represent a problem. • Express a fraction with denominator 10 as an equivalent fraction with denominator 100.	The student who just enters Level 3 should be able to: • Generate equivalent fractions using visual models. • Identify and generate equivalent forms of a fraction with like denominators. • Add two fractions with respective denominators 10 and 100.	The student who just enters Level 4 should be able to: • Compare two fractions with different numerators and different denominators using <, >, and =. • Compare two decimals to the hundredths using <, >, and = or a number line and justify the conclusions by using visual models.
Concepts and Procedures: Domain #2				
Operations and Algebraic Thinking				
RANGE ALD **Target B:** Gain familiarity with factors and multiples.	Level 1 students should be able to recognize that a whole number is a multiple of each of its factors.	Level 2 students should be able to find factor pairs for whole numbers in the range of 1–100 that are multiples of 2 or 5 and determine whether a given whole number in the range of 1–100 is a multiple of a given one-digit number.	Level 3 students should be able to find all factor pairs for whole numbers in the range of 1–100 and determine whether a given whole number in the range of 1–100 is prime or composite.	
RANGE ALD **Target C:** Generate and analyze patterns.	Level 1 students should be able to extend a number or shape pattern that follows a given rule.	Level 2 students should be able to generate a number or shape pattern that follows a given rule.	Level 3 students should be able to analyze a pattern for apparent features that are not explicit in the rule itself.	
THRESHOLD ALD **Operations and Algebraic Thinking Targets B and C**		The student who just enters Level 2 should be able to: • Determine whether a given whole number in the range of 1–100 is a multiple of a given one-digit number. • Generate a shape pattern that follows a given rule.	The student who just enters Level 3 should be able to: • Find factor pairs for whole numbers in the range of 1–100. • Identify apparent features of a pattern in a problem with scaffolding.	
Measurement and Data				
RANGE ALD **Target I:** Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	Level 1 students should be able to know relative sizes of measurement units within one system of units, including km, m, cm; kg, g; lb, oz; l, ml; and hr, min, sec.	Level 2 students should be able to express measurements in a larger unit in terms of a smaller unit within a single system of measurement, record measurement equivalents in a two-column table, and apply the perimeter formula to rectangles in mathematical problems.	Level 3 students should be able to use the four operations to solve problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit; represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale; and apply the area formula to rectangles in mathematical problems.	Level 4 students should be able to apply the perimeter and area formulas to rectangles in word problems.
RANGE ALD **Target J:** Represent and interpret data.	Level 1 students should be able to identify data from a given line plot using whole numbers.	Level 2 students should be able to use data from a given line plot using fractions 1/2, 1/4, and 1/8 to solve one-step problems.	Level 3 students should be able to create a line plot to represent a data set using fractions 1/2, 1/4, and 1/8 and interpret data from a line plot to solve problems involving addition and subtraction of fractions with like denominators.	

RANGE ALD **Target K:** Geometric measurement: understand concepts of angles and measure angles.		Level 2 students should be able to recognize whole-number degrees on a protractor and measure angles in whole-number degrees using a protractor.	Level 3 students should be able to construct angles in whole-number degrees using a protractor, use understanding of angle concepts to decompose a larger angle with two or more smaller angles that have the same sum as the original, and determine an unknown angle measure in a diagram.	Level 4 students should be able to solve addition and subtraction problems to find unknown angles on a diagram in problems by using an equation with a symbol for the unknown angle measure.
THRESHOLD ALD **Measurement and Data** **Targets I, J, and K**		The student who just enters Level 2 should be able to: • Apply the perimeter formula to rectangles in mathematical problems. • Use data from a given line plot using fractions 1/2, 1/4, and 1/8 to solve one-step problems. • Recognize whole-number degrees on a protractor.	The student who just enters Level 3 should be able to: • Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. • Interpret data from a line plot to solve problems involving addition of fractions with like denominators by using information presented in line plots. • Construct angles between 0 and 180 degrees in whole-number degrees using a protractor.	The student who just enters Level 4 should be able to: • Apply the perimeter formula to rectangles in real-world problems. • Solve addition problems to find unknown angles on a diagram in mathematical problems.
Geometry				
RANGE ALD **Target L:** Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	Level 1 students should be able to draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines; recognize a line of symmetry for a familiar two-dimensional figure; and identify right triangles.	Level 2 students should be able to identify points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines in two-dimensional figures and recognize all lines of symmetry in unfamiliar two-dimensional figures.	Level 3 students should be able to draw lines of symmetry for two-dimensional figures, classify two-dimensional figures based on parallel or perpendicular lines or angles of specified lines, and recognize right triangles as a category.	
THRESHOLD ALD **Geometry Target L**		The student who just enters Level 2 should be able to: • Identify points, lines, line segments, and rays.	The student who just enters Level 3 should be able to: • Draw lines of symmetry for two-dimensional figures.	

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Number and Operations – Base Ten				
RANGE ALD **Target C:** Understand the place-value system.	Level 1 students should be able to read and write decimals to the thousandths using base-ten numerals, number names, and expanded form and round decimals to the hundredths.	Level 2 students should be able to use repeated reasoning to understand that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. They should be able to explain patterns in numbers of zeros and/or placement of a decimal point when a number is multiplied or divided by 10.	Level 3 students should be able to use whole number exponents to denote powers of 10; use repeated reasoning to understand and explain patterns in numbers of zeros and/or placement of a decimal point when a number is multiplied or divided by powers of 10; read, write, and compare two decimals to the thousandths using base-ten numerals, number names, and expanded form, using >, =, and < to record the results of the comparison; and round decimals to any place.	Level 4 students should be able to combine multiplying by powers of 10, comparing, and rounding to highlight essential understandings.
RANGE ALD **Target D:** Perform operations with multi-digit whole numbers and with decimals to the hundredths.	Level 1 students should be able to multiply one- and two-digit whole numbers and find whole number quotients of whole numbers with up to three-digit dividends and one-digit divisors, using arrays or area models. They should be able to perform the four operations on decimals to the tenths and a whole number, e.g., 1.3 X 7.	Level 2 students should be able to multiply three- and four-digit whole numbers; find whole number quotients of whole numbers with up to three-digit dividends and two-digit divisors; and perform the four operations on decimals to the tenths or on decimals to the hundredths and a whole number, e.g., 3.42 x 12.	Level 3 students should be able to fluently multiply multi-digit whole numbers using the standard algorithm, find whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors, and perform the four operations on decimals to the hundredths. They should be able to relate the strategy to a written method and explain the reasoning used.	
THRESHOLD ALD **Number and Operations – Base Ten Targets C and D**		The student who just enters Level 2 should be able to: • Understand that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right. • Demonstrate accuracy in multiplying multi-digit whole numbers and in finding whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors.	The student who just enters Level 3 should be able to: • Use whole number exponents to denote powers of 10; round decimals to the thousandths; and read, write, and compare decimals to the thousandths using base-ten numerals, number names, and expanded form, using >, =, and < to record the results of the comparison. • Fluently multiply multi-digit whole numbers and find whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors. • Perform the four operations on decimals to the	The student who just enters Level 4 should be able to: • Combine multiplying by powers of 10, comparing, and rounding to highlight essential understandings.

			hundredths. • Relate a strategy to a written method and explain the reasoning used.	
Number and Operations – Fractions				
RANGE ALD **Target E:** Use equivalent fractions as a strategy to add and subtract fractions.	Level 1 students should be able to add two fractions and mixed numbers with unlike denominators and subtract two fractions with unlike denominators when one denominator is a factor of the other in mathematical problems (denominators < 12). They should be able to use benchmark fractions (1/4s and 1/2s) and number sense with fractions to estimate mentally and assess the reasonableness of answers.	Level 2 students should be able to add fractions and mixed numbers with unlike denominators (denominators ≤ 12) in mathematical problems, subtract a mixed number from a whole number (denominators up to 4), and use benchmark fractions to estimate mentally and assess the reasonableness of answers (denominators ≤ 12).	Level 3 students should be able to add and subtract fractions and mixed numbers with unlike denominators in word problems and use number sense of fractions to estimate mentally and assess the reasonableness of answers.	
RANGE ALD **Target F:** Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	Level 1 students should be able to apply their previous understandings of multiplication to multiply a fraction by a fraction; know the effect that whole number multiplication has on fractions; use or create visual models when multiplying a whole number by a fraction between 0 and 1; and interpret and perform division of a whole number by 1/2 or 1/3.	Level 2 students should be able to multiply a whole number by a mixed number; know the effect that a fraction greater than or less than 1 has on a whole number when multiplied; use or create visual models when multiplying two fractions between 0 and 1; extend their previous understandings of division to divide a unit fraction by a whole number; and understand that division of whole numbers can result in fractions.	Level 3 students should be able to multiply a mixed number by a mixed number; know the effect that a fraction has on another fraction when multiplied (proper and improper fractions); use or create visual models when multiplying two fractions, including when one fraction is larger than 1; and interpret and perform division of any unit fraction by a whole number.	Level 4 students should be able to understand and use the fact that a fraction multiplied by 1 in the form of *a/a* is equivalent to the original fraction.
THRESHOLD ALD **Number and Operations – Fractions Targets E and F**		The student who just enters Level 2 should be able to: • Add two fractions and/or mixed numbers with unlike denominators (denominators less than or equal to 6) in mathematical problems. • Use benchmark fractions to estimate and assess the reasonableness of answers (denominators less than or equal to 6). • Multiply a whole number by a mixed number. • Know the effect that a fraction greater than or less than 1 has on a whole number when multiplied. • Use visual models when multiplying two fractions between 0 and 1. • Perform division of a whole number by any unit fraction. • Understand that division of whole numbers can result in fractions.	The student who just enters Level 3 should be able to: • Subtract fractions and mixed numbers with unlike denominators in word problems. • Use benchmark fractions and number sense of fractions to estimate and assess the reasonableness of answers. • Multiply a mixed number by a mixed number. • Use visual models when multiplying two fractions, including when one fraction is larger than 1. • Interpret division of a whole number by any unit fraction.	The student who just enters Level 4 should be able to: • Use or create visual models when multiplying two fractions that are larger than 1.

Measurement and Data				
RANGE ALD **Target I:** Geometric measurement: understand concepts of volume and relate volume to multiplication and addition.	Level 1 students should be able to use unit cubes to find the volume of rectangular prisms with whole number edge lengths.	Level 2 students should be able to understand the concept that the volume of a rectangular prism packed with unit cubes is related to the edge lengths.	Level 3 students should be able to use the formulas $V = lwh$ and $V = Bh$ to find the volume of rectangular prisms. They should be able to find the volume of two nonoverlapping right rectangular prisms.	Level 4 students should be able to find the volume of a right rectangular prism after doubling the edge length of a side and compare it to the original.
THRESHOLD ALD **Measurement and Data Target I**		The student who just enters Level 2 should be able to: • Understand the concept that the volume of a rectangular prism packed with unit cubes is related to the edge lengths.	The student who just enters Level 3 should be able to: • Use $V = lwh$ and $V = Bh$ to find the volume of rectangular prisms.	The student who just enters Level 4 should be able to: • Find the volume of a right rectangular prism after doubling the edge length of a side with a whole number measurement and compare it to the original.
Concepts and Procedures: Domain #2				
Operations and Algebraic Thinking				
RANGE ALD **Target A:** Write and interpret numerical expressions.	Level 1 students should be able to evaluate numerical expressions that have either parentheses, brackets, or braces.	Level 2 students should be able to write and evaluate numerical expressions having two non-nested sets of parentheses, brackets, or braces.	Level 3 students should be able to write, evaluate, and interpret numerical expressions having any number of non-nested sets of parentheses, brackets, or braces.	
RANGE ALD **Target B:** Analyze patterns and relationships.	Level 1 students should be able to generate two numerical patterns using two given rules involving addition, subtraction, or multiplication.	Level 2 students should be able to generate two numerical patterns using two given rules involving all operations. When working with two whole number numerical patterns, they should be able to graph the corresponding whole number ordered pairs on the coordinate plane.	Level 3 students should be able to compare and analyze two related numerical patterns and explain the relationship within sequences of ordered pairs, and they should be able to graph the ordered pairs on the coordinate plane.	Level 4 students should be able to compare two related numerical patterns and explain the relationship within sequences of ordered pairs that are rational numbers.
THRESHOLD ALD **Operations and Algebraic Thinking Targets A and B**		The student who just enters Level 2 should be able to: • Write numerical expressions having one set of parentheses, brackets, or braces. • Graph whole number ordered pairs from two whole number numerical patterns on a coordinate plane.	The student who just enters Level 3 should be able to: • Write and interpret expressions with two different operations. • Compare two related numerical patterns within sequences and tables.	The student who just enters Level 4 should be able to: • Compare two related numerical patterns and explain the relationship within sequences of ordered pairs that are rational numbers.
Measurement and Data				
RANGE ALD **Target G:** Convert like measurement units within a given measurement system.	Level 1 students should be able to convert a whole number metric measurement to a different metric measurement resulting in a whole number and convert a whole number customary measurement to a different customary measurement resulting in a whole number.	Level 2 students should be able to convert a metric measurement to the tenths place to a different metric measurement and convert a standard measurement given to the 1/4 unit (fractions/mixed numbers) from a larger measurement unit to a smaller one.	Level 3 students should be able to convert like measurements within a system using whole numbers, fractions (standard system), and decimals (metric system).	
RANGE ALD **Target H:** Represent and interpret data.	Level 1 students should be able to make a line plot and represent data sets in whole units.	Level 2 students should be able to make a line plot and display data sets in fractions of a unit (1/2, 1/4, 1/8).	Level 3 students should be able to interpret a line plot to display data sets in fractions of a unit (1/2, 1/4, 1/8) and solve problems using information from line plots that require addition, subtraction, and multiplication of fractions.	

