REPORT

ALIGNMENT ANALYSIS OF

NEBRASKA CONTENT STANDARDS AND INDICATORS

AND THE NEBRASKA STATE ACCOUNTABILITY-MATHEMATICS (NeSA-M)

GRADES 3 – 8 AND 11

OCTOBER 20–22, 2010

The findings in this study are those of the independent reviewing team and do **not** represent the opinion of the vendor Data Recognition Corporation or the State of Nebraska.

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Executive Summary

The alignment study for mathematics was held in Lincoln, Nebraska, October 20–22, 2010. This report consists of a description of the four criteria used to judge the alignment for Grades 3 through 8 and 11, Nebraska Mathematics content standards and the test items found in the Mathematics *Nebraska State Accountability*. This report also includes tables listing the results from the review process.

Seven reviewers participated in the study: four mathematics expert reviewers from the State of Nebraska and three national expert reviewers. A national expert facilitated the alignment process for mathematics. The four State of Nebraska reviewers have extensive teaching experience in the state and expertise in the field of mathematics. The national reviewers also have extensive expertise in the fields of mathematics standards, curriculum, and/or assessment design. The mathematics content standards were used to describe the expectations for what students are to know and do. The reviewers determined the alignment of test questions to the NeSA content standards. A list of reviewers is provided below. In addition, a brief summary of each national expert's professional qualifications is provided in Appendix A. The final results of this study indicate that there is strong alignment between the Nebraska Mathematics Grade 3 through 8 and 11 content standards, goals, and indicators and the NeSA Mathematics assessment.

National Facilitator
James Augustin, PhD

State of Nebraska Reviewers
Jim Harrington, MBA
Chuck Friesen, PhD
DeLoris Tonack, PhD
Janette Parrella, MEd

National Expert Reviewers
Linda Bridges, MEd
Rachelle Meyer, PhD
Leo Edwards, EdD

Introduction

This alignment study is based on the work of Dr. Norman Webb, from the Wisconsin Center for Educational Research, University of Wisconsin–Madison, who states that the alignment of the content standards for student learning with assessments for measuring students' attainment of these expectations is an essential component for an effective standards-based education system. The study models Webb's procedures, including the use of depth-of-knowledge (DOK) categories, as well as Webb's definition of alignment (Webb, 2002, p. 3). The definition is as follows:

> **Alignment** is defined as the degree to which expectations and assessments are in agreement and serve in conjunction with one another to guide the system toward students learning what they are expected to know and do. As such, alignment is a quality of the relationship between expectations and assessments and not a specific attribute of either of these two system components. Alignment describes the match between expectations and assessment that can be legitimately improved by changing either student expectations or assessments. Seen as a relationship between two or more system components, alignment can be determined by using the multiple criteria described in detail in a National Institute of Science Education (NISE) research monograph, *Criteria for Alignment of Expectations and Assessments* (Webb 2002).

The *Nebraska State Accountability-Mathematics* (NeSA-M) is a statewide, mandated testing program. The tests are given in grades 3 through 8 and 11. They consist of multiple-choice tests in the core subject of mathematics. The NeSA-M measures student achievement based on Nebraska's content standards. All questions are written and reviewed by Nebraska educators for content and sensitivity.

Intensive training was provided for all reviewers to understand Webb's Alignment Model and Criteria by Dr. James Augustin. They were first trained to identify the depth-of-knowledge (DOK) levels for the content standards, indicators, and the test questions. This training included reviewing the definitions of the four DOK levels, as defined by Webb (2002). Training also included reviewing examples of test questions aligned to DOK and the alignment process to be followed.

Alignment Process

The alignment process is outlined in the following chart.

2010 NeSA-M Alignment Process

Task 1: Determining the depth of knowledge (DOK) of each indicator
Reviewers individually determined DOK for each indicator. They discussed their DOK ratings in order to reach a group consensus. (See Appendix C)

Task 2: Taking the test
Reviewers took the test, recording their answers and comments about the test questions.

Task 3: Determining what each test question measured and the DOK for each test question
Step 1
Using the first three test questions reviewers independently determined what each question measured by assigning it to a primary indicator and a secondary indicator, if applicable. A group discussion took place; however, reaching consensus on determining what each question measured was not required.

Step 2
Reviewers independently determined the DOK of the first three questions. Reviewers were instructed to code only **one** DOK (Level 1, 2, or 3) for each of the three questions. Reviewers also independently noted any source of challenge for the first three questions. A group discussion took place; however, reaching consensus on the DOK of the first three questions was not required.

Step 3
Reviewers continued to independently determine the primary indicator and the secondary indicator, if applicable, for the remainder of the test questions.

Step 4
Reviewers independently determined the DOK for the remainder of the test questions. Again, the reviewers were instructed to code only **one** DOK for each of the remaining test questions.

Throughout the alignment process, reviewers independently noted any source of challenge for each test question, providing written comments as necessary.

Task 4: Summarizing alignment criteria of test questions
Once reviewers determined the primary and/or secondary indicator for each test question and the DOK for each test question, they analyzed the entire test for:

- Depth-of-knowledge consistency
- Categorical concurrence
- Range-of-knowledge correspondence
- Balance of representation

Task 5: Debriefing Questionnaire
Reviewers independently shared feedback about the process, the test questions, and the standards and indicators.

Alignment Criteria

Reviewers independently assessed specific criteria related to the content agreement between the Nebraska Mathematics content standards and the test questions on the *Nebraska State Accountability-Mathematics* (NeSA-M) tests. The four criteria receiving major attention were: DOK consistency, categorical concurrence, range-of-knowledge correspondence, and balance of representation. For each alignment criterion, an acceptable level was defined by what would be required to assure that a student had met the content standards. Along with the defined requirements, reviewers also used their professional judgment and experience in the classroom to determine whether an acceptable level for each criterion was met.

Depth-of-Knowledge Consistency

For the purpose of this study, Webb's definition of DOK consistency was used. According to Webb (2002), DOK consistency between content standards and test items indicates alignment if what is elicited from students on the test is as demanding cognitively as what students are expected to know and do as stated in the content standards. For consistency to exist between the assessment and the content standards, an item should be coded with the same DOK level as the content standards or one level above the DOK level of the content standard. Reviewers indicated "Yes" if the DOK levels of the test question and content standard were the same or one level above that of the content standards. If these were not consistent, reviewers indicated "No" and stated why. Interpreting and assigning DOK levels to content standards and test questions is an essential requirement of alignment analysis. (See Appendix D, Tables M3.1 – M11.1 for each grade level.)

