Countless standard setting methods, accountability programs, and professional reputations have been staked on one question: How much knowledge, skills, and abilities do students need to have to be classified as Proficient on a test? The answer to this question can be expressed in several different ways, including cut scores to delineate the requisite ability level on a test scale; consequences data to show the percentage of students in each performance level; and performance level descriptors to describe the knowledge, skills, and abilities that students must possess to be placed in the given performance levels of the assessment.

Performance level descriptors can be viewed as carefully selected subsets of content standards. Where content standards exhaustively catalog what students in a given grade level or subject area should know, performance level descriptors describe what students do know. Performance level descriptors capture the standard setting decision – How much is enough? – in a way that is sometimes as important and often more useful than the cut scores themselves.

While well-written performance level descriptors seem to be regarded universally as useful, there is considerable debate as to the best time to write these descriptors. Some argue that performance level descriptors must be developed before the standard setting process (Loomis, 2001). From this perspective, performance level descriptors should
Performance Level Descriptors

guide test development and should be operationalized during the standard setting process. Others argue that the performance level descriptors should be written only after the standard setting is complete so that they reflect the knowledge, skills, and abilities held by the students in each performance level (Lewis & Green, 1997).

The primary purpose of this paper is to explore this debate. In doing so, we first examine three types of performance level descriptors. This is followed by an exploration of the different uses of performance level descriptors, including their uses during and after standard setting deliberations. Finally, we present the results of a study that compares the performance level descriptors that a standard setting committee created before a standard setting using the Bookmark Standard Setting Procedure (Lewis, Mitzel, and Green, 1996) with the descriptors made by the same committee after their deliberations and judgments. This qualitative analysis shows the impact of the standard setting process on performance level descriptors.

Types of performance level descriptors

At their core, all performance level descriptors describe the students who are classified into performance levels. But performance level descriptors can take many different forms. In fact, descriptors often go through several different versions, shaped by several different committees of policymakers and educators.

It must be noted that all performance level descriptors depend on the prior and careful development of content standards for the domain being tested. Although this seems a trivial point, the underlying content standards of any test are the bedrock on
which performance standards and performance level descriptors must be built. Indeed, Loomis (2001) notes that the content standards “must be generally accepted as reasonable in order for the outcomes of the process for setting cutpoints to be valid” (p. 2). Since performance level descriptors are used as inputs and outcomes of the standard setting process, it follows that reasonable content standards are a prerequisite for reasonable performance level descriptors.

Performance level descriptors serve many different purposes and are used by many different audiences. Therefore, it is useful to differentiate between a few key types of descriptors. In practice, the lines drawn between the types often blur, and one type of descriptor is often transformed into another. However, for the purposes of discussion, definitions are offered for policy definitions, a priori performance level definitions, and test-informed performance level descriptors.

Policy definitions

Policy definitions are usually brief and describe students in each performance level in very general terms. Policy definitions are often created by the states or agencies that sponsor standard settings, and they serve to give standard setting committees a springboard from which they may develop richer, more descriptive definitions of each performance level.

Often, policy definitions are little more than one- or two-sentence sketches of students in each performance level. Bourque (2000) remarks that the initial policy definitions for the National Assessment of Educational Progress (NAEP) assessments
Performance Level Descriptors

described students in the *Proficient* performance level as “well prepared for the next level of schooling” without further elaboration of the knowledge, skills, and abilities this preparation implied. Other policy definitions describe non-academic attributes of students in each performance level, using prose to illustrate these students. “Rhonda’s Story” (Morton, 1999) is such a policy definition, an excerpt of which follows.

[Rhonda] is considered by her teachers to be a diligent student who is attentive in class. She has failed one high school class (Algebra I in the 9th grade) but took it again as a 10th grader and passed with a 60.3 average. She is currently passing Biology as an 11th grader with a 60.7 average. She has Cs in English and Social Studies and an overall GPA of 2.08 on a 4.0 scale.

Rhonda is not a discipline problem. She is not an attendance problem. She is not a student leader. She is not a cheerleader. She is not a star athlete. She will probably not attend college but may try to attend community college if work schedules permit. Rhonda is on track (just barely) to pass all required credits for graduation. Her sole remaining obstacle is [the] Graduation Exam.