THRESHOLD ALD **Measurement and Data Targets G and H**		The student who just enters Level 2 should be able to: • Convert a whole number measurement to a decimal or fractional valued measurement within the same system(e.g., 30 in = ___ ft). • Make a line plot and display data sets in whole and half units.	The student who just enters Level 3 should be able to: • Convert from a smaller unit of measurement to a larger one, resulting in one decimal place (metric system) or a small denominator fraction (standard system). • Make a line plot to display data sets in fractions of a unit (1/2, 1/4, 1/8). • Solve one-step problems using information from line plots that require addition, subtraction, and multiplication of fractions.	
Geometry				
RANGE ALD **Target J:** Graph points on the coordinate plane to solve real-world and mathematical problems.	Level 1 students should be able to graph whole number coordinate pairs in the first quadrant of a coordinate plane with unit axis increments.	Level 2 students should be able to graph whole number coordinate pairs on a coordinate plane with whole number axis increments to solve problems.	Level 3 students should be able to graph coordinate pairs where one term is a whole number and one is a fraction on a coordinate plane with whole number axis increments.	Level 4 students should be able to graph coordinate pairs where both terms are fractions on a coordinate plane with fractional axis increments.
RANGE ALD **Target K:** Classify two-dimensional figures into categories based on their properties.		Level 2 students should be able to classify two-dimensional figures into categories by their attributes or properties.	Level 3 students should be able to classify two-dimensional figures into subcategories by their attributes or properties.	
THRESHOLD ALD **Geometry Targets J and K**		The student who just enters Level 2 should be able to: • Graph whole number coordinate pairs on a coordinate plane with whole number increments of 2, 5, and 10. • Classify two-dimensional figures into categories by their attributes or properties.	The student who just enters Level 3 should be able to: • Graph coordinate pairs where one term is a whole number and one is a fraction with a denominator of 2 or 4 on a coordinate plane with whole number axis increments. • Classify two-dimensional figures into subcategories by their attributes or properties.	The student who just enters Level 4 should be able to: • Graph coordinate pairs where one term is a whole number and one is a fraction on a coordinate plane with fractional axis increments of 1/2, 1/4, or 1/10.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 2: Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies. *CLAIM 4: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.*	*CONTENT ALD: The Level 1 student can make sense of and solve simple and familiar well-posed problems in pure and applied mathematics with a high degree of scaffolding, making minimal use of basic problem-solving strategies and given tools.* *The Level 1 student can identify familiar real-world scenarios for analysis and can use simple mathematical models and given tools to solve basic problems.*	*CONTENT ALD: The Level 2 student can make sense of and solve familiar well-posed problems in pure and applied mathematics with a moderate degree of scaffolding, making partial use of knowledge, basic problem-solving strategies, and tools.* *The Level 2 student can reason quantitatively to analyze familiar real-world scenarios and can use mathematical models and given tools to partially interpret and solve basic problems.*	*CONTENT ALD: The Level 3 student can make sense of and persevere in solving a range of unfamiliar well-posed problems in pure and applied mathematics with a limited degree of scaffolding, making adequate use of knowledge and appropriate problem-solving strategies and strategic use of appropriate tools.* *The Level 3 student can reason abstractly and quantitatively to analyze complex, real-world scenarios and to construct and use mathematical models and appropriate tools strategically to adequately interpret and solve problems.*	*CONTENT ALD: The Level 4 student can make sense of and persevere in solving a range of complex and unfamiliar well-posed problems in pure and applied mathematics with no scaffolding, making thorough use of knowledge and problem-solving strategies and strategic use of appropriate tools.* *The Level 4 student can reason abstractly and quantitatively to analyze unfamiliar complex, real-world scenarios, to construct and use complex mathematical models and appropriate tools strategically to thoroughly interpret and solve problems, and to synthesize results.*
Problem Solving & Modeling and Data Analysis				
CLAIM 2 RANGE ALD **Target A:** Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. **CLAIM 2 RANGE ALD** **Target B:** Select and use appropriate tools strategically. **CLAIM 2 RANGE ALD** **Target C:** Interpret results in the context of a situation. **CLAIM 2 RANGE ALD** **Target D:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).	Level 1 students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.	Level 2 students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.	Level 3 students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.	Level 4 students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

CLAIM 4 RANGE ALD **Target A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. **CLAIM 4 RANGE ALD** **Target B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. **CLAIM 4 RANGE ALD** **Target C:** State logical assumptions being used. **CLAIM 4 RANGE ALD** **Target D:** Interpret results in the context of a situation. **CLAIM 4 RANGE ALD** **Target E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **CLAIM 4 RANGE ALD** **Target F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). **CLAIM 4 RANGE ALD** **Target G:** Identify, analyze, and synthesize relevant external resources to pose or solve problems.	Level 1 students should be able to apply mathematics to solve familiar problems arising in everyday life, society, and the workplace by identifying important quantities and by beginning to develop a model.	Level 2 students should be able to apply mathematics to propose solutions by identifying important quantities, locating missing information from relevant external resources, beginning to construct chains of reasoning to connect with a model, producing partial justification and interpretations, and beginning to state logical assumptions.	Level 3 students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.	Level 4 students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.
THRESHOLD ALD **Claims 2 and 4**		The student who just enters Level 2 should be able to: • Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy. • Use the necessary elements given in a problem situation to solve a problem. • Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources.	The student who just enters Level 3 should be able to: • Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace. • Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions.	The student who just enters Level 4 should be able to: • Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity. • Begin to solve problems optimally. • Construct multiple plausible solutions and approaches.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 3: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	*CONTENT ALD: The Level 1 student can construct simple viable arguments with minimal clarity and precision to support his or her own reasoning in familiar contexts.*	*CONTENT ALD: The Level 2 student can construct viable arguments with partial clarity and precision to support his or her own reasoning and to partially critique the reasoning of others in familiar contexts.*	*CONTENT ALD: The Level 3 student can construct viable arguments with adequate clarity and precision to support his or her own reasoning and to critique the reasoning of others.*	*CONTENT ALD: The Level 4 student can construct viable arguments with thorough clarity and precision in unfamiliar contexts to support his or her own reasoning and to critique the reasoning of others.*
Communicating Reasoning				
CLAIM 3 RANGE ALD **Target A:** Test propositions or conjectures with specific examples.	Level 1 students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.	Level 2 students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.	Level 3 students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.	Level 4 students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.
CLAIM 3 RANGE ALD **Target B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.				
CLAIM 3 RANGE ALD **Target C:** State logical assumptions being used.				
CLAIM 3 RANGE ALD **Target D:** Use the technique of breaking an argument into cases.				
CLAIM 3 RANGE ALD **Target E:** Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is.				
CLAIM 3 RANGE ALD **Target F:** Base arguments on concrete referents such as objects, drawings, diagrams, and actions.				

CLAIM 3 RANGE ALD **Target G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)				
THRESHOLD ALD **Claim 3**		The student who just enters Level 2 should be able to: • Find and identify the flaw in an argument.	The student who just enters Level 3 should be able to: • Use stated assumptions, definitions, and previously established results and examples to identify and repair a flawed argument. • Use previous information to support his or her own reasoning on a routine problem.	The student who just enters Level 4 should be able to: • Begin to construct chains of logic about abstract concepts autonomously.

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CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Ratios and Proportional Relationships				
RANGE ALD **Target A:** Understand ratio concepts and use ratio reasoning to solve problems.	Level 1 students should be able to describe a ratio relationship between two whole number quantities, find missing values in tables that display a proportional relationship, and plot the pairs of values from a table on the coordinate plane. They should be able to find a percent as a rate per hundred and convert measurement units.	Level 2 students should be able to understand the concept of unit rate in straightforward, well-posed problems and solve straightforward, well-posed, one-step problems requiring ratio reasoning.	Level 3 students should be able to use ratio reasoning to solve and understand the concept of unit rates in unfamiliar or multi-step problems, including instances of unit pricing and constant speed, and solve percent problems by finding the whole, given a part and the percent. They should be able to describe a ratio relationship between any two number quantities (denominators less than or equal to 12).	Level 4 students should be able to solve unfamiliar or multi-step problems by finding the whole, given a part and the percent; explain ratio relationships between any two number quantities; and identify relationships between models or representations.
THRESHOLD ALD **Ratios and Proportional Relationships Target A**		The student who just enters Level 2 should be able to: • Find unit rates given two whole number quantities where one evenly divides the other.	The student who just enters Level 3 should be able to: • Solve unit rate problems. • Solve percent problems by finding the whole, given a part and the percent. • Describe a ratio relationship between any two number quantities and understand the concept of unit rate in problems (denominators less than or equal to 12).	The student who just enters Level 4 should be able to: • Solve unfamiliar or multi-step problems by finding the whole, given a part and the percent. • Understand and explain ratio relationships between any two number quantities. • Identify relationships between models or representations.

The Number System				
RANGE ALD **Target B:** Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	Level 1 students should be able to apply and extend previous understandings of multiplication and division to multiply a fraction by a fraction, divide a fraction by a whole number, and be able to connect to a visual model. They should understand the effect that a fraction greater than or less than 1 has on a whole number when multiplied and use or create visual models when multiplying a whole number by a fraction between 0 and 1.	Level 2 students should be able to apply and extend previous understandings of multiplication and division to divide a whole number by a fraction between 0 and 1, divide a mixed number by a whole number, and be able to connect to a visual model.	Level 3 students should be able to apply and extend previous understandings of multiplication and division to divide a fraction by a fraction and be able to connect to a visual model.	Level 4 students should be able to use visual models in settings where smaller fractions are divided by larger fractions. They should also understand and apply the fact that a fraction multiplied or divided by 1 in the form of *a/a* is equivalent to the original fraction.
RANGE ALD **Target C:** Compute fluently with multi-digit numbers and find common factors and multiples.	Level 1 students should be able to add, subtract, and multiply multi-digit whole numbers and decimals to hundredths. They should be able to use the distributive property to express the sum of two whole numbers with a common factor.	Level 2 students should be able to divide multi-digit whole numbers and add and subtract multi-digit decimal numbers. They should be able to find common factors of two numbers less than or equal to 100 and multiples of two numbers less than or equal to 12.	Level 3 students should be able to fluently divide multi-digit numbers and add, subtract, multiply, and divide multi-digit decimal numbers. They should be able to find the greatest common factor of two numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.	Level 4 students should be able to make generalizations regarding multiples and factors of sets of numbers (e.g., state that a particular set of numbers is relatively prime).
THRESHOLD ALD **The Number System Targets B and C**		The student who just enters Level 2 should be able to: • Divide a whole number by a fraction between 0 and 1 and be able to connect to a visual model. • Add and subtract multi-digit decimals. • Find common factors of two numbers less than or equal to 40. • Find multiples of two numbers less than or equal to 12.	The student who just enters Level 3 should be able to: • Apply and extend previous understandings of multiplication and division to divide a mixed number by a fraction and be able to connect to a visual model. • Multiply and divide multi-digit decimal numbers. • Find the greatest common factor of two numbers less than or equal to 100 and the least common multiple of two numbers less than or equal to 12.	The student who just enters Level 4 should be able to: • Use visual models in settings where smaller fractions are divided by larger fractions. • Understand and apply the fact that a fraction multiplied or divided by 1 in the form of *a/a* is equivalent to the original fraction.
Expressions and Equations				
RANGE ALD **Target E:** Apply and extend previous understandings of arithmetic to algebraic expressions.	Level 1 students should be able to evaluate numerical expressions without exponents; write one- or two-step numerical expressions; and identify parts of an expression, using terms (e.g., coefficient, term, sum, product, difference, quotient, factor).	Level 2 students should be able to evaluate numerical expressions with nonnegative integer exponents that do not need to be distributed across a set of parentheses. They should be able to apply and extend previous understandings of arithmetic to evaluate expressions with variables that do not contain exponents. They should also be able to write one- and two-step algebraic expressions that introduce a variable and identify equivalent expressions.	Level 3 students should be able to write and evaluate numerical expressions with nonnegative integer exponents and expressions from formulas in real-world problems, and they should be able to apply and extend previous understandings of arithmetic to evaluate expressions with variables that include nonnegative integer exponents. They should be able to apply properties of operations to generate equivalent expressions.	Level 4 students should be able to apply the understanding of the properties of operations and use the properties to show why two expressions are equivalent.
RANGE ALD **Target F:** Reason about and solve one-variable equations and inequalities.	Level 1 students should be able to use substitution to determine when a given number makes an equation or inequality true.	Level 2 students should be able to solve one-variable equations and inequalities of the form $x + p$ =/≤/≥/</> q or px =/≤/≥/</> q, where p and q are nonnegative rational numbers. They should be able to identify and use variables when writing equations.	Level 3 students should be able to write one-variable equations and inequalities of the form $x + p$ =/≤/≥/</> q or px =/≤/≥/</> q, where p and q are nonnegative rational numbers. They should be able to reason about and solve equations and inequalities by writing and graphing their solutions on a number line.	Level 4 students should be able to solve equations and inequalities of the form $x + p$ =/≤/≥/</> q or px =/≤/≥/</> q, where p and q are rational numbers. They should be able to write and graph solutions on the number line.

RANGE ALD **Target G:** Represent and analyze quantitative relationships between dependent and independent variables.	Level 1 students should be able to identify a table that represents a relationship between two variables of the forms $y = kx$ and $y = x \pm c$ with rational numbers and plot points corresponding to equations on coordinate planes.	Level 2 students should be able to use variables to represent and analyze two quantities that change in relationship to each other of the form $y = kx$ or $y = x \pm c$ with rational numbers; identify and create an equation that expresses one quantity in terms of another; and use graphs and tables to represent the relationship.	Level 3 students should be able to use graphs, tables, or context to analyze the relationship between dependent and independent variables and relate them to a linear equation.	Level 4 students should be able to use graphs, tables, or context to analyze nonlinear polynomial relationships between dependent and independent variables and relate them to nonlinear polynomial equations.
THRESHOLD ALD **Expressions and Equations** **Targets E, F, and G**		The student who just enters Level 2 should be able to: • Evaluate expressions with and without variables and without exponents. • Write one- and two-step algebraic expressions introducing a variable. • Solve one-variable equations and inequalities of the form $x + p = / \leq / \geq / < / > q$ or $px = / \leq / \geq / < / > q$, where p and q are nonnegative rational numbers. • Given a table of values for a linear relationship ($y = kx$ or $y = x \pm c$), create the equation.	The student who just enters Level 3 should be able to: • Write and evaluate numerical expressions without exponents and expressions from formulas in real-world problems. • Identify equivalent expressions. • Write one-variable equations and inequalities of the form $x + p = / \leq / \geq / < / > q$ or $px = / \leq / \geq / < / > q$, where p and q are nonnegative rational numbers. • Graph solutions to equations and inequalities on the number line. • Create the graph, table, and equation for a linear relationship ($y = kx$ or $y = x \pm c$) and make connections between the representations.	The student who just enters Level 4 should be able to: • Using the properties of operations, show why two expressions are equivalent. • Solve equations and inequalities of the form $x + p = / \leq / \geq / < / > q$ or $px = / \leq / \geq / < / > q$, where p and q are rational numbers. • Create the graph, table, and equation for nonlinear polynomial relationships, making connections between the representations.
Concepts and Procedures: Domain #2				
The Number System				
RANGE ALD **Target D:** Apply and extend previous understandings of numbers to the system of rational numbers.	Level 1 students should be able to place all integers on a number line and integer pairs on a coordinate plane with one-unit increments on both axes.	Level 2 students should be able to apply and extend previous understandings of whole numbers to order rational numbers and interpret statements of their order in the context of a situation. They should be able to place all rational numbers on a number line and integer pairs on a coordinate plane with various axis increments. They should be able to relate changes in sign to placements on opposite sides of the number line and understand the absolute value of a number as its distance from zero on a number line.	Level 3 students should be able to apply and extend previous understandings of numbers to relate statements of inequality to relative positions on a number line, place points with rational coordinates on a coordinate plane, and solve problems involving the distance between points when they share a coordinate. They should be able to understand absolute value and ordering by using number lines and models and relate reflection across axes to changes in sign.	
THRESHOLD ALD **The Number System Target D**		The student who just enters Level 2 should be able to: • Order fractions and integers. • Place integer pairs on a coordinate plane with axis increments of 2, 5, or 10.	The student who just enters Level 3 should be able to: • Place points with rational coordinates on a coordinate plane and combine absolute value and ordering, with or without models ($\lvert -3 \rvert < \lvert -5 \rvert$).	
Geometry				
RANGE ALD **Target H:** Solve real-world and mathematical problems involving area, surface area, and volume.	Level 1 students should be able to find areas of right triangles; draw polygons with positive coordinates on a grid with a scale in one-unit increments, given nonnegative integer-valued coordinates for the vertices; and find the volume of right rectangular prisms with one side expressed as a fraction or a mixed number in halves or fourths.	Level 2 students should be able to find areas of special quadrilaterals and triangles; draw polygons in the four-quadrant coordinate plane with scales in one-unit increments, given integer-valued coordinates for the vertices; and find the volume of right rectangular prisms with one side expressed as a fraction or a mixed number.	Level 3 students should be able to solve problems that involve finding areas of polygons and special quadrilaterals and triangles and find the volume of right rectangular prisms with all sides expressed as a fraction or a mixed number. They should be able to solve problems by drawing polygons in the four-quadrant coordinate plane with scales in various integer increments, given integer-valued coordinates for the vertices or coordinates containing a mix of integers and half, quarter, or tenth units.	Level 4 students should be able to solve problems by finding surface areas of three-dimensional shapes composed of rectangles and triangles. They should be able to find the volume of a compound figure composed of right rectangular prisms to solve problems.