The four levels of Depth-of-Knowledge were defined for mathematics (See Appendix B). Detailed descriptions (Webb, 2002) help to clarify what the four different levels represent in mathematics.

Categorical Concurrence

According to Webb (2002), an important aspect of alignment between each standard and the test is whether both address the same content categories. The categorical concurrence criterion provides a very general indication of alignment if the standards and the test incorporate the same content. For this alignment study, this criterion was judged by first allowing reviewers to make a determination as to whether the test as a whole included questions measuring content from each of the standards. The reviewers were told to use their professional opinions, as well as the Webb guiding principle to determine that at least six questions measuring content from each standard is a good indicator of categorical concurrence between the standard and the test (Webb, 2002).

Using Webb's model, the number of questions, six, is based on estimating the number of questions that could produce a reasonably reliable subscale for estimating students' mastery of content on that subscale. Of course, many factors have to be considered in determining what a reasonable number is, including the reliability of the subscale, the mean score, and the cutoff score for determining mastery. Using a procedure developed by Subkoviak (1988), and assuming that the cutoff score is the mean and that the reliability of one item is 0.1, it was estimated that six questions would produce an agreement coefficient of at least 0.63. This indicates that about 63% of the group would be consistently classified as masters or non-masters if two equivalent test administrations were employed. The agreement coefficient would increase if the cutoff score was increased to one standard deviation from the mean to 0.77 and, with a cutoff score of 1.5 standard deviations from the mean, to 0.88.

Six questions were assumed as a minimum for an assessment measuring content knowledge related to a standard and as a basis for making some decisions about students' knowledge of that standard. If the mean for six questions is three and one standard deviation is one question, then a cutoff score set at four would produce an agreement coefficient of 0.77. Any fewer questions with a mean of one-half of the questions would require a cutoff that would only allow a student to miss one question. This would be a very stringent requirement, considering a reasonable standard error of measurement on the subscale. (See Appendix D, Tables M3.2 – M11.2 for each grade level.)

Range-of-Knowledge Correspondence

For standards and the test questions to be aligned, the breadth of knowledge required on both must be comparable. The range-of-knowledge criterion is used to judge whether a comparable span of knowledge expected of students by a standard is the same as, or corresponds to, the span of knowledge that students need in order to correctly answer the test questions. For an acceptable range-of-knowledge, at least 50% of the indicators for a standard must have at least one related test question. (See Appendix D, Tables M3.3 – M11.3 for each grade level.)

Balance of Representation

The balance of representation is met if the emphasis of content and performance supplied by the questions (primary, secondary, or both) corresponds to the standards for the test as a whole. Reviewers determined whether the test questions were distributed among the indicators of the standards that were assessed. (See Appendix D, Tables M3.4 – M11.4 for each grade level.)

The balance-of-representation criterion is used to indicate the degree to which one standard is given more emphasis on the assessment than another. An index is used to judge the distribution of the test questions. The index in this study is computed by considering the difference in the proportion of indicators and the proportion of hits assigned to the standard. An index value of 1 signifies perfect balance and is obtained if the hits (questions corresponding to standards) are equally distributed among the indicators. Index values that approach 0 signify that a large proportion of the hits are on only one or two of all of the indicators hit. Depending on the number of indicators and the number of hits, a unimodal distribution has an index value of less than 0.5. A bimodal distribution has an index value of around 0.55 or 0.6. Index values of 0.7 or higher indicate that questions/activities are distributed among all of the indicators at least to some degree. Index values between 0.6 and 0.7 indicate the balance-of-representation criterion has only been "weakly" met.

A summary of Webb's alignment criteria can be found in Table 1 on page 9.

Table 1: Alignment Levels for the Four Criteria

Alignment Level	Depth-of-Knowledge Consistency	Categorical Concurrence	Range-of-Knowledge Correspondence	Balance of Representation
Yes	50%	mean is 6 or more	50%	.70
Yes*	40% - 49%	mean is 5 to 5.9	40% - 49%	.60 - .69
No	less than 40%	mean is less than 5	less than 40%	less than .60

The results for each of the four criteria discussed in this section were calculated using Webb's methodology and the reviewers' averaged ratings, along with their comments. The results for depth-of-knowledge consistency, categorical concurrence, range-of-knowledge correspondence, and balance of representation are found in Appendix D, Tables M3.1 – M11.4 for each grade level.

Source-of-Challenge Criterion

Reviewers noted source-of-challenge issues for the test questions. The sources of challenge may include such issues as questions containing misleading factual information, questions requiring prior knowledge, questions with possible clueing among distractors, and questions deemed by the reviewer as having two possible correct answers.

Results of Alignment Analysis

There are four standards in mathematics: Number Sense, Measurement/Geometry, Algebraic Concepts, and Data Analysis/Probability. Table 2 is the consensus of the seven reviewers' coding of the DOK levels to the indicators of the standards by grade. Grades 3 and 4 have indicators coded at DOK Level 3 while grades 5–8 and 11 have indicators only at DOK levels 1 and 2. The majority of the indicators for all grades were at DOK level 2 ranging from 48% in grade 4 to 67% in grade 8.

Table 2: Content Standards by Depth-of-Knowledge in Mathematics

Grade	Number of Indicators	DOK Level	Indicators by DOK Level	
			Number	*Percent*
3	16	1 2 3	5 10 1	31% 63% 6%
4	25	1 2 3	11 12 2	44% 48% 8%
5	27	1 2 3	12 15 0	44% 56% 0%
6	24	1 2 3	12 12 0	50% 50% 0%
7	21	1 2 3	8 13 0	38% 62% 0%
8	24	1 2 3	8 16 0	33% 67% 0%
11	23	1 2 3	8 15 0	35% 65% 0%

Reliability among Reviewers

The intra-class correlation is based on the mean squares from the analysis of variance of a two-way random effects model, reviewers crossed with items (Shrout and Fleiss, 1979) as described in Appendix E. In general, an average correlation of over 0.70 is considered acceptable. However, increasing the number of reviewers may increase the reliability levels. Table 3 below provides a summary of the intra-class correlation for mathematics grades 3 through 8 and 11. In addition, the percentage of questions coded the same DOK by all seven reviewers is included.