While purposefully vague, policy definitions serve as an important catalyst to the standard setting process. These brief descriptors set the tone for the standard setting, giving panelists a frame of reference from which all other description writing activities may flow.

*A priori performance level definitions*

These descriptors tend to be more elaborate than policy definitions and are often developed just before or at the onset of a standard setting. *A priori* performance level definitions are frequently developed as part of the training activities at a standard setting workshop, giving panelists an opportunity to develop a shared understanding of what it means to be in a particular performance level. Specifically, these definitions generally
Performance Level Descriptors

address the notion of minimal competence, describing the qualities of students who have
the minimum level of acceptable ability in a given performance level.

Mills, Melican, and Ahluwalia (1991) point to the development of this type of
descriptor as one of the key steps in the training component of any standard setting
process, especially test-centered processes such as Angoff (1971). In the most common
configuration, standard setting panelists themselves use policy definitions and content
standards to develop these a priori performance level definitions.

In other configurations, different panelists develop these definitions for use as
inputs in the standard setting process; for example, the NAEP has charged content-
specialist committees with crafting these definitions (Bourque, 2000; Loomis, 2001).
Some states develop descriptors of performance levels soon after their content standards
are written. Often, these descriptors do not focus on the just-competent examinee;
instead, they are written for the range of student performance in a particular performance
level.

Test-informed performance level descriptors

These descriptors catalog the knowledge, skills, and abilities of students in each
performance level, as informed by the test itself when cut scores are applied. These types
of descriptors are often created during the course of the Bookmark Procedure, although
they can be created in the course of any host of standard setting methods, especially item-
mapping methods.
In traditional implementations of the Bookmark Procedure (Lewis, Green, Mitzel, Baum, and Patz, 1998), performance level descriptors are written only after the standard setting judgments have been made. Test items are first assigned to each performance level based on the cut scores recommended by the committee. For example, if the committee recommends that the cut score for the Proficient performance level is 500, then Proficient students are judged to be able to master the content in all the items with a Bookmark location of 500 or below, where the Bookmark location is typically the guess-adjusted location when a response probability is applied (Lewis, et al., 1998; Huynh, 1998). Examining these items as a group, panelists then describe the knowledge, skills, and abilities required of students to answer the items correctly and be classified as Proficient.

Test-informed performance level descriptors are eminently empirical. Because they are based on test items themselves, these descriptors contain only content-based statements that are measured by the test at hand. Bourque (2000) points to the undesirability of descriptors which cannot be validated by test data, including descriptors which contain elements of prediction. Because test-informed performance level descriptors are derived from test items, they do not have this undesired quality.

**Uses of performance level descriptors**

Performance level descriptors are used for several, distinct purposes during and after standard setting. During the standard setting, policy definitions and a priori performance level definitions are often used for training purposes, helping panelists to develop shared
understandings of the minimally competent student, thereby increasing inter- and intra-judge consistency (Plake, Impara, and Irwin, 1999). After the standard setting, descriptors are often used to inform the public and stakeholders about the performance levels, and to help demonstrate the validity of the performance standards.

Training panelists

The literature and common sense indicate that panelists should receive comprehensive training prior to their involvement in a standard setting (Mills, et al., 1991; Raymond and Reid, 2001). Perhaps Berk (1996) used his trademark understatement best to declare that one should train panelists, and “train these judges ‘til it hurts” (p. 229).

As part of this training, standard setting facilitators often lead panelists through exercises by which they create a priori performance level definitions. This activity serves to define the conceptualization of the just-competent examinee.

Studies using the Angoff method have indicated that the creation of a priori performance level definitions can lead to greater intra- and inter-judge consistency. Plake, et al. (1999) showed that when a group of standard setting panelists carefully considered a priori performance level definitions, their Angoff ratings of test items remained relatively consistent over the course of one year, both within and between judges. Impara, Giraud, and Plake (2001) found that changes in the a priori performance level definitions can produce significant differences in the cut scores recommended by otherwise similar standard setting committees.
Informing stakeholders

Performance level descriptors are also used after the standard setting to publicize the knowledge, skills, and abilities that are required of students in each performance level. When reported to teachers, policymakers, and other consumers of testing information, performance level descriptors can provide a vivid illustration of the type and quantity of content that is required to be classified in each performance level for an assessment.