THRESHOLD ALD **Geometry Target H**		The student who just enters Level 2 should be able to: • Find areas of special quadrilaterals and triangles. • Draw polygons in the four-quadrant plane.	The student who just enters Level 3 should be able to: • Find areas of quadrilaterals and other polygons that can be decomposed into three or fewer triangles. • Find the volume of right rectangular prisms with fractional or mixed number side lengths.	The student who just enters Level 4 should be able to: • Solve problems by finding surface areas of triangular or rectangular prisms and triangular or rectangular pyramids.
Statistics and Probability				
RANGE ALD **Target I:** Develop understanding of statistical variability.	Level 1 students should be able to identify questions that lead to variable responses posed in familiar contexts and recognize that such questions are statistical questions.	Level 2 students should be able to recognize that questions that lead to variable responses are statistical questions and vice versa, and they should relate the concept of varying responses to the notion of a range of possible responses. They should develop an understanding that the responses to a statistical question will have a representative center and a given set of numerical data. They should be able to identify a reasonable measure of central tendency with respect to a familiar context.	Level 3 students should be able to pose statistical questions and understand that the responses to a statistical question have a distribution described by its center, spread, and overall shape. They should also understand that a measure of center summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. They should be able to identify a reasonable center and spread with respect to a context.	Level 4 students should be able to justify the reasonableness of their identified center and spread with respect to an unfamiliar context. They should be able to create or complete a data set with given measures (e.g., mean, median, mode, interquartile range).
RANGE ALD **Target J:** Summarize and describe distributions.	Level 1 students should be able to summarize or display numerical data on a number line, in dot plots, and in histograms; find the median of an odd number of data points; and find the mean when data points are nonnegative integers.	Level 2 students should be able to calculate mean and median, understand that mean and median can be different or the same, and use the measure of center to summarize data with respect to the context.	Level 3 students should be able to summarize or display data in box plots and find the interquartile range. They should be able to use the interquartile range along with the angle and measures of center to describe overall patterns in a data distribution, such as symmetry and clusters, and any striking deviations. They should also be able to examine a data set in context and explain the choice of the mean or median, as it relates to the data.	Level 4 students should be able to relate choice of measures of center and variability to the shape of the data distribution in context of the data; find mean absolute deviation and identify outliers with reference to the context of the situation; and predict effects on the mean and median, given a change in data points.
THRESHOLD ALD **Statistics and Probability Targets I and J**		The student who just enters Level 2 should be able to: • Understand that questions that lead to variable responses are statistical questions and vice versa. • Identify a reasonable measure of central tendency for a given set of numerical data. • Find mean and median.	The student who just enters Level 3 should be able to: • Identify a reasonable center and spread for a given context and understand how this relates to the overall shape of the data distribution. • Understand that a measure of center summarizes all of its values with a single number. • Summarize or display data in box plots. • Find the interquartile range. • Use range and measures of center to describe the shape of the data distribution as it relates to a familiar context. • Pose statistical questions.	The student who just enters Level 4 should be able to: • Predict effects on mean and median given a change in data points. • Complete a data set with given measures (e.g., mean, median, mode, interquartile range).

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Ratios and Proportional Relationships				
RANGE ALD **Target A:** Analyze proportional relationships and use them to solve real-world and mathematical problems.	Level 1 students should be able to identify proportional relationships presented in graphical, tabular, or verbal formats in familiar contexts.	Level 2 students should be able to find whole number proportionality constants in relationships presented in graphical, tabular, or verbal formats in familiar contexts. They should also be able to identify proportional relationships presented in equation formats and find unit rates involving whole numbers.	Level 3 students should be able to identify, represent, and analyze proportional relationships in various formats; find unit rates associated with ratios of fractions; and use unit rates to solve one-step problems involving rational numbers. They should be able to analyze a graph of a proportional relationship in order to explain what the points (x, y) and (1, r) represent, where r is the unit rate, and use this information to solve problems.	Level 4 students should be able to solve real-world problems involving proportional relationships and measurement conversions in various formats (e.g., verbally, tabularly, graphically) in a contextual scenario that involves identifying relationships between elements presented in various formats.
THRESHOLD ALD **Ratios and Proportional Relationships Target A**		The student who just enters Level 2 should be able to: • Identify proportional relationships presented in equation formats and find unit rates involving whole numbers.	The student who just enters Level 3 should be able to: • Represent proportional relationships in graphs and tables and solve one-step rate-related problems.	The student who just enters Level 4 should be able to: • Solve real-world problems involving proportional relationships that require one step with measurement conversions.
The Number System				
RANGE ALD **Target B:** Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	Level 1 students should be able to add, subtract, multiply, and divide nonnegative rational numbers. They should be able to add, subtract, multiply, and divide rational numbers with a number line or other manipulative.	Level 2 students should be able to apply and extend previous understandings and properties of addition and subtraction to add and subtract with rational numbers; identify the absolute value of a rational number and understand when opposites combine to make 0; and convert between familiar fractions and decimals.	Level 3 students should be able to solve mathematical problems using the four operations on rational numbers and convert from a fraction to a decimal. They should be able to extend previous understandings of subtraction to realize it is the same as adding the additive inverse. They should also be able to understand $p + q$ as a number located $\|q\|$ units from p on a number line in either direction depending on the sign of q. They should also know, understand, and use the rules for multiplying and dividing signed numbers.	Level 4 students should be able to apply previous understandings of operations to solve real-world problems involving rational numbers with addition, multiplication, subtraction, and division.

THRESHOLD ALD **The Number System Target B**		The student who just enters Level 2 should be able to: • Convert between familiar fractions and decimals.	The student who just enters Level 3 should be able to: • Solve mathematical problems using addition, subtraction, and multiplication on rational numbers. • Understand that (-1)(-1) = 1. • Convert common fractions and fractions with denominators that are a factor of a power of 10 to decimals.	The student who just enters Level 4 should be able to: • Solve real-world problems with integers and proper fractions, using addition, multiplication, subtraction, and division.
Expressions and Equations				
RANGE ALD **Target C:** Use properties of operations to generate equivalent expressions.	Level 1 students should be able to apply properties of operations as strategies to add and subtract linear expressions with integer coefficients.	Level 2 students should be able to apply properties of operations as strategies to factor and expand linear expressions with integer coefficients. They should also be able to add and subtract linear expressions with rational coefficients.	Level 3 students should be able to apply properties of operations as strategies to factor and expand linear expressions with rational coefficients. They should understand that rewriting an expression can shed light on how quantities are related in a familiar problem-solving context with minimal scaffolding.	Level 4 students should understand that rewriting an expression can shed light on how quantities are related in an unfamiliar problem-solving context with no scaffolding.
RANGE ALD **Target D:** Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	Level 1 students should be able to solve multi-step problems with integers or common fractions with denominators of 2 through 10, 25, 50, or 100 and decimals to the hundredths place; solve equations in the form of $px + q = r$, where p, q, and r are integers; and distinguish between inequalities and equations with integer coefficients with or without real-world context.	Level 2 students should be able to solve multi-step problems with rational numbers and solve equations in the form of $px + q = r$ or $p(x + q) = r$, where p, q, and r are rational numbers. Students should be able to use variables to represent quantities in familiar real-world and mathematical situations. They should also be able to create equations with variables to solve familiar problems with a high degree of scaffolding.	Level 3 students should be able to solve and graph solution sets to inequalities with one variable. They should be able to use variables to represent and reason with quantities in real-world and mathematical situations with minimal scaffolding. They should also be able to construct equations with variables to solve problems.	Level 4 students should be able to use variables to represent and reason with quantities in real-world and mathematical situations with no scaffolding. They should be able to construct inequalities with more than one variable to solve problems.
THRESHOLD ALD **Expressions and Equations** **Targets C and D**		The student who just enters Level 2 should be able to: • Apply properties of operations to expand linear expressions with integer coefficients. • Solve multi-step problems with decimal numbers. • Solve equations in the form of $px + q = r$, where p, q, and r are decimal numbers.	The student who just enters Level 3 should be able to: • Add, subtract, and factor linear expressions with decimal coefficients. • Graph the solution set to a given inequality in the form of $x > p$ or $x < p$, where p is a rational number. • Understand that rewriting an expression can shed light on how quantities are related in a familiar problem-solving context with a moderate degree of scaffolding. • Use variables to reason with quantities in real-world and mathematical situations with a high degree of scaffolding.	The student who just enters Level 4 should be able to: • Construct inequalities with two variables to solve problems.

Concepts and Procedures: Domain #2				
Geometry				
RANGE ALD **Target E:** Draw, construct, and describe geometrical figures and describe the relationships between them.	Level 1 students should be able to draw or construct geometric shapes with given conditions by freehand, with ruler and protractor, and by using technology.	Level 2 students should be able to describe geometric shapes with given conditions and determine whether or not a set of any three given angle or side-length measures can result in a unique triangle, more than one triangle, or no triangle at all. They should be able to describe the relationship between a geometric figure and its scale drawing by finding the scale factor between them.	Level 3 students should be able to compute actual lengths and areas from a scale drawing and reproduce a scale drawing using a different scale. They should be able to describe the two-dimensional figures that result from slicing prisms and pyramids by planes that are parallel to a face.	Level 4 students should be able to describe the two-dimensional figures that result from slicing cones, spheres, cylinders, or other three-dimensional figures with rectangular or triangular faces by planes that are not parallel to a given face.
RANGE ALD **Target F:** Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	Level 1 students should be able to identify appropriate formulas for the area and circumference of a circle; calculate the area of triangles and rectangles and the volume of cubes; classify pairs of angles as supplementary, complementary, vertical, or adjacent; and measure angles with appropriate tools.	Level 2 students should be able to use supplementary, complementary, vertical, or adjacent angles to solve problems with angles expressed as numerical measurements in degrees; calculate the circumference of a circle; and calculate the area of circles, quadrilaterals, and polygons and the volume of right rectangular prisms.	Level 3 students should be able to use supplementary, complementary, vertical, and adjacent angles to solve one- or two-step problems with angle measures expressed as variables in degrees; use formulas for the area and circumference of a circle to solve problems; and solve problems involving the area of polygons, the surface area of three-dimensional objects composed of triangles and/or quadrilaterals, and the volume of right prisms.	Level 4 students should be able to solve problems involving surface area and volume of three-dimensional figures with polygonal faces. They should be able to use supplementary, complementary, vertical, and adjacent angles to solve multi-step problems with angle measures expressed as variables in degrees.
THRESHOLD ALD **Geometry Targets E and F**		The student who just enters Level 2 should be able to: • Describe geometric shapes with given conditions. • Use vertical angles expressed as numerical measurements to solve problems. • Calculate the area of a circle when the formula is provided and the area of quadrilaterals.	The student who just enters Level 3 should be able to: • Create a scale drawing of a given figure when a scale factor is given. • Determine the surface area of a right prism. • Use vertical angles expressed as variables to solve two-step problems.	The student who just enters Level 4 should be able to: • Describe the two-dimensional figures that result from slicing spheres and cones.
Statistics and Probability				
RANGE ALD **Target G:** Use random sampling to draw inferences about a population.	Level 1 students should be able to describe what a representative sample entails and identify biased and unbiased samples of a population.	Level 2 students should be able to determine whether or not a sample is random and understand that random samples of an appropriate population are representative samples that support valid results. They should be able to use data from a random sample to draw obvious inferences about a population presented in a familiar context.	Level 3 students should be able to use data from a random sample to draw inferences about a population with an unknown characteristic of interest presented in an unfamiliar context.	Level 4 students should be able to generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
RANGE ALD **Target H:** Draw informal comparative inferences about two populations.	Level 1 students should be able to use the mean to compare and draw inferences about two different populations.	Level 2 students should be able to use range to draw comparisons about two different populations. They should be able to informally compare the visual overlap of two numerical data distributions with similar variability in familiar contexts.	Level 3 students should be able to informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers in any context.	Level 4 students should be able to use measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
RANGE ALD **Target I:** Investigate chance processes and develop, use, and evaluate probability models.	Level 1 students should be able to determine the theoretical probability of a simple event; understand that probabilities are numbers between 0 (impossible) and 1 (always) and that a probability around 1/2 indicates an event that is neither unlikely nor likely.	Level 2 students should be able to approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency. They should be able to predict the approximate relative frequency given the probability.	Level 3 students should be able to find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. They should be able to compare theoretical and experimental results from a probability experiment.	Level 4 students should be able to design, describe, and construct a simulation experiment to generate frequencies for compound events. They should be able to explain what might account for differences between theoretical and experimental results and evaluate the associated probability model.

THRESHOLD ALD **Statistics and Probability** **Targets G, H, and I**		The student who just enters Level 2 should be able to: • Determine whether or not a sample is random. • Find the range of a set of data about a given population. • Approximate the probability of a chance event by collecting data.	The student who just enters Level 3 should be able to: • Use random sampling to draw inferences about a population in familiar contexts. • Informally assess the degree of visual overlap of two numerical data distributions. • Calculate the theoretical probability of a compound event.	The student who just enters Level 4 should be able to: • Generate multiple samples (or simulated samples) of the same size. • Determine which measures of variability should be used to draw informal comparative inferences about two populations. • Construct a simulation experiment and generate frequencies for compound events.

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CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Expressions and Equations				
RANGE ALD **Target B:** Work with radicals and integer exponents.	Level 1 students should be able to identify and calculate square roots of familiar perfect squares and calculate the square of integers. They should be able to translate between standard form and scientific notation.	Level 2 students should be able to identify and calculate the cube root of familiar perfect cubes and calculate the cube of integers. They should be able to use appropriate tools (e.g., calculator, pencil and paper) to translate large or small numbers from scientific to standard notation. They should be able to work with and apply the properties of integer exponents of degree 2 or less in order to produce or identify equivalent numerical expressions.	Level 3 students should be able to identify that the square root of 2 is irrational, calculate or approximate to an appropriate degree of precision the square or cube of a rational number, solve quadratic and cubic monomial equations, and represent the solution as a square or cube root, respectively. They should be able to work with and perform operations with scientific notation and work with and apply the properties of integer exponents in order to produce or identify equivalent numerical expressions.	Level 4 students should be able to use scientific notation and choose units of appropriate size for realistic measurements, solve binomial quadratic and cubic equations, and represent the solution as a square or cube root, respectively.
RANGE ALD **Target C:** Understand the connections between proportional relationships, lines, and linear equations.	Level 1 students should be able to graph a proportional relationship on a coordinate plane.	Level 2 students should be able to compare two different proportional relationships represented in different ways. They should also be able to calculate the slope of a line and identify the *y*-intercept of a line.	Level 3 students should understand that slope is a unit rate of change in a proportional relationship and convert proportional relationships to linear equations in slope-intercept form while also understanding when and why the *y*-intercept is zero. They should also be able to use repeated reasoning to observe that they can use any right triangle to find the slope of a line.	Level 4 students should be able to use similar triangles to explain why the slope is the same between any two distinct points on a nonvertical line in a coordinate plane.
RANGE ALD **Target D:** Analyze and solve linear equations and pairs of simultaneous linear equations.	Level 1 students should be able to solve linear equations in one variable with integer coefficients.	Level 2 students should be able to analyze and solve systems of linear equations graphically by understanding that the solution of a system of linear equations in two variables corresponds to the point of intersection on a plane. They should be able to solve and produce examples of linear equations in one variable with rational coefficients with one solution, infinitely many solutions, or no solution.	Level 3 students should be able to classify systems of linear equations as intersecting, collinear, or parallel; solve linear systems algebraically and estimate solutions using a variety of approaches; and show that a particular linear equation has one solution, no solution, or infinitely many solutions by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). They should be able to solve and produce examples of linear equations in one variable, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	Level 4 students should be able to analyze and solve problems leading to two linear equations in two variables in multiple representations.