Table 3: Summary of Reliability

Grades	Number of Questions	Intra-Class Correlation	Percentage of Questions Coded the Same DOK
3	50	.76	12%
4	55	.81	16%
5	55	.86	25%
6	58	.82	29%
7	58	.83	38%
8	60	.86	33%
11	60	.75	18 %

The intra-class-correlation range is between .75 and .86. All are above .70 and are in the acceptable range. (Refer to Appendix E for the calculation modes.)

Summary of Results

The summary results of alignment analysis for mathematics by grade and criteria are presented in Table 4. "YES" indicates meeting the acceptable level for depth-of-knowledge consistency, categorical concurrence, range-of-knowledge correspondence, and balance of representation.

Table 4: Summary of Alignment Results for Mathematics

Grade	Standard	Depth-of-Knowledge Consistency	Categorical Concurrence	Range-of-Knowledge Correspondence	Balance of Representation
3	Number Sense	Yes	Yes	Yes	Yes
	Geometry/Measurement	Yes	Yes	Yes	Yes
	Algebraic Concepts	Yes	Yes	Yes	Yes
	Data Analysis/Probability	Yes	Yes	Yes	Yes
4	Number Sense	Yes	Yes	Yes	Yes
	Geometry/Measurement	Yes	Yes	Yes	Yes
	Algebraic Concepts	Yes	Yes	Yes	Yes
	Data Analysis/Probability	Yes	Yes	Yes	Yes*
5	Number Sense	Yes	Yes	Yes	Yes
	Geometry/Measurement	Yes	Yes	Yes	Yes
	Algebraic Concepts	Yes	Yes	Yes	Yes
	Data Analysis/Probability	Yes	Yes	Yes	Yes
6	Number Sense	Yes	Yes	Yes	Yes*
	Geometry/Measurement	Yes	Yes	Yes	Yes
	Algebraic Concepts	Yes	Yes	Yes	Yes
	Data Analysis/Probability	Yes	Yes	Yes	Yes
7	Number Sense	Yes	Yes	Yes	Yes
	Geometry/Measurement	Yes	Yes	Yes	Yes
	Algebraic Concepts	Yes	Yes	Yes	Yes
	Data Analysis/Probability	Yes	Yes	Yes	Yes
8	Number Sense	Yes	Yes	Yes	Yes*
	Geometry/Measurement	Yes	Yes	Yes	Yes
	Algebraic Concepts	Yes	Yes	Yes	Yes
	Data Analysis/Probability	Yes	Yes	Yes	Yes
11	Number Sense	Yes	Yes	Yes	Yes
	Geometry/Measurement	Yes	Yes	Yes	Yes
	Algebraic Concepts	Yes	Yes	Yes	Yes
	Data Analysis/Probability	Yes	Yes	Yes	Yes

Conclusion

A panel of seven individuals reviewed the alignment of Nebraska's mathematics tests for grades 3 through 8 and 11. The panelists, four Nebraska mathematics educators and three mathematics experts from other states, reviewed the test forms assembled for census administration in spring, 2011. Reviewers' judgments were collected on Webb's four dimensions of alignment: Categorical Concurrence, Depth-of-Knowledge (DOK) Consistency, Range of Knowledge, and Balance of Representation. Judgments were made for four standards that define the four reporting categories for mathematics at each grade: Number Sense (Standard 1), Geometric/Measurement Concepts (Standard 2), Algebraic Concepts (Standard 3), and Data Analysis/Probability Concepts (Standard 4).

Analysis of the reviewers' judgments and their written debriefing comments indicate that the mathematics test for each grade is aligned with Nebraska's content standards and grade-level indicators. However, some weaknesses in Balance of Representation were revealed for three grade levels. In their written comments made at the end of the process, the reviewers generally found alignment to be very acceptable. They agreed that the tests reflect the cognitive complexity and difficulty of the content standards and indicators and will elicit a full range of student performance at each grade. The following are conclusions drawn from specific results of the Nebraska mathematics test alignment study for each grade and the panelists' comments from the study's Task 5 open-ended questions concerning alignment.

Grade 3

An acceptable level of alignment was achieved for all four alignment criteria for all four standards. Panelists confirmed the acceptable alignment in their written comments. Although two judges indicated the form was in need of slight improvement, their comments were concerned with specific item context and appearance rather than alignment.

Grade 4

An acceptable level of alignment was achieved at grade 4 for all four alignment criteria. However, Balance of Representation was Yes* for Standard 4, Data Analysis/Probability Concepts. This means that the items measuring the standard were not as well distributed across the indicators as is desired. Written comments about the form and its alignment were positive, but two panelists did indicate the form was in need of slight improvement, and one of them cited Balance of Representation specifically as an area of concern.

Grade 5

An acceptable level of alignment was achieved at grade 5 for all four alignment criteria. The reviewers' written comments on the acceptable alignment and general quality of the form supported the quantitative analyses of their judgments. It should be noted that one concern that emerged in the written comments and in a discussion among the panelists at the end of the study process was the presence of Venn diagrams on the test; Venn diagrams do not appear in the standards and indicators at grade 5 or any other grade they reviewed. Based upon the panel's discussion and written comments, it seems desirable to communicate information about Venn diagrams and the indicators to Nebraska educators.

Grade 6

Analysis of panelists' judgments indicated adequate alignment of the grade 6 form for all four alignment criteria. However, Balance of Representation was found to be Yes* for Standard 1, Number Sense, meaning that the items measuring the standard were not as appropriately distributed across the eight indicators as desired. The reviewers were split in their written comments on overall alignment. Four panelists said the form alignment was adequate, while three panelists noted a need for slight improvement, citing balance of items across indicators.

Grade 7

The grade 7 mathematics test form was judged to be aligned for all four criteria. Written comments of the reviewers supported the adequate alignment. Although it did not seem to affect alignment judgments, it should be noted that the panelists spent a large amount of time during the Task 1 consensus discussion trying to clarify the meaning of "contextualized problems" in indicator 7.3.2.a under the Algebraic Concepts standard.

Grade 8

An acceptable level of alignment was achieved for all four alignment criteria. However, Balance of Representation was found to be Yes* for Standard 1, Number Sense, indicating a less than desirable distribution of items across eight indicators that fall within the standard. Most panelists' written comments supported adequate alignment overall, but some concerns about Balance of Representation led two panelists to the overall conclusion that the form was in need of slight improvement.