Bourque (2000) reports that this informational use of descriptors was planned with the NAEP; the NAEP achievement level descriptors were provided along with cut scores and exemplar exercises in NAEP reports. Concern was raised, however, about the effectiveness of this type of use. Indeed, Bourque remarks, “the curricular language of the current form [of reported performance level descriptors] is not understood well by those outside the curriculum area … nor do they provide the public press and media outlets with a clear understanding of what it means to perform at [each performance level]” (p. 6). This cautionary tale has a clear moral: when informational use of descriptors is planned, special care must be taken to make sure the descriptors are clearly accessible to stakeholders without domain-specific expertise.

Demonstrating the validity of performance standards
Validating performance standards is multi-faceted endeavor, calling on practitioners to demonstrate that the standards were well-founded through the application of a well-conceived standard setting process, applied according to best practices. Kane (1994) points to the interpretative argument as being key in the demonstration of the validity of performance standards, where the interpretative argument “specif[ies] the network of inferences leading from the score to the conclusions drawn about examinees and the decisions made about examinees, as well as the assumptions that support these inferences” (p. 431).

Arguably, one of the most persuasive elements of the interpretive argument can be the performance level descriptor. It specifies the content required of students in each performance level, as asserted by the standard setting panelists through their cut scores.

**Performance level descriptors and the Bookmark Standard Setting Procedure**

Although the uses of performance level descriptors are manifold, their geneses all share a common trait: groups of policymakers, content experts, or standard setting panelists discuss their expectations of students in each performance level.

When a priori performance level definitions are created as part of a standard setting, panelists often begin with content standards and policy definitions. A typical scenario is that described for the Analytic Judgmental Method (Plake and Hambleton, 1998). As part of the training regimen, panelists strive to “articulate performance expectations for [the performance levels] in terms of the [content standards]” (p. 10). As previously noted, similar activities are also included in Angoff standard settings.
Traditional implementations of the Bookmark Standard Setting Procedure, however, have taken a different approach. In these workshops, the performance level definition is created not at the beginning of the standard setting process, but rather throughout the process in an informal manner, and then formalized at the end of the workshop as test-informed performance level descriptors.

One can view the analysis of the ordered item booklet in the Bookmark Procedure as a performance level description exercise. As panelists consider the test items that students must master in order to be classified in a given performance level, they consider the knowledge, skills, and abilities measured by those items. With their cut score judgments (bookmark placements), panelists assert that students at a given performance level can demonstrate mastery on a subset of items in the ordered item booklet. (For example, a panelist might decide that students in a performance level must be able to master the content in the 20 easiest items on the test, as ordered in the ordered item booklet.) As panelists make their bookmark placements, they can immediately see how the descriptor for the performance level at hand changes, and can then compare this new descriptor with their internalized conception of minimal competence. After traditional implementations of the Bookmark Procedure, panelists then create test-informed performance level descriptors using the final cut scores recommendations of the standard setting committee as a guide.

During more recent implementations of the Bookmark Procedure, however, a slightly different approach has been taken (Egan, Mercado, Brandstrom, and Tele’a, 2005). Panelists have been instructed to create formal performance level definitions prior to study of test items in the ordered item booklet. This activity, much like activities
occuring during implementations of the Angoff procedure, helps panelists form shared
conceptualizations of minimal competence.

Unlike the Angoff procedure, however, panelists in the Bookmark Procedure are
permitted to change their conceptualizations of minimal competence – referred to as
Target Student definitions – during their examination of the test items in the ordered item
booklet. Indeed, Egan and Green (2003) found that examination of the ordered item
booklet, the definition of the Target Student, and the content standards were three of the
most influential factors in panelists’ decision making processes.