THRESHOLD ALD **Expressions and Equations Targets B, C, and D**		The student who just enters Level 2 should be able to: • Find the cube of one-digit numbers and the cube root of perfect cubes (less than 1,000). • Use appropriate tools (e.g., calculator, pencil and paper) to translate large numbers from scientific to standard notation. • Identify the *y*-intercept and calculate the slope of a line from an equation or graph. • Graph a system of linear equations and identify the solution as the point of intersection.	The student who just enters Level 3 should be able to: • Solve simple quadratic monomial equations and represent the solution as a square root. • Work with and perform operations with scientific notation of large numbers. • Identify unit rate of change in linear relationships (i.e., slope is the rate of change). • Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms and equations with infinitely many solutions or no solution. • Solve a system of linear equations with integer coefficients using an algebraic strategy.	The student who just enters Level 4 should be able to: • Write a system of two linear equations with two variables to represent a context.
Functions				
RANGE ALD **Target E:** Define, evaluate, and compare functions.	Level 1 students should be able to identify whether or not a relationship that is represented graphically, in a table, or algebraically is a function. They should be able to compare the properties of two linear functions represented in the same way (graphically or in a table).	Level 2 students should be able to produce input and output pairs for a given function and identify whether an input/output pair satisfies a function. They should be able to compare properties of two functions represented in the same way (algebraic, graphic, tabular, or verbal). They should be able to classify functions as linear or nonlinear on the basis of their graph.	Level 3 students should be able to classify functions as linear or nonlinear in different forms (e.g., graphical, algebraic, verbal description, and/or tabular) and should know linear equations of the form $y = mx + b$ are functions. They should also be able to define a function as a rule that assigns to each input exactly one output. They should be able to compare properties of two functions represented in different ways (algebraic, graphic, tabular, or verbal).	Level 4 students should be able to give examples of functions that are not linear and be able to compare properties of two nonlinear functions represented in different ways (algebraic, graphic, tabular, or verbal).
RANGE ALD **Target F:** Use functions to model relationships between quantities.	Level 1 students should be able to identify a function that models a linear relationship between two quantities.	Level 2 students should be able to construct a graphical or tabular model to represent a linear relationship between two quantities and should be able to find the rate of change of a linear relationship displayed in a graph or table. They should be able to analyze a graph of a linear function to qualitatively describe it.	Level 3 students should be able to construct a function to represent a linear relationship between two quantities and a graph to represent verbally described qualitative features and determine the rate of change and initial value of a function from a graph, a verbal description of a relationship, or from two sets of *xy*-values given as coordinate pairs or displayed in a table. They should be able to analyze a graph of a linear or nonlinear function to qualitatively describe it.	Level 4 students should be able to interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.
THRESHOLD ALD **Functions Targets E and F**		The student who just enters Level 2 should be able to: • Identify whether an input/output pair satisfies a function. • Compare properties of two linear functions represented in the same way (algebraically, graphically, or in a table). • Construct a table to represent a linear relationship between two quantities. • Qualitatively describe a graph of a linear function.	The student who just enters Level 3 should be able to: • Classify functions as linear or nonlinear on the basis of the algebraic representation. • Determine the rate of change and the initial value of a function. • Know linear equations of the form $y = mx + b$ are functions. • Compare properties of two linear functions represented in different ways (algebraically, graphically, or in a table).	The student who just enters Level 4 should be able to: • Interpret the rate of change and initial value of a linear function in terms of its graph.

Geometry				
RANGE ALD **Target G:** Understand congruence and similarity using physical models, transparencies, or geometry software.	Level 1 students should be able to identify reflections, rotations, and translations and the result of these rigid motions on figures.	Level 2 students should be able to construct reflections and translations of figures in a coordinate plane and identify dilations and the results of dilations on figures.	Level 3 students should be able to understand and describe the impact of a transformation on a figure and its component parts with or without coordinates. They should be able to use or describe a sequence of transformations to determine or exhibit the congruence of two figures. They should also be able to construct rotations and dilations of figures in a coordinate plane.	Level 4 students should be able to describe a sequence that exhibits the similarity between two shapes and understand that the angle measures are unchanged.
RANGE ALD **Target H:** Understand and apply the Pythagorean theorem.	Level 1 students should be able to identify the hypotenuse and the legs of a right triangle given the side lengths or an image of a right triangle.	Level 2 students should be able to apply the Pythagorean theorem to determine whether or not a given triangle is a right triangle, given its side lengths. They should be able to find the distance between two points on a horizontal or vertical line in a two-dimensional coordinate system.	Level 3 students should be able to apply the Pythagorean theorem to determine the unknown side lengths of right triangles and to find the distance between two points in a coordinate system in two dimensions.	Level 4 students should be able to apply the Pythagorean theorem to find the distance between two points in a coordinate system in three dimensions.
THRESHOLD ALD **Geometry Targets G and H**		The student who just enters Level 2 should be able to: • Construct reflections across an axis and translations of figures in a coordinate plane.	The student who just enters Level 3 should be able to: • Predict the location of point P after a transformation. • Know that sequences of translations, rotations, and reflections on a figure always result in a congruent figure. • Construct rotations of figures in a coordinate plane.	The student who just enters Level 4 should be able to: • Describe the impact of two transformations, including a dilation, on a figure. • Identify or draw the relevant right triangle in a three-dimensional figure, given coordinates or a diagram.
Concepts and Procedures: Domain #2				
The Number System				
RANGE ALD **Target A:** Know that there are numbers that are not rational and approximate them by rational numbers.	Level 1 students should be able to identify square roots of numbers less than 100; identify pi as not rational; and understand that every rational number has a decimal expansion.	Level 2 students should be able to identify approximate locations of familiar irrational numbers on a number line; identify numbers as rational or irrational; and convert between fractions and terminating decimals.	Level 3 students should be able to use rational approximations of irrational numbers to locate them on a number line and to make numerical comparisons; convert between fractions and repeating decimals; and compare rational numbers.	Level 4 students should be able to approximate irrational numbers to a specified level of precision and should be able to use the approximations to solve problems or estimate the value of an expression.
THRESHOLD ALD **The Number System Target A**		The student who just enters Level 2 should be able to: • Identify numbers as rational or irrational.	The student who just enters Level 3 should be able to: • Convert from fractions to repeating decimals. • Use rational approximations of familiar irrational numbers to make numerical comparisons.	The student who just enters Level 4 should be able to: • Approximate irrational numbers between two integers to a specified level of precision.

Geometry				
RANGE ALD **Target I:** Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	Level 1 students should be able to identify the key dimensions (i.e., radii, heights, circumferences, and diameters) of cones, cylinders, and spheres.	Level 2 students should be able to identify the appropriate formula for the volumes of a cone, a cylinder, and a sphere and should be able to connect the key dimensions to the appropriate locations in the formula.	Level 3 students should be able to calculate the volumes of cones, cylinders, and spheres in direct and familiar mathematical and real-world problems.	Level 4 students should be able to solve unfamiliar or multi-step problems involving volumes of cones, cylinders, and spheres.
THRESHOLD ALD **Geometry Target I**		The student who just enters Level 2 should be able to: • Identify the appropriate formula for the volume of a cylinder and connect the key dimensions to the appropriate location in the formula.	The student who just enters Level 3 should be able to: • Calculate the volume of a cylinder in direct and familiar mathematical and real-world problems.	The student who just enters Level 4 should be able to: • Solve unfamiliar or multi-step problems involving volumes of cylinders.
Statistics and Probability				
RANGE ALD **Target J:** Investigate patterns of association in bivariate data.	Level 1 students should be able to investigate a scatter plot for clustering between two quantities and construct a scatter plot from given data. They should be able to construct a two-way frequency table of given categorical data.	Level 2 students should be able to investigate a scatter plot for positive, negative, and linear association and informally fit a line to data for a given scatter plot that suggests a linear association. They should be able to calculate frequencies from categorical data in a two-way frequency table.	Level 3 students should be able to investigate a scatter plot for patterns such as outliers and nonlinear association. They should be able to write an equation for the trend line or line of best fit for a given scatter plot with a linear association. They should also be able to interpret and use relative frequencies from a two-way table to describe possible association between two variables.	Level 4 students should be able to use scatter plots, trend lines, and associations between variables in two-way frequency tables to make predictions in real-world situations.
THRESHOLD ALD **Statistics and Probability Target J**		The student who just enters Level 2 should be able to: • Identify what a linear pattern looks like from a given scatter plot.	The student who just enters Level 3 should be able to: • Describe outliers for a given scatter plot.	The student who just enters Level 4 should be able to: • Use the trend line or line of best fit to make predictions in real-world situations.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 2: Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies. *CLAIM 4: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.*	*CONTENT ALD: The Level 1 student can make sense of and solve simple and familiar well-posed problems in pure and applied mathematics with a high degree of scaffolding, making minimal use of basic problem-solving strategies and given tools.* *The Level 1 student can identify familiar real-world scenarios for analysis and can use simple mathematical models and given tools to solve basic problems.*	*CONTENT ALD: The Level 2 student can make sense of and solve familiar well-posed problems in pure and applied mathematics with a moderate degree of scaffolding, making partial use of knowledge, basic problem-solving strategies, and tools.* *The Level 2 student can reason quantitatively to analyze familiar real-world scenarios and can use mathematical models and given tools to partially interpret and solve basic problems.*	*CONTENT ALD: The Level 3 student can make sense of and persevere in solving a range of unfamiliar well-posed problems in pure and applied mathematics with a limited degree of scaffolding, making adequate use of knowledge and appropriate problem-solving strategies and strategic use of appropriate tools.* *The Level 3 student can reason abstractly and quantitatively to analyze complex, real-world scenarios and to construct and use mathematical models and appropriate tools strategically to adequately interpret and solve problems.*	*CONTENT ALD: The Level 4 student can make sense of and persevere in solving a range of complex and unfamiliar well-posed problems in pure and applied mathematics with no scaffolding, making thorough use of knowledge and problem-solving strategies and strategic use of appropriate tools.* *The Level 4 student can reason abstractly and quantitatively to analyze unfamiliar complex, real-world scenarios, to construct and use complex mathematical models and appropriate tools strategically to thoroughly interpret and solve problems, and to synthesize results.*
Problem Solving & Modeling and Data Analysis				
CLAIM 2 RANGE ALD **Target A:** Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. **CLAIM 2 RANGE ALD** **Target B:** Select and use appropriate tools strategically. **CLAIM 2 RANGE ALD** **Target C:** Interpret results in the context of a situation. **CLAIM 2 RANGE ALD** **Target D:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).	Level 1 students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.	Level 2 students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.	Level 3 students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.	Level 4 students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

CLAIM 4 RANGE ALD **Target A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. **CLAIM 4 RANGE ALD** **Target B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. **CLAIM 4 RANGE ALD** **Target C:** State logical assumptions being used. **CLAIM 4 RANGE ALD** **Target D:** Interpret results in the context of a situation. **CLAIM 4 RANGE ALD** **Target E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **CLAIM 4 RANGE ALD** **Target F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). **CLAIM 4 RANGE ALD** **Target G:** Identify, analyze, and synthesize relevant external resources to pose or solve problems.	Level 1 students should be able to apply mathematics to solve familiar problems arising in everyday life, society, and the workplace by identifying important quantities and by beginning to develop a model.	Level 2 students should be able to apply mathematics to propose solutions by identifying important quantities, locating missing information from relevant external resources, beginning to construct chains of reasoning to connect with a model, producing partial justification and interpretations, and beginning to state logical assumptions.	Level 3 students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.	Level 4 students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.
THRESHOLD ALD **Claims 2 and 4**		The student who just enters Level 2 should be able to: • Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy. • Use the necessary elements given in a problem situation to solve a problem. • Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources.	The student who just enters Level 3 should be able to: • Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace. • Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions.	The student who just enters Level 4 should be able to: • Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity. • Begin to solve problems optimally. • Construct multiple plausible solutions and approaches.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 3: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	*CONTENT ALD: The Level 1 student can construct simple viable arguments with minimal clarity and precision to support his or her own reasoning in familiar contexts.*	*CONTENT ALD: The Level 2 student can construct viable arguments with partial clarity and precision to support his or her own reasoning and to partially critique the reasoning of others in familiar contexts.*	*CONTENT ALD: The Level 3 student can construct viable arguments with adequate clarity and precision to support his or her own reasoning and to critique the reasoning of others.*	*CONTENT ALD: The Level 4 student can construct viable arguments with thorough clarity and precision in unfamiliar contexts to support his or her own reasoning and to critique the reasoning of others.*
Communicating Reasoning				
CLAIM 3 RANGE ALD **Target A:** Test propositions or conjectures with specific examples.	Level 1 students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.	Level 2 students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.	Level 3 students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.	Level 4 students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.
CLAIM 3 RANGE ALD **Target B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.				
CLAIM 3 RANGE ALD **Target C:** State logical assumptions being used.				
CLAIM 3 RANGE ALD **Target D:** Use the technique of breaking an argument into cases.				
CLAIM 3 RANGE ALD **Target E:** Distinguish correct logic or reasoning from that which is flawed and—if there is a flaw in the argument—explain what it is.				
Claim 3 RANGE ALD **Target F:** Base arguments on concrete referents such as objects, drawings, diagrams, and actions.				

CLAIM 3 RANGE ALD **Target G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)				
THRESHOLD ALD **Claim 3**		The student who just enters Level 2 should be able to: • Find and identify the flaw in an argument.	The student who just enters Level 3 should be able to: • Use stated assumptions, definitions, and previously established results and examples to identify and repair a flawed argument. • Use previous information to support his or her own reasoning on a routine problem.	The student who just enters Level 4 should be able to: • Begin to construct chains of logic about abstract concepts autonomously.

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CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Algebra				
RANGE ALD **Target D:** Interpret the structure of expressions.	Level 1 students should be able to identify parts of an expression, such as terms, factors, coefficients, exponents, etc.	Level 2 students should be able to interpret parts of an expression, such as terms, factors, coefficients, exponents, etc. They should also be able to recognize equivalent forms of linear expressions.	Level 3 students should be able to recognize equivalent forms of quadratic, exponential, and polynomial expressions and use structure to identify ways to rewrite it.	Level 4 students should be able to look for and use structure and repeated reasoning to make generalizations about the possible equivalent forms expressions can have.
RANGE ALD **Target E:** Write expressions in equivalent forms to solve problems.	Level 1 students should be able to choose a quadratic expression with integer coefficients and a leading coefficient of 1 in an equivalent form that reveals a property of interest when solving problems. 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., $x^3 = xxx$.	Level 2 students should be able choose a quadratic expression with integer coefficients in an equivalent form that reveals a property of interest when solving problems. 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., $x^0x^2x^3 = xxxxx = x^{2+3}$.	Level 3 students should be able to choose a quadratic expression with rational coefficients in an equivalent form that reveals a property of interest when solving problems. 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.	Level 4 students should be able to write a quadratic expression with rational coefficients in an equivalent form to solve problems.
RANGE ALD **Target F:** Perform arithmetic operations on polynomials.	Level 1 students should be able to add, subtract, and multiply single variable polynomials of degree 2 or less.	Level 2 students should be able to add, subtract, and multiply multi-variable polynomials made up of monomials of degree 2 or less. They should understand that polynomials are closed under addition.	Level 3 students should be able to add, subtract, and multiply multi-variable polynomials of any degree and understand that polynomials are closed under subtraction and multiplication.	Level 4 students should understand and be able to explain that polynomials form a system analogous to the integers.

RANGE ALD **Target G:** Create equations that describe numbers or relationships.	Level 1 students should be able to create and use one-step linear equations in one variable to model a familiar situation and to solve a familiar problem.	Level 2 students should be able to create and use quadratic equations, linear equations, and linear inequalities in one and two variables to model a familiar situation and to solve a familiar problem. They should be able to graph a linear or a quadratic equation in two variables and be able to rearrange a familiar formula or an unfamiliar linear formula in one or two variables for a particular given quantity.	Level 3 students should be able to create and use linear and quadratic equations and inequalities and exponential equations with an integer base and a monomial exponent to model an unfamiliar situation and to solve an unfamiliar problem. They should be able to graph an equation in two variables and be able to rearrange a quadratic formula for a particular given quantity.	Level 4 students should be able to create and use exponential equations with an integer base and a polynomial exponent in multiple variables to model an unfamiliar situation and to solve an unfamiliar problem. They should be able to rearrange a simple rational formula or multi-variable polynomial, linear, or quadratic formulas for a particular given quantity or to highlight a quantity of interest and be able to analyze in context to determine which quantity is of interest.
RANGE ALD **Target H:** Understand solving equations as a process of reasoning and explain the reasoning.	Level 1 students should be able to explain solution steps for solving one-step linear equations in one variable.	Level 2 students should be able to look for and make use of structure to solve simple radical equations and simple rational equations in one variable in which the variable term is in the numerator. They should be able to understand and explain solution steps for solving linear equations in one variable as a process of reasoning.	Level 3 students should be able to look for and make use of structure to solve simple radical and simple rational equations in one variable presented in various forms. They should be able to understand and explain solution steps for solving quadratic equations in one variable as a process of reasoning.	Level 4 students should be able to give examples showing how extraneous solutions may arise and why they arise when solving radical and simple rational equations. They should be able to explain how extraneous solutions may arise in context when solving linear and quadratic equations.
RANGE ALD **Target I:** Solve equations and inequalities in one variable.	Level 1 students should be able to solve one-step linear equations in one variable.	Level 2 students should be able to solve one-step linear inequalities and quadratic equations with a leading coefficient of 1 in one variable with integer roots.	Level 3 students should be able to solve multi-step linear equations and inequalities and quadratic equations in one variable with real roots.	No descriptor
RANGE ALD **Target J:** Represent and solve equations and inequalities graphically.	Level 1 students should be able to represent a linear equation with an integer-valued slope in two variables graphically on a coordinate plane	Level 2 students should be able to represent linear equations and inequalities with integer coefficients in one and two variables graphically on a coordinate plane and should understand that the plotted line represents the solution set to an equation. They should be able to graph and estimate the solution of systems of linear equations.	Level 3 students should be able to represent exponential functions graphically. They should be able to represent linear equations and inequalities and quadratic equations in two variables graphically on a coordinate plane and should understand that the plotted line or curve represents the solution set to an equation. They should be able to graph and estimate the solution of systems involving a linear equation and a simple quadratic equation.	Level 4 students should be able to explain why the x-coordinates of the points where f(x) and g(x) intersect compose the solution to f(x) = g(x).