Grade 11

Similar to the forms for the elementary grades, the grade 11 form was judged to be adequately aligned for all four criteria. Panelists' debriefing comments supported the acceptable overall alignment of the form, with many positive observations about the content from both the Nebraska mathematics teachers and the out-of-state mathematics experts.

Summary

The mathematics forms for all seven grades were judged by the panel of seven reviewers to be aligned, considering all four of Webb's criteria. Analysis of the reviewers' judgments revealed that Balance of Representation was Yes* for one of the standards at each of three grades, according to Webb's statistical criterion. In grade 4 the Balance of Representation was Yes* for Data Analysis/Probability Concepts (Standard 4). In grade 6 the Balance of Representation was weak for Number Sense (Standard 1). And the Balance of Representation was also Yes* for Number Sense at grade 8. Relatively small adjustments to future item form contents could be expected to strengthen the Balance of Representation at these grades.

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References

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Webb, N.L. (2002). *Alignment Study in Language Arts, Mathematics, Science, and Social Studies of State Standards and Assessments for Four States.* State Collaborative on Assessment & State Standards (SCASS).Technical Issues in Large-Scale Assessment (TILSA): University of Wisconsin, Wisconsin Center for Education Research.

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Appendix A

Biographies of the National Expert Reviewers

James W. Augustin, PhD

Dr. Augustin has extensive experience in conducting alignment studies for Alaska (2005 and 2007), Idaho (2007), Louisiana (2008), Maryland (2008) and West Virginia (2009). Dr. Augustin has also consulted with the Commonwealth of Puerto Rico on alignment study procedures for the Commonwealth's No Child Left Behind (NCLB) testing program. For the state of Louisiana, he served as the alignment evaluator and participated in writing the final reports. All of the alignment studies for which Dr. Augustin has served as a trainer, lead facilitator, report writer, and/or reviewer were based upon Dr. Norman Webb's methodology.
Dr. Augustin received a BA in psychology from Trinity University; an MA in psychology, with an emphasis on learning, human development, and measurement from Marquette University; and a PhD in psychology (including advanced study in measurement and testing, as well as research design and methodology) from North Carolina State University. His related professional work experience includes 15 years at Harcourt Educational Measurement and with the Educational Testing Service (ETS) managing test development activities for state testing programs. Among the states he has worked with closely in test development are Connecticut, Georgia, Indiana, Mississippi, Ohio, Oklahoma, Texas, Virginia, and Wisconsin. In addition, as the director of large-scale assessment at ETS, he worked with Maryland educators to develop high school assessments for algebra/data analysis, geometry, biology, English, and government (2002–2005).

Rachelle D. Meyer, PhD

Dr. Meyer is currently a lecturer in the Department of Curriculum and Instruction at Baylor University in Waco, Texas. Her responsibilities include teaching content pedagogy for secondary and middle school mathematics teaching associates and supervising university interns. She has also served as the mathematics laboratory coordinator at Baylor University and as a mentor teacher at Texas State University. Dr. Meyer is also extensively involved in a number of mathematics initiatives and community programs, including: university liaison for University High School; coprincipal investigator for Action Research and Its Impact on PDS Partnerships; director of GEAR UP: Project S.T.O.M.P.; co-director of GEAR UP Lesson Study; instructor for Teacher Quality Grant; instructor for GEAR UP Super Saturdays; president for the Central Texas Council of Teachers of Mathematics; member of the PDS Coordinating Council; member of the PDS Research Symposium; chair of the middle school task force; member of the secondary certificate team; member of the middle school certificate team; and member of NCATE middle and secondary mathematics SPA report teams. Dr. Meyer has authored and coauthored numerous manuscripts and research publications, professionally presented at state and national educational conferences, and she has reviewed for NCTM *Mathematics Teaching in the Middle School.*

Linda Bridges, MEd

Ms. Linda Bridges is currently a secondary Alabama Math, Science, and Technology Initiative (AMSTI) Specialist at the University of Alabama in Huntsville, Alabama. In this capacity, Ms. Bridges serves as an AMSTI trainer for grades 6–12 mathematics teachers; develops and presents professional development sessions and workshops to grades 6–12 mathematics teachers; models inquiry-based, hands-on lessons in grades 5–12 AMSTI mathematics classrooms; models and uses appropriate forms of technology in lesson presentations and teacher training; and presents AMSTI overview sessions to preservice teachers at local universities. Ms. Bridges has also worked as a college algebra adjunct teacher at Northwest Mississippi Community College and the University of Mississippi in Oxford, MS.

In addition to her university teaching experience, Ms. Bridges has over 32 years of teaching experience at the middle and high school level, including five years teaching geometry, algebra II, pre-calculus, trigonometry, foundations of higher mathematics, AP Calculus I and II, AP Statistics, probability and statistics, Integrating Science/Mathematics with Technology and Data Analysis, Theory of Equations, and other individualized courses at the Mississippi School for Mathematics and Science. Ms. Bridges is also a mentor for teachers seeking National Board Certification and a member of the Alabama Council of Teachers of Mathematics, the National Council of Teachers of Mathematics, and the Council of Presidential Awardees in Mathematics. She has been extensively involved in state and national mathematics initiatives throughout her educational career.

Ms. Bridges received a BS in Mathematics from Mississippi University for Women and an MEd in Secondary Mathematics Education from the University of Mississippi. She also holds a Class AA Secondary Mathematics (6–12) teacher certification in the state of Alabama and is a National Board Certified Teacher in Secondary Mathematics.

Leo Edwards, Jr., EdD

Dr. Edwards currently serves as a mathematics education consultant for state departments of education, school districts, and other educational resource groups and agencies. Dr. Edwards has participated as a mathematics national expert for other state alignment studies based on Dr. Norman Webb's methodology. His work includes many research and professional practices, including projects awarded and funded by the Eisenhower Fund, NASA, Texas Instruments, the National Science Foundation, and other states, universities, and educational organizations. He is a contributing author for several mathematics textbooks for elementary and secondary levels from publishers that include Silver Burdett Ginn and Glencoe/Merrill. Dr. Edwards has conducted numerous mathematics and education-related workshops and made conference presentations related to mathematics topics at the elementary and secondary levels. In addition to his position on the faculty at Fayetteville State University, Dr. Edwards has held leadership positions that include director of the Mathematics & Science Education Center, acting dean of Colleges of Arts and Sciences, and acting vice chancellor for Academic Affairs. Dr. Edwards received a BS degree in mathematics from Fayetteville State University, Fayetteville, North Carolina; an MEd in mathematics education from Temple University, Philadelphia, Pennsylvania; an MA degree in computer sciences from Goddard College, Plainfield, Vermont; and an EdD in curriculum and instruction from Utah State University, Logan, Utah.