In the present study, we consider the change in performance level descriptors
during the course of the Bookmark Procedure. This study followed the deliberations of a
standard setting committee, and examined the differences between a priori performance
level definitions created by panelists before the standard setting with test-informed
performance level descriptors created after standard setting judgments were complete.

Methods and Procedures

Performance level descriptors were written both before and after a single standard
setting, and the differences between those sets of descriptors were analyzed.

Standard Setting Committee

A standard setting committee consisting of 16 educators participated in a standard
setting using the Bookmark Standard Setting Procedure (Lewis, Mitzel, and Green,
The standard setting study was sponsored by a large school district in the United States (District A).

The school district selected the panelists to be representative of teachers in the district. Of the 16 panelists, 14 identified themselves as classroom teachers, and the remaining 2 identified themselves as educators who were not classroom teachers. The average participant reported that they had worked for 20.9 years (s.d. 10.4 yrs.) in his or her current profession. Of these 16 panelists, three panelists were designated by District A as Table Leaders. Table Leaders served as co-facilitators of the standard setting process and received additional training in leading various discussions contained in the Bookmark Procedure.

**Purpose of the Standard Setting**

Standard setting was performed on a large-scale assessment of high school mathematics. The examination is used in partial fulfillment of the district’s mandate under No Child Left Behind to measure students’ abilities in mathematics during high school. The test contained a combination of selected-response (SR) and constructed-response (CR) items: 77 SR items and three CR items were included. Panelists set recommended three cut scores for the test, thereby establishing four performance levels. These performance levels are labeled here as *Below Basic, Basic, Proficient, and Advanced*. 
Contemporaneous to this study, seven other examinations underwent standard setting for the same school district. These tests and their associated standard settings were not analyzed for the purposes of this investigation.

Implementation of the Bookmark Procedure

Prior to the standard setting, panelists were asked to develop a priori performance level definitions. This task was accomplished in two parts. First, the three Table Leaders met to review the district’s content standards for high school mathematics. With the help of a facilitator, the Table Leaders perused the skills listed in the content standards.

For each skill, the Table Leaders discussed whether students who were “minimally Proficient” would be able to demonstrate it on the test. For those skills which were deemed demonstrable by the minimally Proficient student, the Table Leaders then discussed whether those students would be able to perform the skill all of the time, or only some of the time, driven by context. Table Leaders performed this discussion for the minimally Proficient student, and then repeated it twice, once each while considering “minimally Basic” and “minimally Advanced” students. Taken together, these three conceptualizations of students who are minimally in each performance level were called target student definitions.

Following the discussion with three Table Leaders, the remaining 13 panelists joined the discussion. The Table Leaders recounted their previous discussion with the group, describing why they considered each skill to be attainable by target students. Panelists asked questions of Table Leaders and suggested changes to the list of
demonstrable skills. All 16 panelists maintained their own lists of demonstrable skills. A master list was created by the facilitator, based on the thoughts of the group.

Panelists then engaged in the Bookmark Procedure. Over the course of three days, the panelists studied the test items as ordered by difficulty in the ordered item booklet, made notes on what each item measured on item maps, and made cut score judgments in three successive rounds of discussion and ratings. During each round of judgments, panelists were directed to consider the description of the target students. After each round of voting, panelists were shown impact data, the percentage of students who would be classified in each performance level based on the median judgment of the group. Panelists were encouraged to use the target student descriptions as a facet of their decision making, along with their experience with students, their understanding of the content measured on the test, and their conversations with other panelists.

After the standard setting study, panelists revisited the target student descriptions. Aided by a facilitator, panelists updated the description of each target student to agree with the group’s final cut score judgments. Panelists were directed to review their ordered item booklets to describe the knowledge, skills, and abilities that were required of students in each performance level: this content is that required of each target student. After this activity, three test-informed performance level descriptors were generated, each capturing the skills that the group recommended for students a performance level, after studying the test items.

Results
Table 1 shows the a priori performance level definitions that the standard setting committee for District A created prior to the Bookmark Procedure. These definitions were created in consultation with the District’s content standards, and prior to study of test items. These definitions are shown separated by content standards: this division was also used by panelists during the creation of the definition.