THRESHOLD ALD **Algebra Targets D, E, F, G, H, I, and J**		The student who just enters Level 2 should be able to: • Use linear equations in one and two variables and inequalities in one variable to model a familiar situation and to solve a familiar problem. • Explain solution steps for solving linear equations and solve a simple radical equation. • Use properties of exponents to expand a single variable (coefficient of 1) repeated up to two times with a nonnegative integer exponent into an equivalent form and vice versa, e.g., $x^0x^2x^3 = xxxxx = x^{2+3}$ • Solve one-step linear equations and inequalities in one variable and understand the solution steps as a process of reasoning. • Represent linear equations and quadratic equations with integer coefficients in one and two variables graphically on a coordinate plane. • Recognize equivalent forms of linear expressions and choose a quadratic expression with integer leading coefficients in an equivalent form. • Add multi-variable polynomials made up of monomials of degree 2 or less. • Graph and estimate the solution of systems of linear equations and systems of linear inequalities.	The student who just enters Level 3 should be able to: • Create and use quadratic inequalities in two variables to model a situation and to solve a problem. • Choose a quadratic expression in one variable with rational coefficients in an equivalent form, identify its zeros, and explain the solution steps as a process of reasoning. • Use properties of exponents to write equivalent forms of exponential functions with one or more variables with integer coefficients with nonnegative integer exponents involving operations of addition, subtraction, and multiplication without requiring distribution of an exponent across parentheses. • Solve a quadratic equation with integer roots. • Represent exponential functions graphically and estimate the solution of systems of equations displayed graphically. • Understand that the plotted line, curve, or region represents the solution set to an equation or inequality. • Add and subtract multi-variable polynomials of any degree and understand that polynomials are closed under subtraction.	The student who just enters Level 4 should be able to: • Choose an appropriate equivalent form of an expression in order to reveal a property of interest when solving problems. • Solve a formula for any variable in the formula. • Provide an example that would lead to an extraneous solution when solving simple rational equations.
Functions				
RANGE ALD **Target K:** Understand the concept of a function and use function notations.	Level 1 students should be able to distinguish between functions and nonfunctions. They should be able to state the domain and range given a graph.	Level 2 students should understand the concept of a function in order to distinguish a relation as a function or not a function. They should be able to identify domain and range of a function given a graph of a quadratic or linear function, and they should understand that the graph of a function f(x) is the graph of the equation y = f(x).	Level 3 students should be able to use function notation to evaluate a linear, quadratic, or exponential function given in function notation for a particular input. They should be able to identify the domain and range for any linear, quadratic, or exponential function presented in any form, e.g., as a graph, a verbal description, or a sequence.	Level 4 students should be able to find the input for a given output of linear, quadratic, or exponential functions when given in function notation.
RANGE ALD **Target L:** Interpret functions that arise in applications in terms of a context.	Level 1 students should be able to interpret linear functions in context, and given the key features of a linear graph, they should be able to identify the appropriate graph.	Level 2 students should be able to interpret quadratic functions in two variables in context of the situation, and given the key features of a graph of a polynomial function, they should be able to identify the appropriate graph.	Level 3 students should be able to graph linear, quadratic, and exponential functions and interpret and relate key features, including range and domain, in familiar or scaffolded contexts.	Level 4 students should be able to interpret complex key features such as symmetries and end behavior of graphs and functions in unfamiliar problems or contexts.

RANGE ALD **Target M:** Analyze functions using different representations.	Level 1 students should be able to graph a linear function by hand or by using technology. They should be able to compare properties of two linear functions represented in different ways. They should be able to identify equivalent forms of linear functions.	Level 2 students should be able to graph quadratic functions by hand; graph exponential functions by hand or by using technology; compare properties of two quadratic or two other functions of the same type, i.e., linear to linear, represented in different ways; and understand equivalent forms of linear and quadratic functions.	Level 3 students should be able to analyze and compare properties of two linear, quadratic, or exponential functions of different types represented in different ways and understand equivalent forms of functions.	Level 4 students should be able to graph a variety of functions, including linear, quadratic, and exponential, by hand and by using technology. They should be able to analyze and explain relationships between various types of functions and the behaviors of the functions and be able to determine which equivalent form is most appropriate for a given task.
RANGE ALD **Target N:** Build a function that models a relationship between two quantities.	Level 1 students should be able to identify an explicit function and determine the steps for calculation from a context requiring up to two steps. They should be able to add and subtract two linear functions.	Level 2 students should be able to build an explicit linear function to describe or model a relationship between two quantities and determine the steps for calculation from a context.	Level 3 students should be able to add, subtract, and multiply, linear, quadratic, and exponential functions.	Level 4 students should be able to determine when it is appropriate to combine functions using arithmetic operations in context.
THRESHOLD ALD **Functions Targets K, L, M, and N**		The student who just enters Level 2 should be able to: • Understand the concept of a function in order to distinguish a relation as a function or not a function. • The student should be able to identify the appropriate graphs. • Identify properties of two linear or two quadratic functions. Understand equivalent forms of linear and quadratic functions. • Graph linear functions by hand and by using technology. • Build an explicit function to describe or model a relationship between two quantities. • Add, subtract, and multiply linear functions.	The student who just enters Level 3 should be able to: • Identify the domain and range of linear, quadratic, and exponential functions presented in any form. • Use function notation to evaluate a function for numerical or monomial inputs. • Appropriately interpret key features of linear, quadratic, and exponential functions in familiar or scaffolded contexts. • Graph quadratic and exponential functions both by hand and by using technology. • Analyze and compare properties of a linear function to properties of another function of any type.	The student who just enters Level 4 should be able to: • Find the input of a function when given the function in function notation and the output, or find the output when given the input. • Describe complex features such as symmetries, and end behavior of the graph of a function.
Statistics and Probability				
RANGE ALD **Target P:** Summarize, represent, and interpret data on a single count or measurement variable.	Level 1 students should be able to describe a data set in terms of center and spread and represent data graphically.	Level 2 students should be able to describe and use appropriate statistics to interpret and explain differences in shape, center, and spread of two or more different data sets, including box plots, histograms, or dot plots, representing familiar contexts. They should be able to identify the mean and the median and select the appropriate one for representing the center of the data for data sets.	Level 3 students should be able to use appropriate statistics to interpret, explain, and summarize differences in shape, center, and spread of two or more different data sets of varying complexity and levels of familiarity, including the effect of outliers. They should be able to select the appropriate choice of spread as interquartile range or standard deviation based on the selection of center.	Level 4 students should be able to interpret data to explain why a data value is an outlier and interpret and explain differences in the approximate areas under the normal curve of two or more data sets. They should be able to use the standard deviation of a data set to fit to a normal distribution.

THRESHOLD ALD **Statistics and Probability Target P**		The student who just enters Level 2 should be able to: • Describe the differences in shape, center, and spread of two or more different data sets representing familiar contexts.	The student who just enters Level 3 should be able to: • Select the appropriate choice of spread as interquartile range or standard deviation based on the selection of the measure of center.	The student who just enters Level 4 should be able to: • Interpret data to explain why a data value is an outlier.
Concepts and Procedures: Domain #2				
Quantities				
RANGE ALD **Target C:** Reason quantitatively and use units to solve problems	Level 1 students should be able to choose the units in a formula, correctly scale a graph with unit increments, and identify a quantity from a graph with a scale in unit increments of a specified measurement.	Level 2 students should be able to reason quantitatively to choose and interpret the units in a formula given in a familiar context, including making measurement conversions between simple units and identifying a quantity from a graph with the scale in increments of various sizes. They should be able to use units to guide the solution of a familiar multi-step problem with scaffolding.	Level 3 students should be able to reason quantitatively to choose and interpret the units in a formula given in an unfamiliar context, including making measurement conversions between compound units, and to define appropriate quantities or measurements in familiar contexts with some scaffolding to construct a model. They should be able to identify appropriate levels of measurement precision in context and to choose and interpret the scale and origin of a linear, quadratic, or exponential graph or data display. They should be able to use units to guide the solution of an unfamiliar multi-step problem without scaffolding.	Level 4 students should be able to define appropriate quantities or measurements in unfamiliar contexts with little to no scaffolding to construct a model.
THRESHOLD ALD **Quantities Target C**		The student who just enters Level 2 should be able to: • Choose and interpret the correct units in a formula given in a familiar context, including making measurement conversions between simple units.	The student who just enters Level 3 should be able to: • Reason quantitatively to choose and interpret the units in a formula given in an unfamiliar context, including making compound measurement conversions. • Define appropriate quantities or measurements in familiar contexts with some scaffolding to construct a model. • Choose the scale and origin of a linear or quadratic graph or data display	The student who just enters Level 4 should be able to: • Define appropriate quantities or measurements in unfamiliar contexts with some scaffolding to construct a model.
Number and Quantity				
RANGE ALD **Target A:** Extend the properties of exponents to rational exponents.	Level 1 students should be able to rewrite expressions with rational exponents of the form (1/n) to radical form and vice versa.	Level 2 students should be able to look for and use structure to extend the properties of integer exponents to multiply and divide expressions with rational exponents that have common denominators.	Level 3 students should be able to rewrite expressions with rational exponents of the form (m/n) to radical form, and radical expressions with integer exponents to exponent form. Look for and use structure to extend the properties of integer exponents to laws of exponents on radical expressions and expressions with rational exponents.	Level 4 students should be able to identify the exponent property used when rewriting expressions and recognize when laws of exponents cannot be used to rewrite an expression.

RANGE ALD **Target B:** Use properties of rational and irrational numbers.	Level 1 students should be able to identify the difference between a rational and an irrational number.	Level 2 students should be able to perform operations on rational and irrational numbers and should be able to look for and use repeated reasoning to understand that the rational numbers are closed under addition and multiplication.	Level 3 students should be able to look for and use repeated reasoning to understand and explain that the sum and product of a rational number and a nonzero irrational number are irrational.	Level 4 students should be able to provide a specific example given a generalization statement, such as the sum of a rational number and an irrational number is irrational.
THRESHOLD ALD **Number and Quantity Targets A and B**		The student who just enters Level 2 should be able to: • Extend the properties of integer exponents to multiply expressions with rational exponents that have common denominators. • Perform operations on rational numbers and familiar irrational numbers. • Understand that rational numbers are closed under addition and multiplication.	The student who just enters Level 3 should be able to: • Apply laws of exponents on expressions with exponents that have common denominators. • Rewrite expressions with rational exponents of the form (m/n) to radical form. • Rewrite radical expressions with integer exponents to exponent form. • Use repeated reasoning to recognize that the sums and products of a rational number and a nonzero irrational number are irrational.	The student who just enters Level 4 should be able to: • Explain the relationship between properties of integer exponents and properties of rational exponents.
Similarity, Right Triangles, and Trigonometry				
RANGE ALD **Target O:** Define trigonometric ratios and solve problems involving right triangles.	Level 1 students should be able to identify trigonometric ratios and use the Pythagorean Theorem to solve for the missing side in a right triangle in familiar real-world or mathematical contexts with scaffolding.	Level 2 students should be able to define trigonometric ratios and should know the relationship between the sine and cosine of complementary angles. They should be able to use the Pythagorean Theorem in unfamiliar problems and trigonometric ratios in familiar problems to solve for the missing side in a right triangle with some scaffolding.	Level 3 students should be able to use the Pythagorean Theorem, trigonometric ratios, and the sine and cosine of complementary angles to solve unfamiliar problems with minimal scaffolding involving right triangles, finding the missing side or missing angle of a right triangle.	Level 4 students should be able to solve unfamiliar, complex, or multistep problems without scaffolding involving right triangles.
THRESHOLD ALD **Similarity, Right Triangles, and Trigonometry Target O**		The student who just enters Level 2 should be able to: • Use the Pythagorean Theorem in unfamiliar problems to solve for the missing side in a right triangle with some scaffolding.	The student who just enters Level 3 should be able to: • Use trigonometric ratios and the sine and cosine of complementary angles to find missing angles or sides of a given right triangle with minimal scaffolding.	The student who just enters Level 4 should be able to: • Solve right triangle problems with multiple stages and in compound figures without scaffolding.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 2: Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.	*CONTENT ALD: The Level 1 student can make sense of and solve simple and familiar well-posed problems in pure and applied mathematics with a high degree of scaffolding, making minimal use of basic problem-solving strategies and given tools.*	*CONTENT ALD: The Level 2 student can make sense of and solve familiar well-posed problems in pure and applied mathematics with a moderate degree of scaffolding, making partial use of knowledge, basic problem-solving strategies, and tools.*	*CONTENT ALD: The Level 3 student can make sense of and persevere in solving a range of unfamiliar well-posed problems in pure and applied mathematics with a limited degree of scaffolding, making adequate use of knowledge and appropriate problem-solving strategies and strategic use of appropriate tools.*	*CONTENT ALD: The Level 4 student can make sense of and persevere in solving a range of complex and unfamiliar well-posed problems in pure and applied mathematics with no scaffolding, making thorough use of knowledge and problem-solving strategies and strategic use of appropriate tools.*
CLAIM 4: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.	*The Level 1 student can identify familiar real-world scenarios for analysis and can use simple mathematical models and given tools to solve basic problems.*	*The Level 2 student can reason quantitatively to analyze familiar real-world scenarios and can use mathematical models and given tools to partially interpret and solve basic problems.*	*The Level 3 student can reason abstractly and quantitatively to analyze complex, real-world scenarios and to construct and use mathematical models and appropriate tools strategically to adequately interpret and solve problems.*	*The Level 4 student can reason abstractly and quantitatively to analyze unfamiliar complex, real-world scenarios, to construct and use complex mathematical models and appropriate tools strategically to thoroughly interpret and solve problems, and to synthesize results.*
Problem Solving & Modeling and Data Analysis				
CLAIM 2 RANGE ALD **Target A:** Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.	Level 1 students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.	Level 2 students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.	Level 3 students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.	Level 4 students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.
CLAIM 2 RANGE ALD **Target B:** Select and use appropriate tools strategically.				
CLAIM 2 RANGE ALD **Target C:** Interpret results in the context of a situation.				
CLAIM 2 RANGE ALD **Target D:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).				