Appendix B

Depth-of-Knowledge Levels

Depth of Knowledge – Mathematics

Mathematics DOK Levels

Level 1 (Recall) includes the recall of information such as a fact, definition, term, or a simple procedure, as well as performing a simple algorithm or applying a formula. That is, in mathematics, a one-step, well-defined, and straight algorithmic procedure should be included at this lowest level. Other key words that signify Level 1 include "identify," "recall," "recognize," "use," and "measure." Verbs such as "describe" and "explain" could be classified at different levels, depending on what is to be described and explained.

Level 2 (Skill/Concept) includes the engagement of some mental processing beyond an habitual response. A Level 2 assessment item requires students to make some decisions as to how to approach the problem or activity, whereas Level 1 requires students to demonstrate a rote response, perform a well-known algorithm, follow a set procedure (like a recipe), or perform a clearly defined series of steps. Keywords that generally distinguish a Level 2 item include "classify," "organize," "estimate," "make observations," "collect and display data," and "compare data." These actions imply more than one step. For example, to compare data requires first identifying characteristics of objects or phenomena and then grouping or ordering the objects. Some action verbs, such as "explain," "describe," or "interpret," could be classified at different levels depending on the object of the action. For example, interpreting information from a simple graph, or reading information from the graph, also are at Level 2. Interpreting information from a complex graph that requires some decisions on what features of the graph need to be considered and how information from the graph can be aggregated is at Level 3. Level 2 activities are not limited only to number skills, but may involve visualization skills and probability skills. Other Level 2 activities include noticing or describing non-trivial patterns, explaining the purpose and use of experimental procedures; carrying out experimental procedures; making observations and collecting data; classifying, organizing, and comparing data; and organizing and displaying data in tables, graphs, and charts.

Level 3 (Strategic Thinking) requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. In most instances, requiring students to explain their thinking is at Level 3. Activities that require students to make conjectures are also at this level. The cognitive demands at Level 3 are complex and abstract. The complexity does not result from the fact that there are multiple answers, a possibility for both Levels 1 and 2, but because the task requires more demanding reasoning. An activity, however, that has more than one possible answer and requires students to justify the response they give would most likely be at Level 3.

Other Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and deciding which concepts to apply in order to solve a complex problem.

Level 4 (Extended Thinking) requires complex reasoning, planning, developing, and thinking, most likely over an extended period of time. The extended time period is not a distinguishing factor if the required work is only repetitive and does not require applying significant conceptual understanding and higher-order thinking. For example, if a student has to take the water temperature from a river each day for a month and then construct a graph, this would be classified as a Level 2. However, if the student is to conduct a river study that requires taking into consideration a number of variables, this would be a Level 4. At Level 4, the cognitive demands of the task should be high and the work should be very complex. Students should be required to make several connections—relate ideas *within* the content area or *among* content areas—and have to select one approach among many alternatives on how the situation should be solved, in order to be at this highest level. Level 4 activities include designing *and* conducting experiments and projects; developing and proving conjectures, making connections between a finding and related concepts and phenomena; combining and synthesizing ideas into new concepts; and critiquing experimental designs.

(Webb 2002)

Appendix C

Depth-of-Knowledge Consensus

Depth-of-Knowledge Consensus
Mathematics
Grade 3

Grade 3 NUMBER SENSE	Consensus
MA 3.1.1 Students will represent and show relationships among positive rational numbers within the base-ten number system.	
MA 3.1.1.e Demonstrate multiple equivalent representations for numbers up to 10,000	2
MA 3.1.1.g Compare and order whole numbers through the thousands	2
MA 3.1.1.h Find parts of whole and parts of a set for 1/2, 1/3, or 1/4	1
MA 3.1.1.i Round a given number to tens, hundreds, or thousands	2
MA 3.1.2 Students demonstrate the meaning of multiplication with whole numbers.	
MA 3.1.2.a Represent multiplication as repeated addition using objects, drawings, words, and symbols	2
MA.3.1.2.d Use drawings, words, and symbols to explain the meaning of multiplication using an array	3
Grade 3 GEOMETRIC/MEASUREMENT CONCEPTS	
MA 3.2.1 Students will identify characteristics and describe properties of two-dimensional shapes and three-dimensional objects.	
MA 3.2.1.a Identify the number of sides, angles, and vertices of two-dimensional shapes	1
MA 3.2.1.b Identify congruent two-dimensional figures given multiple two-dimensional shapes	1
MA 3.2.2 Students will identify distances on a number line.	
MA 3.2.2.b Determine the distance between two whole number points on a number line	1
MA 3.2.5 Students will apply appropriate procedures and tools to determine measurements using customary and metric units.	
MA 3.2.5.e Identify the appropriate customary unit for measuring length, weight, and capacity/volume	2
MA 3.2.5.g Compare and order objects according to length using centimeters and meters	2

Grade 3 ALGEBRAIC CONCEPTS	Consensus
MA 3.3.1 Students will represent relationships.	
MA 3.3.1.a Identify, describe, and extend numeric and non-numeric patterns	2
MA 3.3.2 Students will create and use models to represent mathematical situations.	
MA 3.3.2.a Model situations that involve the addition and subtraction of whole numbers using objects, number lines, and symbols	2
MA 3.3.3 Students will identify and apply properties of whole numbers to solve equations involving addition and subtraction.	
MA 3.3.3.b Solve simple one-step whole number equations involving addition and subtraction	1
Grade 3 DATA ANALYSIS/PROBABILITY CONCEPTS	
MA 3.4.1 Students will organize, display, compare, and interpret data.	
MA 3.4.1.a Represent data using horizontal and vertical bar graphs	2
MA 3.4.1.c Interpret data using horizontal and vertical bar graphs	2