**TABLE 1 ABOUT HERE.**

Participants then engaged in the Bookmark Procedure and developed cut score recommendations. Drawing upon their examination of the test items, panelists then developed a test-informed performance level descriptor of this performance level. This descriptor is shown in Table 2. As with the a priori performance level definition, this performance level descriptor is shown as separated by content standard.

**TABLE 2 ABOUT HERE.**

For each bulleted point in the a priori performance level definition found in Table 1, we attempted to locate where it fell in the final, test-informed performance level descriptors. Table 3 denotes where each target student skill was located in the final descriptors. In some cases, we could not find a similar concept in the final descriptors for Below Basic, Basic, Proficient, or Advanced. For most bulleted points, we were able to identify a similar concept in the final descriptors for one of the achievement levels. In those cases, we indicate the performance level that the bulleted point ended up in. For example, panelists initially noted in the a priori performance level definition that the Proficient student should be able to “find and use the slope and y-intercept of a linear graph.” After the standard setting, however, this skill was identified in the Advanced range.
As shown in Table 1, panelists in District A identified 17 elements of knowledge, skills, and abilities that they believed the minimally competent *Proficient* student should possess. Of these, we were able to identify 11 in the final descriptors for all achievement levels: six were included in the final *Advanced* or *Advanced Plus* descriptors, three in the final *Proficient* descriptor, and two in the final *Basic* or *Below Basic* descriptors. The remaining six could not be found in the committee’s final test-informed performance level descriptors.

**Discussion**

This study examined the differences between performance level descriptors developed before and after a standard setting study. Whether performance level descriptors are written before or after the standard setting process, the goal of the activity is the same: to list the skills that minimally *Proficient* students in a performance level can perform on the test. Even so, the results of the study suggest that differences exist between the performance level definition written before the standard setting and the test-informed performance level descriptor that follows it.

In the *a priori* versus *a posteriori* debate regarding development of performance level descriptors, we come down firmly in the middle. Our own experience with standard setting participants suggests that the development of target student definitions ensures the study of the content standards by participants, and it focuses the participants on the type of student for whom they are to make bookmark judgments. However, as the results of
our study suggest, these target student definitions should be informed by the test data themselves.

Standard setting panelists do not predict accurately the knowledge, skills, and abilities that they will ultimately deem necessary for the minimally Proficient student to possess. Any performance-level definition that is developed before the standard setting is a prediction of the knowledge skills and abilities that a student should possess. Even though this information is helpful when used to guide the standard setting, it should not be used to represent the final cut scores. The use of a priori performance level definitions may leave the testing public with misapprehension of what it means to be Proficient on a given test. No matter how much time, effort, or energy goes into the development of a priori performance level definitions they will remain a prediction of how students should perform on the test. Since standard setting panelists’ perception of the difficulty of certain skills is not always borne out by the data, this speaks to the need to finalize performance level descriptors once the cut scores are finalized. The discordance between panelists’ perception of the difficulty of skills and the ability of students to perform well on those skills sometimes lead to performance level definitions which are out of alignment with the test data.

Another, more pragmatic reason for writing performance level descriptions after the standard setting process is complete lies in the process of changing cut scores for political reasons, after the content-based recommendations of the standard setting committee have been made. It is a reality that many sponsors of standard setting workshops modify their cut scores, largely based on the impact data associated with the cut scores. These two activities – content-based standard setting, and politically-based
cut score adjustment – should be viewed as two parts of a cohesive standard setting process. Accordingly, the descriptors that follow from a standard setting should reflect the entire standard setting process, including a posteriori adjustments to cut scores by the state or school district. Test-informed performance level descriptors can be easily changed to reflect these adjustments, and can therefore reflect the knowledge, skills, and abilities that are required of students in each performance level, based on the final cut scores implemented after the entire standard setting process.