CLAIM 4 RANGE ALD **Target A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. **CLAIM 4 RANGE ALD** **Target B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. **CLAIM 4 RANGE ALD** **Target C:** State logical assumptions being used. **CLAIM 4 RANGE ALD** **Target D:** Interpret results in the context of a situation. **CLAIM 4 RANGE ALD** **Target E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **CLAIM 4 RANGE ALD** **Target F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). **CLAIM 4 RANGE ALD** **Target G:** Identify, analyze, and synthesize relevant external resources to pose or solve problems.	Level 1 students should be able to apply mathematics to solve familiar problems arising in everyday life, society, and the workplace by identifying important quantities and by beginning to develop a model.	Level 2 students should be able to apply mathematics to propose solutions by identifying important quantities, locating missing information from relevant external resources, beginning to construct chains of reasoning to connect with a model, producing partial justification and interpretations, and beginning to state logical assumptions.	Level 3 students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.	Level 4 students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.
THRESHOLD ALD **Claims 2 and 4**		The student who just enters Level 2 should be able to: • Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy. • Use the necessary elements given in a problem situation to solve a problem. • Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources.	The student who just enters Level 3 should be able to: • Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace. • Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions.	The student who just enters Level 4 should be able to: • Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity. • Begin to solve problems optimally. • Construct multiple plausible solutions and approaches.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 3: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	*CONTENT ALD: The Level 1 student can construct simple viable arguments with minimal clarity and precision to support his or her own reasoning in familiar contexts.*	*CONTENT ALD: The Level 2 student can construct viable arguments with partial clarity and precision to support his or her own reasoning and to partially critique the reasoning of others in familiar contexts.*	*CONTENT ALD: The Level 3 student can construct viable arguments with adequate clarity and precision to support his or her own reasoning and to critique the reasoning of others.*	*CONTENT ALD: The Level 4 student can construct viable arguments with thorough clarity and precision in unfamiliar contexts to support his or her own reasoning and to critique the reasoning of others.*
Communicating Reasoning				
CLAIM 3 RANGE ALD **Target A:** Test propositions or conjectures with specific examples.	Level 1 students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.	Level 2 students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.	Level 3 students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.	Level 4 students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.
CLAIM 3 RANGE ALD **Target B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.				
CLAIM 3 RANGE ALD **Target C:** State logical assumptions being used.				
CLAIM 3 RANGE ALD **Target D:** Use the technique of breaking an argument into cases.				
CLAIM 3 RANGE ALD **Target E:** Distinguish correct logic or reasoning from that which is flawed and— if there is a flaw in the argument— explain what it is.				
CLAIM 3 RANGE ALD **Target F:** Base arguments on concrete referents such as objects, drawings, diagrams, and actions.				

CLAIM 3 RANGE ALD **Target G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)				
THRESHOLD ALD **Claim 3**		The student who just enters Level 2 should be able to: • Find and identify the flaw in an argument.	The student who just enters Level 3 should be able to: • Use stated assumptions, definitions, and previously established results and examples to identify and repair a flawed argument. • Use previous information to support his or her own reasoning on a routine problem.	The student who just enters Level 4 should be able to: • Begin to construct chains of logic about abstract concepts autonomously.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Algebra				
RANGE ALD **Target D:** Interpret the structure of expressions.	Level 1 students should be able to identify parts of an expression, such as terms, factors, coefficients, exponents, etc.	Level 2 students should be able to interpret parts of an expression, such as terms, factors, coefficients, exponents, etc. They should also be able to recognize equivalent forms of linear expressions.	Level 3 students should be able to recognize equivalent forms of quadratic, exponential, and polynomial expressions and use structure to identify ways to rewrite it.	Level 4 students should be able to look for and use structure and repeated reasoning to make generalizations about the possible equivalent forms expressions can have.
RANGE ALD **Target E:** Write expressions in equivalent forms to solve problems.	Level 1 students should be able to choose a quadratic expression with integer coefficients and a leading coefficient of 1 in an equivalent form that reveals a property of interest when solving problems. 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., $x^3 = xxx$.	Level 2 students should be able choose a quadratic expression with integer coefficients in an equivalent form that reveals a property of interest when solving problems. 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., $x^0x^2x^3 = xxxxx = x^{2+3}$.	Level 3 students should be able to choose a quadratic expression with rational coefficients in an equivalent form that reveals a property of interest when solving problems. 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.	Level 4 students should be able to write a quadratic expression with rational coefficients in an equivalent form to solve problems.
RANGE ALD **Target F:** Perform arithmetic operations on polynomials.	Level 1 students should be able to add, subtract, and multiply single variable polynomials of degree 2 or less.	Level 2 students should be able to add, subtract, and multiply multi-variable polynomials made up of monomials of degree 2 or less. They should understand that polynomials are closed under addition.	Level 3 students should be able to add, subtract, and multiply multi-variable polynomials of any degree and understand that polynomials are closed under subtraction and multiplication.	Level 4 students should understand and be able to explain that polynomials form a system analogous to the integers.

RANGE ALD **Target G:** Create equations that describe numbers or relationships.	Level 1 students should be able to create and use one-step linear equations in one variable to model a familiar situation and to solve a familiar problem.	Level 2 students should be able to create and use quadratic equations, linear equations, and linear inequalities in one and two variables to model a familiar situation and to solve a familiar problem. They should be able to graph a linear or a quadratic equation in two variables and be able to rearrange a familiar formula or an unfamiliar linear formula in one or two variables for a particular given quantity.	Level 3 students should be able to create and use linear and quadratic equations and inequalities and exponential equations with an integer base and a monomial exponent to model an unfamiliar situation and to solve an unfamiliar problem. They should be able to graph an equation in two variables and be able to rearrange a quadratic formula for a particular given quantity.	Level 4 students should be able to create and use exponential equations with an integer base and a polynomial exponent in multiple variables to model an unfamiliar situation and to solve an unfamiliar problem. They should be able to rearrange a simple rational formula or multi-variable polynomial, linear, or quadratic formulas for a particular given quantity or to highlight a quantity of interest and be able to analyze in context to determine which quantity is of interest.
RANGE ALD **Target H:** Understand solving equations as a process of reasoning and explain the reasoning.	Level 1 students should be able to explain solution steps for solving one-step linear equations in one variable.	Level 2 students should be able to look for and make use of structure to solve simple radical equations and simple rational equations in one variable in which the variable term is in the numerator. They should be able to understand and explain solution steps for solving linear equations in one variable as a process of reasoning.	Level 3 students should be able to look for and make use of structure to solve simple radical and simple rational equations in one variable presented in various forms. They should be able to understand and explain solution steps for solving quadratic equations in one variable as a process of reasoning.	Level 4 students should be able to give examples showing how extraneous solutions may arise and why they arise when solving radical and simple rational equations. They should be able to explain how extraneous solutions may arise in context when solving linear and quadratic equations.
RANGE ALD **Target I:** Solve equations and inequalities in one variable.	Level 1 students should be able to solve one-step linear equations in one variable.	Level 2 students should be able to solve one-step linear inequalities and quadratic equations with a leading coefficient of 1 in one variable with integer roots.	Level 3 students should be able to solve multi-step linear equations and inequalities and quadratic equations in one variable with real roots.	No descriptor
RANGE ALD **Target J:** Represent and solve equations and inequalities graphically.	Level 1 students should be able to represent a linear equation with an integer-valued slope in two variables graphically on a coordinate plane	Level 2 students should be able to represent linear equations and inequalities with integer coefficients in one and two variables graphically on a coordinate plane and should understand that the plotted line represents the solution set to an equation. They should be able to graph and estimate the solution of systems of linear equations.	Level 3 students should be able to represent exponential functions graphically. They should be able to represent linear equations and inequalities and quadratic equations in two variables graphically on a coordinate plane and should understand that the plotted line or curve represents the solution set to an equation. They should be able to graph and estimate the solution of systems involving a linear equation and a simple quadratic equation.	Level 4 students should be able to explain why the x-coordinates of the points where f(x) and g(x) intersect compose the solution to f(x) = g(x).

THRESHOLD ALD **Algebra Targets D, E, F, G, H, I, and J**		The student who just enters Level 2 should be able to: • Use linear equations in one and two variables and inequalities in one variable to model a familiar situation and to solve a familiar problem. • Explain solution steps for solving linear equations and solve a simple radical equation. • Use properties of exponents to expand a single variable (coefficient of 1) repeated up to two times with a nonnegative integer exponent into an equivalent form and vice versa, e.g., $x^0x^2x^3 = xxxxx = x^{2+3}$ • Solve one-step linear equations and inequalities in one variable and understand the solution steps as a process of reasoning. • Represent linear equations and quadratic equations with integer coefficients in one and two variables graphically on a coordinate plane. • Recognize equivalent forms of linear expressions and choose a quadratic expression with integer leading coefficients in an equivalent form. • Add multi-variable polynomials made up of monomials of degree 2 or less. • Graph and estimate the solution of systems of linear equations and systems of linear inequalities.	The student who just enters Level 3 should be able to: • Create and use quadratic inequalities in two variables to model a situation and to solve a problem. • Choose a quadratic expression in one variable with rational coefficients in an equivalent form, identify its zeros, and explain the solution steps as a process of reasoning. • Use properties of exponents to write equivalent forms of exponential functions with one or more variables with integer coefficients with nonnegative integer exponents involving operations of addition, subtraction, and multiplication without requiring distribution of an exponent across parentheses. • Solve a quadratic equation with integer roots. • Represent exponential functions graphically and estimate the solution of systems of equations displayed graphically. • Understand that the plotted line, curve, or region represents the solution set to an equation or inequality. • Add and subtract multi-variable polynomials of any degree and understand that polynomials are closed under subtraction.	The student who just enters Level 4 should be able to: • Choose an appropriate equivalent form of an expression in order to reveal a property of interest when solving problems. • Solve a formula for any variable in the formula. • Provide an example that would lead to an extraneous solution when solving simple rational equations.
Functions				
RANGE ALD **Target K:** Understand the concept of a function and use function notations.	Level 1 students should be able to distinguish between functions and nonfunctions. They should be able to state the domain and range given a graph.	Level 2 students should understand the concept of a function in order to distinguish a relation as a function or not a function. They should be able to identify domain and range of a function given a graph of a quadratic or linear function, and they should understand that the graph of a function f(x) is the graph of the equation y = f(x).	Level 3 students should be able to use function notation to evaluate a linear, quadratic, or exponential function given in function notation for a particular input. They should be able to identify the domain and range for any linear, quadratic, or exponential function presented in any form, e.g., as a graph, a verbal description, or a sequence.	Level 4 students should be able to find the input for a given output of linear, quadratic, or exponential functions when given in function notation.
RANGE ALD **Target L:** Interpret functions that arise in applications in terms of a context.	Level 1 students should be able to interpret linear functions in context, and given the key features of a linear graph, they should be able to identify the appropriate graph.	Level 2 students should be able to interpret quadratic functions in two variables in context of the situation, and given the key features of a graph of a polynomial function, they should be able to identify the appropriate graph.	Level 3 students should be able to graph linear, quadratic, and exponential functions and interpret and relate key features, including range and domain, in familiar or scaffolded contexts.	Level 4 students should be able to interpret complex key features such as symmetries and end behavior of graphs and functions in unfamiliar problems or contexts.

RANGE ALD **Target M:** Analyze functions using different representations.	Level 1 students should be able to graph a linear function by hand or by using technology. They should be able to compare properties of two linear functions represented in different ways. They should be able to identify equivalent forms of linear functions.	Level 2 students should be able to graph quadratic functions by hand; graph exponential functions by hand or by using technology; compare properties of two quadratic or two other functions of the same type, i.e., linear to linear, represented in different ways; and understand equivalent forms of linear and quadratic functions.	Level 3 students should be able to analyze and compare properties of two linear, quadratic, or exponential functions of different types represented in different ways and understand equivalent forms of functions.	Level 4 students should be able to graph a variety of functions, including linear, quadratic, and exponential, by hand and by using technology. They should be able to analyze and explain relationships between various types of functions and the behaviors of the functions and be able to determine which equivalent form is most appropriate for a given task.
RANGE ALD **Target N:** Build a function that models a relationship between two quantities.	Level 1 students should be able to identify an explicit function and determine the steps for calculation from a context requiring up to two steps. They should be able to add and subtract two linear functions.	Level 2 students should be able to build an explicit linear function to describe or model a relationship between two quantities and determine the steps for calculation from a context.	Level 3 students should be able to add, subtract, and multiply linear, quadratic, and exponential functions.	Level 4 students should be able to determine when it is appropriate to combine functions using arithmetic operations in context.
THRESHOLD ALD **Functions Targets K, L, M, and N**		The student who just enters Level 2 should be able to: • Understand the concept of a function in order to distinguish a relation as a function or not a function. • The student should be able to identify the appropriate graphs. • Identify properties of two linear or two quadratic functions. Understand equivalent forms of linear and quadratic functions. • Graph linear functions by hand and by using technology. • Build an explicit function to describe or model a relationship between two quantities. • Add, subtract, and multiply linear functions.	The student who just enters Level 3 should be able to: • Identify the domain and range of linear, quadratic, and exponential functions presented in any form. • Use function notation to evaluate a function for numerical or monomial inputs. • Appropriately interpret key features of linear, quadratic, and exponential functions in familiar or scaffolded contexts. • Graph quadratic and exponential functions both by hand and by using technology. • Analyze and compare properties of a linear function to properties of another function of any type.	The student who just enters Level 4 should be able to: • Find the input of a function when given the function in function notation and the output, or find the output when given the input. • Describe complex features such as symmetries, and end behavior of the graph of a function.
Statistics and Probability				
RANGE ALD **Target P:** Summarize, represent, and interpret data on a single count or measurement variable.	Level 1 students should be able to describe a data set in terms of center and spread and represent data graphically.	Level 2 students should be able to describe and use appropriate statistics to interpret and explain differences in shape, center, and spread of two or more different data sets, including box plots, histograms, or dot plots, representing familiar contexts. They should be able to identify the mean and the median and select the appropriate one for representing the center of the data for data sets.	Level 3 students should be able to use appropriate statistics to interpret, explain, and summarize differences in shape, center, and spread of two or more different data sets of varying complexity and levels of familiarity, including the effect of outliers. They should be able to select the appropriate choice of spread as interquartile range or standard deviation based on the selection of center.	Level 4 students should be able to interpret data to explain why a data value is an outlier and interpret and explain differences in the approximate areas under the normal curve of two or more data sets. They should be able to use the standard deviation of a data set to fit to a normal distribution.

THRESHOLD ALD **Statistics and Probability Target P**		The student who just enters Level 2 should be able to: • Describe the differences in shape, center, and spread of two or more different data sets representing familiar contexts.	The student who just enters Level 3 should be able to: • Select the appropriate choice of spread as interquartile range or standard deviation based on the selection of the measure of center.	The student who just enters Level 4 should be able to: • Interpret data to explain why a data value is an outlier.
Concepts and Procedures: Domain #2				
Quantities				
RANGE ALD **Target C:** Reason quantitatively and use units to solve problems	Level 1 students should be able to choose the units in a formula, correctly scale a graph with unit increments, and identify a quantity from a graph with a scale in unit increments of a specified measurement.	Level 2 students should be able to reason quantitatively to choose and interpret the units in a formula given in a familiar context, including making measurement conversions between simple units and identifying a quantity from a graph with the scale in increments of various sizes. They should be able to use units to guide the solution of a familiar multi-step problem with scaffolding.	Level 3 students should be able to reason quantitatively to choose and interpret the units in a formula given in an unfamiliar context, including making measurement conversions between compound units, and to define appropriate quantities or measurements in familiar contexts with some scaffolding to construct a model. They should be able to identify appropriate levels of measurement precision in context and to choose and interpret the scale and origin of a linear, quadratic, or exponential graph or data display. They should be able to use units to guide the solution of an unfamiliar multi-step problem without scaffolding.	Level 4 students should be able to define appropriate quantities or measurements in unfamiliar contexts with little to no scaffolding to construct a model.
THRESHOLD ALD **Quantities Target C**		The student who just enters Level 2 should be able to: • Choose and interpret the correct units in a formula given in a familiar context, including making measurement conversions between simple units.	The student who just enters Level 3 should be able to: • Reason quantitatively to choose and interpret the units in a formula given in an unfamiliar context, including making compound measurement conversions. • Define appropriate quantities or measurements in familiar contexts with some scaffolding to construct a model. • Choose the scale and origin of a linear or quadratic graph or data display	The student who just enters Level 4 should be able to: • Define appropriate quantities or measurements in unfamiliar contexts with some scaffolding to construct a model.
Number and Quantity				
RANGE ALD **Target A:** Extend the properties of exponents to rational exponents.	Level 1 students should be able to rewrite expressions with rational exponents of the form (1/n) to radical form and vice versa.	Level 2 students should be able to look for and use structure to extend the properties of integer exponents to multiply and divide expressions with rational exponents that have common denominators.	Level 3 students should be able to rewrite expressions with rational exponents of the form (m/n) to radical form, and radical expressions with integer exponents to exponent form. Look for and use structure to extend the properties of integer exponents to laws of exponents on radical expressions and expressions with rational exponents.	Level 4 students should be able to identify the exponent property used when rewriting expressions and recognize when laws of exponents cannot be used to rewrite an expression.