Depth-of-Knowledge Consensus
Mathematics
Grade 4

Grade 4 NUMBER SENSE	Consensus
MA 4.1.1 Students will represent and show relationships among positive rational numbers within the base-ten number system.	
MA 4.1.1.b Demonstrate multiple equivalent representations for decimal numbers through the hundredths place	2
MA 4.1.1.c Compare and order whole numbers and decimals through the hundredths place	2
MA 4.1.1.e Represent a fraction as parts of a whole, and/or parts of a set	1
MA 4.1.1.f Use visual models to find equivalent fractions	2
MA 4.1.1.h Locate fractions on a number line	2
MA 4.1.2 Students will demonstrate the meaning of division with whole numbers.	
MA 4.1.2.a Use drawings, words, and symbols to explain the meaning of division	3
4.1.3 Students will compute fluently and accurately using appropriate strategies and tools.	
MA 4.1.3.b Add and subtract decimals to the hundredth place	1
MA 4.1.3.c Multiply two-digit whole numbers	1
MA 4.1.3.e Mentally compute multiplication and division involving powers of 10	1
MA 4.1.3.f Select and apply the appropriate method of computation when problem solving	2
Grade 4 GEOMETRIC/MEASUREMENT CONCEPTS	
MA 4.2.1 Students will classify two-dimensional shapes and three-dimensional objects.	
MA 4.2.1.a Identify two- and three- dimensional shapes according to their sides and angle properties	1
MA 4.2.1.b Classify an angle as acute, obtuse, and right	1
MA 4.2.1.c Identify parallel, perpendicular, and intersecting lines	1
MA 4.2.2 Students will describe locations using coordinate geometry.	

Grade 4 (continued)	**Consensus**
MA 4.2.2.a Identify the ordered pair of a plotted point in first quadrant by its location	1
MA 4.2.5 Students will apply appropriate procedures and tools to estimate and determine measurement using customary units and metric units.	
MA 4.2.5.b Identify time to the minute on an analog clock	1
MA 4.2.5.c Solve problems involving elapsed time	2
MA 4.2.5.d Identify the appropriate metric unit for measuring length, weight, and capacity/volume	2
MA 4.2.5.g Compute simple unit conversions for length within a system of measurement	2
Grade 4 ALGEBRAIC CONCEPTS	
MA 4.3.1 Students will represent and analyze relationships.	
MA 4.3.1.c Use ≤ and ≥ symbols to compare quantities	2
MA 4.3.1.d Select appropriate operational and relational symbols to make a number sentence true	2
MA 4.3.3 Students will identify and apply properties of whole numbers to solve equations involving multiplication and division.	
MA 4.3.3.c Use symbolic representations of the commutative property of multiplication	1
MA 4.3.3.d Solve simple one-step whole number equations	1
Grade 4 DATA ANALYSIS/PROBABILITY CONCEPTS	
MA 4.4.1 Students will organize, display, compare, and interpret data.	
MA 4.4.1.b Compare different representations of the same data	2
MA 4.4.1.c Interpret data and draw conclusions using dot/line plots	2
MA 4.4.2 Students will construct predictions based on data.	
MA 4.4.2.a Make predictions based on data to answer questions from tables and bar graphs	3

Depth-of-Knowledge Consensus
Mathematics
Grade 5

Grade 5 NUMBER SENSE	Consensus
MA 5.1.1 Students will represent and show relationships among positive rational numbers.	
MA 5.1.1.a Demonstrate multiple equivalent representations for whole numbers and decimals through the thousandths place	2
MA 5.1.1.b Compare and order whole numbers, fractions, and decimals through the thousandths place	2
MA 5.1.1.c Identify and name fractions in their simplest form and find common denominators for fractions	2
MA 5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents	2
MA 5.1.1.e Classify a number as prime or composite	1
MA 5.1.1.f Identify factors and multiples of any whole number	1
MA 5.1.2 Students will demonstrate the meaning of arithmetic operations with whole numbers.	
MA 5.1.2.c Use words and symbols to explain the distributive property of multiplication over addition	2
MA 5.1.3 Students will compute fluently and accurately using appropriate strategies and tools.	
MA 5.1.3.a Add and subtract positive rational numbers	2
MA 5.1.3.b Select, apply, and explain the appropriate method of computation when problem solving	2
MA 5.1.3.c Multiply decimals	1
MA 5.1.3.d Divide a decimal by a whole number	1
MA 5.1.4 Students will estimate and check reasonableness of answers using appropriate strategies and tools.	
MA 5.1.4.a Estimate the sums and differences of positive rational numbers to check the reasonableness of such results	2

Grade 5 GEOMETRIC/MEASUREMENT CONCEPTS	Consensus
MA 5.2.1 Students will describe relationships among two-dimensional shapes and three-dimensional objects.	
MA 5.2.1.a Identify the number of edges, faces, and vertices of triangular and rectangular prisms	1
MA 5.2.1.d Identify degrees on a circle	1
5.2.2 Students will identify locations using coordinate geometry.	
MA 5.2.2.a Plot the location of an ordered pair in the first quadrant	1
MA 5.2.5 Students will apply appropriate procedures, tools, and formulas to determine measurements using customary units and metric units.	
MA 5.2.5.b Identify correct unit (customary or metric) to the measurement situation	1
MA 5.2.5.f Determine the area of rectangles and squares	1
Grade 5 ALGEBRAIC CONCEPTS	
MA 5.3.2 Students will create, use, and compare models representing mathematical situations.	
MA 5.3.2.a Model situations that involve the addition, subtraction, and multiplication of positive rational numbers using words, graphs, and tables	2
MA 5.3.3 Students will apply properties of simple positive rational numbers to solve one-step equations.	
MA 5.3.3.b Use symbolic representations of the associative property	2
MA 5.3.3.c Evaluate numerical expressions by using parentheses with respect to order of operations	1
MA 5.3.3.d Evaluate simple algebraic expressions involving addition and subtraction	1
MA 5.3.3.e Solve one-step addition and subtraction equations involving common positive rational numbers	2

Grade 5 DATA ANALYSIS/PROBABILITY CONCEPTS	Consensus
MA 5.4.1 Students will organize, display, compare, and interpret data.	
MA 5.4.1.a Represent data using line graphs	2
MA 5.4.1.b Represent the same set of data in different formats	2
MA 5.4.1.c Draw conclusions based on a set of data	2
MA 5.4.3 Students will determine theoretical probabilities.	
MA 5.4.3.b Generate a list of possible outcomes for a simple event	1
MA 5.4.3.c Explain the likelihood of an event that can be represented by a number from 0 to 1	2