Bringing us full circle to the need for a priori performance level definitions, the content standards from which these definitions are created are comprehensive of the content domain being tested, and are therefore expansive in their scope. No single test of reasonable length can measure every component skill contained in most states’ and districts’ content standards, so many a priori performance level definitions can be expected to include some statements which are not measured explicitly by the test undergoing standard setting. The a priori performance level definitions can be used in final descriptors in those cases where part of the content standard was not measured. Of course, if a content standard is measured by the assessment, the performance level descriptor should be updated to reflect those data.

Limitations and Future Research

Since this study examined only one standard setting committee, the results cannot be generalized to all standard settings. A future study should examine the definitions created by multiple groups in multiple standard settings. It should also examine the
difference in a priori performance level definitions created by standard setting participants versus a panel convened solely for the purpose of writing a priori definitions. There is a chance that the specialized panel may create more accurate definitions than panelists in a standard setting.

In addition, the authors analyzed the descriptors for evidence of change. Even with our extensive experience designing and implementing standard setting, we do not consider ourselves content experts. In future studies, this analysis should be undertaken by experts in the content area. Finally, a future study may ask participants to gauge how much the target student definition changes over the course of a standard setting.

Even though more research is clearly needed, these preliminary findings suggest that the creation of test-informed performance level descriptors using demonstrated test performance only adds richness, clarity, and accuracy to the descriptors. Indeed, the entire Bookmark Procedure can be viewed as an extended descriptor-writing activity: panelists gather information about what students can do in each performance level throughout the workshop, honing their conceptualizations of the minimally Proficient student as they make cut score judgments and discuss them with their colleagues.
References


Table 1. A priori performance level definition developed by standard setting panelists in District A prior to the beginning of the Bookmark Procedure.

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Target Proficient Student</th>
</tr>
</thead>
</table>
| **Standard 1**   | - Use rational numbers in real world applications with no more than 3 steps  
                  - Perform calculations using the order of operations, including parentheses and exponents  
                  - Use ratio and proportion to solve problems |
| **Standard 2**   | - Solve 2-step linear equations and inequalities  
                  - Find and use the slope and y-intercept of a linear graph  
                  - Translate words to expressions and equations  
                  - Use Scientific Notation to represent numbers in different forms |
| **Standard 3**   | - Interpret graphical data (tables, charts, graphs)  
                  - Identify the mean, median, and mode of a set of data  
                  - Find simple probabilities that do not involve more than a single event (no “and” or “or”) |
| **Standard 4**   | - Understand the attributes of similar triangles  
                  - Identify 2- and 3-dimensional shapes  
                  - Identify and extend arithmetic and geometric patterns  
                  - Know and apply the Pythagorean theorem when only whole numbers or Pythagorean triples are involved  
                  - Find perimeter, area, and volume of simple figures that do not need to be broken up into parts |
| **Standard 5**   | - Convert between units of distance, capacity, and mass  
                  - Know and apply the formula relating distance, rate, and time (d=rt) |
Table 2. Test-informed performance level descriptors developed by standard setting panelists in District A after completing the Bookmark Procedure.

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Below Basic</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
<th>Advanced Plus</th>
</tr>
</thead>
</table>
| **Standard 1**   | • estimate the quotient when dividing whole numbers  
|                  | • use estimation in real-world situations  
|                  | • locate decimal and fractional parts on the number line  
|                  | • convert numbers in Scientific Notation to standard form  
|                  | • compute the midpoint of two given points on a coordinate plane  
|                  | • Apply the properties of exponents  
|                  | • Add fractions with unlike denominators  
|                  | • Compare numbers in fraction or decimal form  
|                  | • Convert from fractions to decimals  
|                  | • Apply the concept of least common multiple in a real-world situation  
|                  | • use order of operations to evaluate expressions with integers  
|                  | • extend geometric patterns in real-world situations  
|                  | • use properties of integers to evaluate the validity of a statement  
|                  | • use the concepts of rate and time in real-world situations  
|                  | • apply part-to-part and part-to-whole ratio concepts in real-world situations  
|                  | • apply the rules of rounding numbers  
|                  | • apply geometric patterns to in real-world situations  
| **Standard 2**   | • No evidence of this standard at this performance level  
|                  | • translate words into an algebraic expression  
|                  | • evaluate an arithmetic expression  
|                  | • translate a real-world situation into a linear equation  
|                  | • identify the graph of a quadratic function  
|                  | • Translate word problems into algebraic equations  
|                  | • Identify the rule for a function from a table of values  
|                  | • solve a multi-variable equation for a specified variable  
|                  | • identify the equation of a line in slope-intercept form given its graph  
|                  | • identify the equation of a line in slope-intercept form given two points on the line  
|                  | • translate words into an algebraic expression  
|                  | • solve linear equations  
|                  | • multiply binomials and combine like terms  
|                  | • determine the limits of an algebraic expression  
|                  | • solve a standard quadratic equation for x in terms of y  
|                  | • write and evaluate an expression involving percentages and discounts  