RANGE ALD **Target B:** Use properties of rational and irrational numbers.	Level 1 students should be able to identify the difference between a rational and an irrational number.	Level 2 students should be able to perform operations on rational and irrational numbers and should be able to look for and use repeated reasoning to understand that the rational numbers are closed under addition and multiplication.	Level 3 students should be able to look for and use repeated reasoning to understand and explain that the sum and product of a rational number and a nonzero irrational number are irrational.	Level 4 students should be able to provide a specific example given a generalization statement, such as the sum of a rational number and an irrational number is irrational.
THRESHOLD ALD **Number and Quantity Targets A and B**		The student who just enters Level 2 should be able to: • Extend the properties of integer exponents to multiply expressions with rational exponents that have common denominators. • Perform operations on rational numbers and familiar irrational numbers. • Understand that rational numbers are closed under addition and multiplication.	The student who just enters Level 3 should be able to: • Apply laws of exponents on expressions with exponents that have common denominators. • Rewrite expressions with rational exponents of the form (m/n) to radical form. • Rewrite radical expressions with integer exponents to exponent form. • Use repeated reasoning to recognize that the sums and products of a rational number and a nonzero irrational number are irrational.	The student who just enters Level 4 should be able to: • Explain the relationship between properties of integer exponents and properties of rational exponents.
Similarity, Right Triangles, and Trigonometry				
RANGE ALD **Target O:** Define trigonometric ratios and solve problems involving right triangles.	Level 1 students should be able to identify trigonometric ratios and use the Pythagorean Theorem to solve for the missing side in a right triangle in familiar real-world or mathematical contexts with scaffolding.	Level 2 students should be able to define trigonometric ratios and should know the relationship between the sine and cosine of complementary angles. They should be able to use the Pythagorean Theorem in unfamiliar problems and trigonometric ratios in familiar problems to solve for the missing side in a right triangle with some scaffolding.	Level 3 students should be able to use the Pythagorean Theorem, trigonometric ratios, and the sine and cosine of complementary angles to solve unfamiliar problems with minimal scaffolding involving right triangles, finding the missing side or missing angle of a right triangle.	Level 4 students should be able to solve unfamiliar, complex, or multistep problems without scaffolding involving right triangles.
THRESHOLD ALD **Similarity, Right Triangles, and Trigonometry Target O**		The student who just enters Level 2 should be able to: • Use the Pythagorean Theorem in unfamiliar problems to solve for the missing side in a right triangle with some scaffolding.	The student who just enters Level 3 should be able to: • Use trigonometric ratios and the sine and cosine of complementary angles to find missing angles or sides of a given right triangle with minimal scaffolding.	The student who just enters Level 4 should be able to: • Solve right triangle problems with multiple stages and in compound figures without scaffolding.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 2: Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.	*CONTENT ALD: The Level 1 student can make sense of and solve simple and familiar well-posed problems in pure and applied mathematics with a high degree of scaffolding, making minimal use of basic problem-solving strategies and given tools.*	*CONTENT ALD: The Level 2 student can make sense of and solve familiar well-posed problems in pure and applied mathematics with a moderate degree of scaffolding, making partial use of knowledge, basic problem-solving strategies, and tools.*	*CONTENT ALD: The Level 3 student can make sense of and persevere in solving a range of unfamiliar well-posed problems in pure and applied mathematics with a limited degree of scaffolding, making adequate use of knowledge and appropriate problem-solving strategies and strategic use of appropriate tools.*	*CONTENT ALD: The Level 4 student can make sense of and persevere in solving a range of complex and unfamiliar well-posed problems in pure and applied mathematics with no scaffolding, making thorough use of knowledge and problem-solving strategies and strategic use of appropriate tools.*
CLAIM 4: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.	*The Level 1 student can identify familiar real-world scenarios for analysis and can use simple mathematical models and given tools to solve basic problems.*	*The Level 2 student can reason quantitatively to analyze familiar real-world scenarios and can use mathematical models and given tools to partially interpret and solve basic problems.*	*The Level 3 student can reason abstractly and quantitatively to analyze complex, real-world scenarios and to construct and use mathematical models and appropriate tools strategically to adequately interpret and solve problems.*	*The Level 4 student can reason abstractly and quantitatively to analyze unfamiliar complex, real-world scenarios, to construct and use complex mathematical models and appropriate tools strategically to thoroughly interpret and solve problems, and to synthesize results.*
Problem Solving & Modeling and Data Analysis				
CLAIM 2 RANGE ALD **Target A:** Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. **CLAIM 2 RANGE ALD** **Target B:** Select and use appropriate tools strategically. **CLAIM 2 RANGE ALD** **Target C:** Interpret results in the context of a situation. **CLAIM 2 RANGE ALD** **Target D:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).	Level 1 students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.	Level 2 students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.	Level 3 students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.	Level 4 students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

CLAIM 4 RANGE ALD **Target A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. **CLAIM 4 RANGE ALD** **Target B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. **CLAIM 4 RANGE ALD** **Target C:** State logical assumptions being used. **CLAIM 4 RANGE ALD** **Target D:** Interpret results in the context of a situation. **CLAIM 4 RANGE ALD** **Target E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **CLAIM 4 RANGE ALD** **Target F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). **CLAIM 4 RANGE ALD** **Target G:** Identify, analyze, and synthesize relevant external resources to pose or solve problems.	Level 1 students should be able to apply mathematics to solve familiar problems arising in everyday life, society, and the workplace by identifying important quantities and by beginning to develop a model.	Level 2 students should be able to apply mathematics to propose solutions by identifying important quantities, locating missing information from relevant external resources, beginning to construct chains of reasoning to connect with a model, producing partial justification and interpretations, and beginning to state logical assumptions.	Level 3 students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.	Level 4 students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.
THRESHOLD ALD **Claims 2 and 4**		The student who just enters Level 2 should be able to: • Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy. • Use the necessary elements given in a problem situation to solve a problem. • Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources.	The student who just enters Level 3 should be able to: • Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace. • Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions.	The student who just enters Level 4 should be able to: • Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity. • Begin to solve problems optimally. • Construct multiple plausible solutions and approaches.

OVERALL CLAIM: Students can demonstrate progress toward college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 3: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	*CONTENT ALD: The Level 1 student can construct simple viable arguments with minimal clarity and precision to support his or her own reasoning in familiar contexts.*	*CONTENT ALD: The Level 2 student can construct viable arguments with partial clarity and precision to support his or her own reasoning and to partially critique the reasoning of others in familiar contexts.*	*CONTENT ALD: The Level 3 student can construct viable arguments with adequate clarity and precision to support his or her own reasoning and to critique the reasoning of others.*	*CONTENT ALD: The Level 4 student can construct viable arguments with thorough clarity and precision in unfamiliar contexts to support his or her own reasoning and to critique the reasoning of others.*
Communicating Reasoning				
CLAIM 3 RANGE ALD **Target A:** Test propositions or conjectures with specific examples.	Level 1 students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.	Level 2 students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.	Level 3 students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.	Level 4 students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.
CLAIM 3 RANGE ALD **Target B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.				
CLAIM 3 RANGE ALD **Target C:** State logical assumptions being used.				
CLAIM 3 RANGE ALD **Target D:** Use the technique of breaking an argument into cases.				
CLAIM 3 RANGE ALD **Target E:** Distinguish correct logic or reasoning from that which is flawed and— if there is a flaw in the argument— explain what it is.				
CLAIM 3 RANGE ALD **Target F:** Base arguments on concrete referents such as objects, drawings, diagrams, and actions.				

CLAIM 3 RANGE ALD **Target G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)				
THRESHOLD ALD **Claim 3**		The student who just enters Level 2 should be able to: • Find and identify the flaw in an argument.	The student who just enters Level 3 should be able to: • Use stated assumptions, definitions, and previously established results and examples to identify and repair a flawed argument. • Use previous information to support his or her own reasoning on a routine problem.	The student who just enters Level 4 should be able to: • Begin to construct chains of logic about abstract concepts autonomously.

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CLAIM 1: Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	*CONTENT ALD: The Level 1 student can minimally explain and in a minimal way apply mathematical concepts. The Level 1 student interprets and carries out mathematical procedures with minimal precision and fluency.*	*CONTENT ALD: The Level 2 student can partially explain and partially apply mathematical concepts. The Level 2 student interprets and carries out mathematical procedures with partial precision and fluency.*	*CONTENT ALD: The Level 3 student can adequately explain and adequately apply mathematical concepts. The Level 3 student interprets and carries out mathematical procedures with adequate precision and fluency.*	*CONTENT ALD: The Level 4 student can thoroughly explain and accurately apply mathematical concepts. The Level 4 student interprets and carries out mathematical procedures with high precision and fluency.*
Concepts and Procedures: Domain #1				
Algebra				
RANGE ALD **Target D:** Interpret the structure of expressions.	Level 1 students should be able to identify parts of an expression, such as terms, factors, coefficients, exponents, etc.	Level 2 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.	Level 3 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.	Level 4 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 ALD **Target E:** Write expressions in equivalent forms to solve problems.	Level 1 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., $x^3 = xxx$.	Level 2 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., $x^0x^2x^3 = xxxxx = x^{2+3}$.	Level 3 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.	Level 4 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.
RANGE ALD **Target F:** Perform arithmetic operations on polynomials.	Level 1 students should be able to add, subtract, and multiply single-variable polynomials of degree 2 or less.	Level 2 students should be able to add, subtract, and multiply multi-variable polynomials made up of monomials of degree 2 or less. They should understand that polynomials are closed under addition.	Level 3 students should be able to add, subtract, and multiply multi-variable polynomials of any degree and understand that polynomials are closed under subtraction and multiplication.	Level 4 students should understand and be able to explain that polynomials form a system analogous to the integers.
RANGE ALD **Target G:** Create equations that describe numbers or relationships.	Level 1 students should be able to create and use one-step linear equations in one variable to model a familiar situation and to solve a familiar problem.	Level 2 students should be able to create and use quadratic equations, linear equations, and linear inequalities in one and two variables to model a familiar situation and to solve a familiar problem. They should be able to graph a linear or a quadratic equation in two variables and be able to rearrange a familiar formula or an unfamiliar linear formula in one or two variables for a particular given quantity.	Level 3 students should be able to create and use linear, quadratic, and rational equations and inequalities and exponential equations with an integer base and a polynomial exponent in multiple variables to model an unfamiliar situation and to solve an unfamiliar problem. They should be able to graph an equation in two variables and be able to rearrange a linear, a quadratic, an absolute, a rational, or a cubic multi-variable formula for a particular given quantity.	Level 4 students should be able to rearrange polynomial, logarithmic, exponential, or trigonometric formulas with one or more variables to highlight a quantity of interest and be able to analyze in context to determine which quantity is of interest.

RANGE ALD **Target H:** Understand solving equations as a process of reasoning and explain the reasoning.	Level 1 students should be able to explain solution steps for solving one-step linear equations in one variable.	Level 2 students should be able to look for and make use of structure to solve simple radical equations and simple rational equations in one variable in which the variable term is in the numerator and should understand the solution steps as a process of reasoning. They should be able to understand and explain solution steps for solving linear equations in one variable as a process of reasoning.	Level 3 students should be able to look for and make use of structure to solve simple radical and rational equations in one variable presented in various forms. They should be able to understand and explain solution steps for solving quadratic, radical, and rational equations in one variable as a process of reasoning.	Level 4 students should be able to give examples showing how extraneous solutions may arise and why they arise when solving linear, quadratic, radical, and rational equations.
RANGE ALD **Target I:** Solve equations and inequalities in one variable.	Level 1 students should be able to solve one-step linear equations in one variable.	Level 2 students should be able to solve one-step linear inequalities and quadratic equations in one variable with integer roots.	Level 3 students should be able to solve multi-step linear equations and inequalities and quadratic equations in one variable with real roots.	Level 4 students should be able to solve quadratic equations in one variable with complex roots.
RANGE ALD **Target J:** Represent and solve equations and inequalities graphically.	Level 1 students should be able to represent a linear equation with an integer-valued slope in two variables graphically on a coordinate plane.	Level 2 students should be able to represent linear equations and inequalities and quadratic equations with integer coefficients in one and two variables graphically on a coordinate plane and should understand that the plotted line or curve represents the solution set to an equation. They should be able to graph and estimate the solution of systems of linear equations.	Level 3 students should be able to represent polynomial, rational, absolute value, exponential, and logarithmic functions graphically. They should be able to graph and estimate the solution of systems of equations and systems of linear inequalities. They should understand that the plotted line, curve, or region represents the solution set to an equation or inequality.	Level 4 students should be able to explain why the x-coordinates of the points where $f(x)$ and $g(x)$ intersect compose the solution to $f(x) = g(x)$.
THRESHOLD ALD **Algebra Targets D, E, F, G, H, I, and J**		The student who just enters Level 2 should be able to: • Use linear equations in one and two variables and inequalities in one variable to model a familiar situation and to solve a familiar problem. • Explain solution steps for solving linear equations and solve a simple radical equation. • Use properties of exponents to expand a single variable (coefficient of 1) repeated up to two times with a nonnegative integer exponent into an equivalent form and vice versa, e.g., $x^2x^3 = xxxxx = x^{2+3}$. • Solve one-step linear equations and inequalities in one variable and understand the solution steps as a process of reasoning. • Represent linear equations and quadratic equations with integer coefficients in one and two variables graphically on a coordinate plane. • Recognize equivalent forms of linear expressions and write a quadratic expression with integer-leading coefficients in an equivalent form by factoring. • Add multi-variable polynomials made up of monomials of degree 2 or less. • Graph and estimate the solution of systems of linear equations.	The student who just enters Level 3 should be able to: • Create and use quadratic inequalities in two variables to model a situation and to solve a problem. • Write a quadratic expression in one variable with rational coefficients in an equivalent form by factoring, identify its zeros, and explain the solution steps as a process of reasoning. • Use properties of exponents to write equivalent forms of exponential functions with one or more variables with integer coefficients with nonnegative integer exponents involving operations of addition, subtraction, and multiplication without requiring distribution of an exponent across parentheses. • Solve a quadratic equation with integer roots in standard form. • Represent polynomial and exponential functions graphically and estimate the solution of systems of equations displayed graphically. • Understand that the plotted line, curve, or region represents the solution set to an equation or inequality. • Add and subtract multi-variable polynomials of any degree and understand that polynomials are closed under subtraction.	The student who just enters Level 4 should be able to: • Choose an appropriate equivalent form of an expression in order to reveal a property of interest when solving problems. • Solve a formula for any variable in the formula. • Provide an example that would lead to an extraneous solution when solving linear, quadratic, radical, and rational equations. • Use a variety of methods such as factoring, completing the square, quadratic formula, etc., to solve equations and to find minimum and maximum values of quadratic equations.