Depth-of-Knowledge Consensus
Mathematics
Grade 6

Grade 6 NUMBER SENSE	Consensus
MA 6.1.1 Students will represent and show relationships among positive rational numbers and integers.	
MA 6.1.1.b Compare and order positive and negative integers	1
MA 6.1.1.d Represent large numbers using exponential notation	2
MA 6.1.1.e Identify the prime factorization of numbers	1
MA 6.1.2 Students will demonstrate the meaning of arithmetic operations with positive fractions and decimals.	
MA 6.1.2.a Use drawings, words, and symbols to explain the meaning of addition and subtraction of fractions	2
MA 6.1.2.b Use drawings, words and symbols to explain the meaning of addition and subtraction of decimals	2
MA 6.1.3 Students will compute fluently and accurately using appropriate strategies and tools.	
MA 6.1.3.a Multiply and divide positive rational numbers	1
MA 6.1.3.b Select and apply the appropriate method of computation when problem solving	2
MA 6.1.4 Students will estimate and check reasonableness of answers using appropriate strategies and tools.	
MA 6.1.4.a Use appropriate estimation methods to check the reasonableness of solutions for problems involving positive rational numbers	2

Grade 6 GEOMETRIC/MEASUREMENT CONCEPTS	Consensus
MA 6.2.2 Students will label points using coordinate geometry.	
MA 6.2.2.a Identify the ordered pair of a plotted point in the coordinate plane	1
MA 6.2.4 Students will use visualization of geometric models to solve problems.	
MA 6.2.4.a Identify two-dimensional drawings of three-dimensional objects	2
MA 6.2.5 Students will apply appropriate procedures, tools, and formulas to determine measurements.	
MA 6.2.5.d Determine the perimeter of polygons	1
MA 6.2.5.e Determine the area of parallelograms and triangles	1
MA 6.2.5.f Determine the volume of rectangular prisms	1
Grade 6 ALGEBRAIC CONCEPTS	
MA 6.3.1 Students will represent, analyze, and use relationships to make generalizations.	
MA 6.3.1.a Describe and create simple algebraic expressions from words and tables	2
MA 6.3.1.b Use a variable to describe a situation with an equation	2
MA 6.3.2 Students will create, use, and interpret models of quantitative relationships.	
MA 6.3.2.a Model contextualized problems using various representations	2
MA 6.3.3 Students will apply properties to solve equations.	
MA 6.3.3.b Evaluate numerical expressions containing multiple operations with respect to order of operations	2
MA 6.3.3.c Evaluate simple algebraic expressions involving multiplication and division	1
MA 6.3.3.d Solve one-step equations involving positive rational numbers	1
MA 6.3.3.e Identify and explain the properties of equality used in solving one-step equations	2

Grade 6 DATA ANALYSIS/PROBABILITY CONCEPTS	Consensus
MA 6.4.1 Students will organize, display, compare, and interpret data.	
MA 6.4.1.b Compare and interpret data sets and their graphical representations	2
MA 6.4.1.c Find the mean, median, mode, and range for a set of data	1
MA 6.4.3 Students will apply basic concepts of probability.	
MA 6.4.3.b Compute theoretical probabilities for independent events	1
MA 6.4.3.c Find experimental probability for independent events	1

Depth-of-Knowledge Consensus
Mathematics
Grade 7

Grade 7 NUMBER SENSE	Consensus
MA 7.1.1 Students will represent and show relationships among rational numbers.	
MA 7.1.1.a Show equivalence among fractions, decimals, and percents	1
MA 7.1.1.b Compare and order rational numbers	2
MA 7.1.1.c Represent large numbers using scientific notation	1
MA 7.1.3 Students will compute fluently and accurately using appropriate strategies and tools.	
MA 7.1.3.a Compute accurately with integers	1
MA 7.1.3.b Select, apply, and explain the method of computation when problem solving using integers and positive rational numbers	2
MA 7.1.3.c Solve problems involving percent of numbers	2
MA 7.1.4 Students will estimate and check reasonableness of answers using appropriate strategies and tools.	
MA 7.1.4.a Use estimation methods to check the reasonableness of solutions for problems involving integers and positive rational numbers	2
Grade 7 GEOMETRIC/MEASUREMENT CONCEPTS	
MA 7.2.2 Students will specify locations and describe relationships using coordinate geometry.	
MA 7.2.2.a Plot the location of an ordered pair in the coordinate plane	1
MA 7.2.2.c Find the distance between points along horizontal and vertical lines of a coordinate plane	1
MA 7.2.3 Students will use transformations and symmetry to analyze geometric shapes.	

Grade 7 GEOMETRIC/MEASUREMENT CONCEPTS	Consensus
MA 7.2.3.b Perform and describe positions and orientation of shapes under a single transformation on a coordinate plane	2
MA 7.2.5 Students will select and apply appropriate procedures, tools, and formulas to determine measurements.	
MA 7.2.5.b Determine the area of trapezoids and circles, and the circumference of circles	1
Grade 7 ALGEBRAIC CONCEPTS	
MA 7.3.1 Students will represent and analyze relationships using algebraic symbols.	
MA 7.3.1.a Describe and create algebraic expressions from words, tables, and graphs	2
MA 7.3.1.b Use a variable to describe a situation with an inequality	2
MA 7.3.2 Students will create, use, and interpret models of quantitative relationships.	
MA 7.3.2.a Model contextualized problems using various representations	2
MA 7.3.3 Students will apply properties to solve equations and inequalities.	
MA 7.3.3.c Given the value of the variable(s), evaluate algebraic expressions with respect to order of operations	1
MA 7.3.3.d Solve two-step equations involving integers and positive rational numbers	2
MA 7.3.3.e Solve one-step inequalities involving positive rational numbers	1
Grade 7 DATA ANALYSIS/PROBABILITY CONCEPTS	
MA 7.4.1 Students will formulate questions that can be addressed with data, and then organize, display, and analyze the relevant data to answer their questions.	
MA 7.4.1.a Analyze data sets and interpret their graphical representations	2
MA 7.4.1.b Find and interpret mean, median, mode, and range for sets of data	2
MA 7.4.3 Students will apply and interpret basic concepts of probability.	
MA 7.4.3.a Find the probability of independent compound events	2
MA 7.4.3.b Compare and contrast theoretical and experimental probabilities	2