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Below Basic</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
<th>Advanced Plus</th>
</tr>
</thead>
</table>
| **Standard 3**   | • read data from a graph  
• compute simple probability  
• make predictions and draw inferences from graphs  | • interpret and estimate data from a graph  
| | • Analyze and draw inferences from surveys | • compute number of possible outcomes in situations involving combinations  
• compute probabilities of events where there is no replacement  | • interpret graphical data to identify valid conclusions |
| **Standard 4**   | • No evidence of this standard at this performance level  | • No evidence of this standard at this performance level  | • No evidence of this standard at this performance level  | • determine valid ways to calculate areas of irregular geometric figures  
• identify the ratio of the sides of similar rectangles given their perimeters  
• determine surface area and volume of geometric solid  
• determine the possible dimensions of a rectangle given its area | • determine the ratio of the areas of inscribed regular polygons  
• compute the area of a figure which can be broken down into simple geometric shapes  
• compute the volume of a solid which can be broken down into simple geometric solids  
• determine the ratio of the areas of regular polygons using congruent shapes |
<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Below Basic</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
<th>Advanced Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard 5</strong></td>
<td>• No evidence of this standard at this performance level</td>
<td>• No evidence of this standard at this performance level</td>
<td>• Identify information from a map • Apply the distance, time, and speed relationship in real-world situations • Use proportional reasoning in real-world situations</td>
<td>• determine scale using measurement • convert between metric units of length</td>
<td>• apply the distance and time relationship in real-world situations involving average speed</td>
</tr>
</tbody>
</table>
Table 3. Target Student with skills assigned to final performance level

<table>
<thead>
<tr>
<th>Content Standard</th>
<th>Target Proficient Student</th>
<th>Final Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Use rational numbers in real world applications with no more than 3 steps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Perform calculations using the order of operations, including parentheses and exponents</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td>• Use ratio and proportion to solve problems</td>
<td>Advanced Plus</td>
</tr>
<tr>
<td><strong>Standard 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Solve 2-step linear equations and inequalities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Find and use the slope and y-intercept of a linear graph</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td>• Translate words to expressions and equations</td>
<td>Proficient</td>
</tr>
<tr>
<td></td>
<td>• Use Scientific Notation to represent numbers in different forms</td>
<td>Below Basic</td>
</tr>
<tr>
<td><strong>Standard 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Interpret graphical data (tables, charts, graphs)</td>
<td>Advanced Plus</td>
</tr>
<tr>
<td></td>
<td>• Identify the mean, median, and mode of a set of data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Find simple probabilities that do not involve more than a single event (no “and” or “or”)</td>
<td>Advanced</td>
</tr>
<tr>
<td><strong>Standard 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Understand the attributes of similar triangles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Identify 2- and 3-dimensional shapes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Identify and extend arithmetic and geometric patterns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Know and apply the Pythagorean theorem when only whole numbers or Pythagorean triples are involved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Find perimeter, area, and volume of simple figures that do not need to be broken up into parts</td>
<td>Advanced/Advanced Plus</td>
</tr>
<tr>
<td><strong>Standard 5</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Convert between units of distance, capacity, and mass</td>
<td>Advanced Plus</td>
</tr>
<tr>
<td></td>
<td>• Know and apply the formula relating distance, rate, and time (d=rt)</td>
<td>Proficient</td>
</tr>
</tbody>
</table>