Functions				
RANGE ALD **Target K:** Understand the concept of a function and use function notations.	Level 1 students should be able to distinguish between functions and nonfunctions. They should be able to state the domain and range given a graph.	Level 2 students should understand the concept of a function in order to distinguish a relation as a function or not a function. They should be able to identify domain and range of a function given a graph of a quadratic, linear, cubic, or absolute function, and they should understand that the graph of a function $f(x)$ is the graph of the equation $y = f(x)$.	Level 3 students should be able to use function notation to evaluate a function given in function notation for a particular input. They should be able to identify the domain and range for any given function presented in any form, e.g., as a graph, a verbal description, or a sequence.	Level 4 students should be able to find the input for a given output when given in function notation.
RANGE ALD **Target L:** Interpret functions that arise in applications in terms of a context.	Level 1 students should be able to interpret linear functions in context, and given the key features of a linear graph, they should be able to identify the appropriate graph.	Level 2 students should be able to interpret quadratic and other polynomial functions in two variables in context of the situation, and given the key features of a graph of a polynomial function, they should be able to identify the appropriate graph. They should be able to specify the average rate of change from an equation of a linear function and approximate it from a graph of a linear function.	Level 3 students should be able to graph various types of functions and interpret and relate key features, including range and domain, in familiar or scaffolded contexts. They should be able to specify the average rate of change of a function on a given domain from its equation or approximate the average rate of change of a function from its graph.	Level 4 students should be able to interpret complex key features such as holes, symmetries, and end behavior of graphs and functions in unfamiliar problems or contexts.
RANGE ALD **Target M:** Analyze functions using different representations.	Level 1 students should be able to graph a linear function by hand or by using technology. They should be able to compare properties of two linear functions represented in different ways. They should be able to identify equivalent forms of linear functions.	Level 2 students should be able to graph linear and quadratic functions by hand; graph square root, cube root, piecewise-defined, polynomial, exponential, and logarithmic functions by hand or by using technology; compare properties of two quadratic or two other functions of the same type, i.e., linear to linear, represented in different ways; and understand equivalent forms of linear and quadratic functions. They should be able to compare properties of two trigonometric functions represented in the same way.	Level 3 students should be able to analyze and compare properties of two functions of different types represented in different ways and understand equivalent forms of functions. They should be able to graph trigonometric functions by hand and by using technology.	Level 4 students should be able to graph a variety of functions, including linear, quadratic, square root, cube root, piecewise-defined, polynomial, exponential, logarithmic, and trigonometric, by hand and by using technology. They should be able to analyze and explain relationships between various types of functions and the behaviors of the functions and be able to determine which equivalent form is most appropriate for a given task.
RANGE ALD **Target N:** Build a function that models a relationship between two quantities.	Level 1 students should be able to identify an explicit or a recursive function and determine the steps for calculation from a context requiring up to two steps. They should be able to add and subtract two linear functions.	Level 2 students should be able to build an explicit or a recursive function to describe or model a relationship between two quantities and determine the steps for calculation from a context. They should be able to add, subtract, and multiply linear and quadratic functions.	Level 3 students should be able to translate between explicit and recursive forms of a function. They should be able to add, subtract, multiply, and divide functions.	Level 4 students should be able to determine when it is appropriate to combine functions using arithmetic operations in context.

THRESHOLD ALD **Functions Targets K, L, M, and N**		The student who just enters Level 2 should be able to: • Understand the concept of a function in order to distinguish a relation as a function or not a function. • Interpret quadratic functions in context, and given the key features of a graph, the student should be able to identify the appropriate graph. • Graph quadratic functions by hand or by using technology. • Identify properties of two linear or two quadratic functions. • Understand equivalent forms of linear and quadratic functions. • Build an explicit function to describe or model a relationship between two quantities. • Add, subtract, and multiply linear functions.	The student who just enters Level 3 should be able to: • Identify the domain and range of linear, quadratic, and exponential functions presented in any form. • Use function notation to evaluate a function for numerical or monomial inputs. • Appropriately graph and interpret key features of linear, quadratic, and exponential functions in familiar or scaffolded contexts and specify the average rate of change of a function on a given domain from its equation or approximate the average rate of change of a function from its graph. • Graph linear, quadratic, logarithmic, and exponential functions by hand and by using technology. • Analyze and compare properties of a linear function to properties of another function of any type. • Build a recursive function to describe or model a relationship between two quantities. • Divide linear functions.	The student who just enters Level 4 should be able to: • Find the input of a function when given the function in function notation and the output, or find the output when given the input. • Describe complex features such as holes, symmetries, and end behavior of the graph of a function. • Graph functions both by hand and by using technology.
Statistics and Probability				
RANGE ALD **Target P:** Summarize, represent, and interpret data on a single count or measurement variable.	Level 1 students should be able to describe a data set in terms of center and spread and represent data graphically.	Level 2 students should be able to describe and use appropriate statistics to interpret and explain differences in shape, center, and spread of two or more different data sets, including box plots, histograms, or dot plots, representing familiar contexts. They should be able to identify the mean and the median and select the appropriate one for representing the center of the data for data sets.	Level 3 students should be able to use appropriate statistics to interpret, explain, and summarize differences in shape, center, and spread of two or more different data sets of varying complexity and levels of familiarity, including the effect of outliers. They should be able to select the appropriate choice of spread as interquartile range or standard deviation based on the selection of center and use the standard deviation of a data set to fit to a normal distribution.	Level 4 students should be able to interpret data to explain why a data value is an outlier and interpret and explain differences in the approximate areas under the normal curve of two or more data sets.
THRESHOLD ALD **Statistics and Probability Target P**		The student who just enters Level 2 should be able to: • Describe the differences in shape, center, and spread of two or more different data sets representing familiar contexts.	The student who just enters Level 3 should be able to: • Select the appropriate choice of spread as interquartile range or standard deviation based on the selection of the measure of center.	The student who just enters Level 4 should be able to: • Interpret data to explain why a data value is an outlier.
Concepts and Procedures: Domain #2				
Quantities				
RANGE ALD **Target C:** Reason quantitatively and use units to solve problems.	Level 1 students should be able to choose the units in a formula, correctly scale a graph with unit increments, and identify a quantity from a graph with a scale in unit increments of a specified measurement.	Level 2 students should be able to reason quantitatively to choose and interpret the units in a formula given in a familiar context, including making measurement conversions between simple units and identifying a quantity from a graph with the scale in increments of various sizes. They should be able to use units to guide the solution of a familiar multi-step problem with scaffolding.	Level 3 students should be able to reason quantitatively to choose and interpret the units in a formula given in an unfamiliar context, including making measurement conversions between compound units, and to define appropriate quantities or measurements in familiar contexts with some scaffolding to construct a model. They should be able to identify appropriate levels of measurement precision in context and to choose and interpret the scale and origin of a graph or data display. They should be able to use units to guide the solution of an unfamiliar multi-step problem without scaffolding.	Level 4 students should be able to define appropriate quantities or measurements in unfamiliar contexts with little to no scaffolding to construct a model.

THRESHOLD ALD **Quantities Target C**		The student who just enters Level 2 should be able to: • Choose and interpret the correct units in a formula given in a familiar context, including making measurement conversions between simple units.	The student who just enters Level 3 should be able to: • Reason quantitatively to choose and interpret the units in a formula given in an unfamiliar context, including making compound measurement conversions. • Define appropriate quantities or measurements in familiar contexts with some scaffolding to construct a model. • Choose the scale and origin of a graph or data display.	The student who just enters Level 4 should be able to: • Define appropriate quantities or measurements in unfamiliar contexts with some scaffolding to construct a model.
Number and Quantity				
RANGE ALD **Target A:** Extend the properties of exponents to rational exponents.	Level 1 students should be able to rewrite expressions with rational exponents of the form $(1/n)$ to radical form and vice versa.	Level 2 students should be able to look for and use structure to extend the properties of integer exponents to multiply and divide expressions with rational exponents that have common denominators.	Level 3 students should be able to rewrite expressions with rational exponents of the form (m/n) to radical form, and vice versa, and look for and use structure to extend the properties of integer exponents to all laws of exponents on radical expressions and expressions with rational exponents.	Level 4 students should be able to identify the exponent property used when rewriting expressions and recognize when laws of exponents cannot be used to rewrite an expression.
RANGE ALD **Target B:** Use properties of rational and irrational numbers.	Level 1 students should be able to identify the difference between a rational and an irrational number.	Level 2 students should be able to perform operations on rational and irrational numbers and should be able to look for and use repeated reasoning to understand that the rational numbers are closed under addition and multiplication.	Level 3 students should be able to look for and use repeated reasoning to understand and explain that the sum and product of a rational number and a nonzero irrational number are irrational.	Level 4 students should be able to provide a specific example given a generalization statement, such as the sum of a rational number and an irrational number is irrational.
THRESHOLD ALD **Number and Quantity Targets A and B**		The student who just enters Level 2 should be able to: • Extend the properties of integer exponents to multiply expressions with rational exponents that have common denominators. • Perform operations on rational numbers and familiar irrational numbers. • Understand that rational numbers are closed under addition and multiplication.	The student who just enters Level 3 should be able to: • Apply all laws of exponents on expressions with exponents that have common denominators. • Rewrite expressions with rational exponents of the form (m/n) to radical form and vice versa. • Use repeated reasoning to recognize that the sums and products of a rational number and a nonzero irrational number are irrational.	The student who just enters Level 4 should be able to: • Explain the relationship between properties of integer exponents and properties of rational exponents.
Similarity, Right Triangles, and Trigonometry				
RANGE ALD **Target O:** Define trigonometric ratios and solve problems involving right triangles.	Level 1 students should be able to identify trigonometric ratios and use the Pythagorean Theorem to solve for the missing side in a right triangle in familiar real-world or mathematical contexts with scaffolding.	Level 2 students should be able to define trigonometric ratios and should know the relationship between the sine and cosine of complementary angles. They should be able to use the Pythagorean Theorem in unfamiliar problems and trigonometric ratios in familiar problems to solve for the missing side in a right triangle with some scaffolding.	Level 3 students should be able to use the Pythagorean Theorem, trigonometric ratios, and the sine and cosine of complementary angles to solve unfamiliar problems with minimal scaffolding involving right triangles, finding the missing side or missing angle of a right triangle.	Level 4 students should be able to solve unfamiliar, complex, or multi-step problems without scaffolding involving right triangles.
THRESHOLD ALD **Similarity, Right Triangles, and Trigonometry Target O**		The student who just enters Level 2 should be able to: • Use the Pythagorean Theorem in unfamiliar problems to solve for the missing side in a right triangle with some scaffolding.	The student who just enters Level 3 should be able to: • Use trigonometric ratios and the sine and cosine of complementary angles to find missing angles or sides of a given right triangle with minimal scaffolding.	The student who just enters Level 4 should be able to: • Solve right triangle problems with multiple stages and in compound figures without scaffolding.

OVERALL CLAIM: Students can demonstrate college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 2: Students can solve a range of complex, well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies. *CLAIM 4: Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.*	*CONTENT ALD: The Level 1 student can make sense of and solve simple and familiar well-posed problems in pure and applied mathematics with a high degree of scaffolding, making minimal use of basic problem-solving strategies and given tools.* *The Level 1 student can identify familiar real-world scenarios for analysis and can use simple mathematical models and given tools to solve basic problems.*	*CONTENT ALD: The Level 2 student can make sense of and solve familiar well-posed problems in pure and applied mathematics with a moderate degree of scaffolding, making partial use of knowledge, basic problem-solving strategies, and tools.* *The Level 2 student can reason quantitatively to analyze familiar real-world scenarios and can use mathematical models and given tools to partially interpret and solve basic problems.*	*CONTENT ALD: The Level 3 student can make sense of and persevere in solving a range of unfamiliar well-posed problems in pure and applied mathematics with a limited degree of scaffolding, making adequate use of knowledge and appropriate problem-solving strategies and strategic use of appropriate tools.* *The Level 3 student can reason abstractly and quantitatively to analyze complex, real-world scenarios and to construct and use mathematical models and appropriate tools strategically to adequately interpret and solve problems.*	*CONTENT ALD: The Level 4 student can make sense of and persevere in solving a range of complex and unfamiliar well-posed problems in pure and applied mathematics with no scaffolding, making thorough use of knowledge and problem-solving strategies and strategic use of appropriate tools.* *The Level 4 student can reason abstractly and quantitatively to analyze unfamiliar complex, real-world scenarios, to construct and use complex mathematical models and appropriate tools strategically to thoroughly interpret and solve problems, and to synthesize results.*
Problem Solving & Modeling and Data Analysis				
CLAIM 2 RANGE ALD **Target A:** Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. **CLAIM 2 RANGE ALD** **Target B:** Select and use appropriate tools strategically. **CLAIM 2 RANGE ALD** **Target C:** Interpret results in the context of a situation. **CLAIM 2 RANGE ALD** **Target D:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).	Level 1 students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.	Level 2 students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.	Level 3 students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.	Level 4 students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

CLAIM 4 RANGE ALD **Target A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. **CLAIM 4 RANGE ALD** **Target B:** Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. **CLAIM 4 RANGE ALD** **Target C:** State logical assumptions being used. **CLAIM 4 RANGE ALD** **Target D:** Interpret results in the context of a situation. **CLAIM 4 RANGE ALD** **Target E:** Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **CLAIM 4 RANGE ALD** **Target F:** Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). **CLAIM 4 RANGE ALD** **Target G:** Identify, analyze, and synthesize relevant external resources to pose or solve problems.	Level 1 students should be able to apply mathematics to solve familiar problems arising in everyday life, society, and the workplace by identifying important quantities and by beginning to develop a model.	Level 2 students should be able to apply mathematics to propose solutions by identifying important quantities, locating missing information from relevant external resources, beginning to construct chains of reasoning to connect with a model, producing partial justification and interpretations, and beginning to state logical assumptions.	Level 3 students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.	Level 4 students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.
THRESHOLD ALD **Claims 2 and 4**		The student who just enters Level 2 should be able to: • Select tools to solve a familiar and moderately scaffolded problem and apply them with partial accuracy. • Use the necessary elements given in a problem situation to solve a problem. • Apply mathematics to propose solutions by identifying important quantities and by locating missing information from relevant external resources.	The student who just enters Level 3 should be able to: • Use appropriate tools to accurately solve problems arising in everyday life, society, and the workplace. • Apply mathematics to solve problems by identifying important quantities and mapping their relationship and by stating and using logical assumptions.	The student who just enters Level 4 should be able to: • Analyze and interpret the context of an unfamiliar situation for problems of increasing complexity. • Begin to solve problems optimally. • Construct multiple plausible solutions and approaches.

OVERALL CLAIM: Students can demonstrate college and career readiness in mathematics.	*POLICY ALD: The Level 1 student demonstrates minimal understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 2 student demonstrates partial understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 3 student demonstrates adequate understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*	*POLICY ALD: The Level 4 student demonstrates thorough understanding of and ability to apply the mathematics knowledge and skills needed for success in college and careers, as specified in the Common Core State Standards.*
CLAIM 3: Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.	*CONTENT ALD: The Level 1 student can construct simple viable arguments with minimal clarity and precision to support his or her own reasoning in familiar contexts.*	*CONTENT ALD: The Level 2 student can construct viable arguments with partial clarity and precision to support his or her own reasoning and to partially critique the reasoning of others in familiar contexts.*	*CONTENT ALD: The Level 3 student can construct viable arguments with adequate clarity and precision to support his or her own reasoning and to critique the reasoning of others.*	*CONTENT ALD: The Level 4 student can construct viable arguments with thorough clarity and precision in unfamiliar contexts to support his or her own reasoning and to critique the reasoning of others.*
Communicating Reasoning				
CLAIM 3 RANGE ALD **Target A:** Test propositions or conjectures with specific examples.	Level 1 students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.	Level 2 students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.	Level 3 students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.	Level 4 students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.
CLAIM 3 RANGE ALD **Target B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.				
CLAIM 3 RANGE ALD **Target C:** State logical assumptions being used.				
CLAIM 3 RANGE ALD **Target D:** Use the technique of breaking an argument into cases.				
CLAIM 3 RANGE ALD **Target E:** Distinguish correct logic or reasoning from that which is flawed and— if there is a flaw in the argument— explain what it is.				
CLAIM 3 RANGE ALD **Target F:** Base arguments on concrete referents such as objects, drawings, diagrams, and actions.				

CLAIM 3 RANGE ALD **Target G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)				
THRESHOLD ALD **Claim 3**		The student who just enters Level 2 should be able to: • Find and identify the flaw in an argument.	The student who just enters Level 3 should be able to: • Use stated assumptions, definitions, and previously established results and examples to identify and repair a flawed argument. • Use previous information to support his or her own reasoning on a routine problem.	The student who just enters Level 4 should be able to: • Begin to construct chains of logic about abstract concepts autonomously.