Depth-of-Knowledge Consensus
Mathematics
Grade 8

Grade 8 NUMBER SENSE	Consensus
MA 8.1.1 Students will represent and show relationships among real numbers.	
MA 8.1.1.a Compare and order real numbers	2
MA 8.1.1.c Represent small numbers using scientific notation	1
MA 8.1.1.d Classify numbers as natural, whole, integer, rational, irrational, or real	1
MA 8.1.3 Students will compute fluently and accurately using appropriate strategies and tools.	
MA 8.1.3.a Compute accurately with rational numbers	1
MA 8.1.3.b Evaluate expressions involving absolute value of integers	1
MA 8.1.3.d Select, apply, and explain the method of computation when problem solving using rational numbers	2
MA 8.1.3.e Solve problems involving ratios and proportions	2
MA 8.1.4 Students will estimate and check reasonableness of answers using appropriate strategies and tools.	
MA 8.1.4.a Use estimation methods to check the reasonableness of solutions for problems involving rational numbers	2

Grade 8 GEOMETRIC/MEASUREMENT CONCEPTS	Consensus
MA 8.2.1 Students will describe, compare, and contrast characteristics, properties, and relationships of geometric shapes and objects.	
MA 8.2.1.c Identify geometric properties of parallel lines cut by a transversal and related angles	1
MA 8.2.1.d Identify pairs of angles	1
MA 8.2.1.e Examine the relationships of the interior angles of a triangle	1
MA 8.2.2 Students will specify locations and describe spatial relationships using coordinate geometry.	
MA 8.2.2.a Use coordinate geometry to represent and examine the properties of rectangles and squares using horizontal and vertical segments	2
MA 8.2.5 Students will select and apply appropriate procedures, tools, and formulas to determine measurements.	
MA 8.2.5.c Apply the Pythagorean theorem to find missing lengths in right triangles and to solve problems	2
MA 8.2.5.d Use scale factors to find missing lengths in similar shapes	2
Grade 8 ALGEBRAIC CONCEPTS	
MA 8.3.1 Students will represent and analyze relationships using algebraic symbols.	
MA 8.3.1.b Describe relationships using algebraic expressions, equations, and inequalities	2
MA 8.3.2 Students will create, use, and interpret models of quantitative relationships.	
MA 8.3.2.a Model contextualized problems using various representations	2
MA 8.3.3 Students will apply properties to solve equations and inequalities.	
MA 8.3.3.b Evaluate numerical expressions containing whole number exponents	1
MA 8.3.3.c Solve multi-step equations involving rational numbers	2
MA 8.3.3.d Solve two-step inequalities involving rational numbers	2

Grade 8 DATA ANALYSIS/PROBABILITY CONCEPTS	Consensus
MA 8.4.1 Students will formulate questions that can be addressed with data, and then organize, display, and analyze the relevant data to answer their questions.	
MA 8.4.1.b Compare characteristics between sets of data or within a given set of data	2
MA 8.4.1.d Select the most appropriate unit of central tendency for sets of data	2
MA 8.4.1.e Identify misrepresentation and misinterpretation of data represented in circle graphs and box plots	2
MA 8.4.3 Students will apply and interpret basic concepts of probability.	
MA 8.4.3.a Identify complementary events and calculate their probabilities	2
MA 8.4.3.b Compute probabilities for independent compound events	2

Depth-of-Knowledge Consensus
Mathematics
Grade 11

Grade 11 NUMBER SENSE	Consensus
MA 12.1.3 Students will compute fluently and accurately using appropriate strategies and tools.	
MA 12.1.3.a Compute accurately with real numbers	1
MA 12.1.3.b Simplify exponential expressions	1
MA 12.1.4 Students will estimate and check reasonableness of answers using appropriate strategies and tools.	
MA 12.1.4.a Use estimation methods to check the reasonableness of real number computations and decide if the problem calls for an approximation or an exact number	2
Gr11 GEOMETRIC/MEASUREMENT CONCEPTS	
MA 12.2.1 Students will analyze characteristics, properties, and relationships among geometric shapes and objects.	
MA 12.2.1.d Apply geometric properties to solve problems	2
MA 12.2.1.e Identify and apply right triangle relationships	2
MA 12.2.2 Students will use coordinate geometry to analyze and describe relationships in the coordinate plane.	
MA 12.2.2.a Use coordinate geometry to analyze geometric situations	2
MA 12.2.2.c Apply the distance formula	1
MA 12.2.2.d Prove special types of triangles and quadrilaterals	2
MA 12.2.4 Students will use visualization, spatial reasoning, and geometric modeling to solve problems.	
MA 12.2.4.b Use geometric models to visualize, describe, and solve problems	2
MA 12.2.5 Students will apply the units, systems, and formulas to solve problems.	
MA 12.2.5.d Convert equivalent rates	2

Grade 11 ALGEBRAIC CONCEPTS	Consensus
MA 12.3.1 Students will generalize, represent, and analyze relationships using algebraic symbols.	
MA 12.3.1.a Represent, interpret, and analyze functions with graphs, tables, and algebraic notation, and convert among these representations	2
MA 12.3.1.c Identify the slope and intercepts of a linear relationship from an equation or graph	1
MA 12.3.1.d Identify characteristics of linear and non-linear functions	1
MA 12.3.1.f Compare and analyze the rate of change by using ordered pairs, tables, graphs, and equations	2
MA 12.3.2 Students will model and analyze quantitative relationships.	
MA 12.3.2.b Represent a variety of quantitative relationships using linear equations and one variable inequalities	2
MA 12.3.3 Students will represent and solve equations and inequalities.	
MA 12.3.3.b Simplify algebraic expressions involving exponents	1
MA 12.3.3.c Add and subtract polynomials	1
MA 12.3.3.d Multiply and divide polynomials	1
MA 12.3.3.f Identify and generate equivalent forms of linear equations	2

Grade 11 DATA ANALYSIS/PROBABILITY CONCEPTS	Consensus
MA 12.4.1 Students will formulate a question and design a survey or an experiment in which data is collected and displayed in a variety of formats, then select and use appropriate statistical methods to analyze the data.	
MA 12.4.1.d Describe the shape and determine the spread (variance, standard deviation) and outliers of a data set	2
MA 12.4.3 Students will apply and analyze concepts of probability.	
MA 12.4.3.b Identify dependent and independent events and calculate their probabilities	2
MA 12.4.3.c Use the appropriate counting techniques to determine the probability of an event	2
MA 12.4.3.d Analyze events to determine if they are mutually exclusive	2

Appendix D

Results of the Alignment Analysis

Grade 3

Table M3.1: Summary of Depth-of-Knowledge Consistency

Standard	Indicators	Hits		Percent of Questions at DOK Level						DOK Consistency
		Mean	SD	Under		At		Above		
				Mean	SD	Mean	SD	Mean	SD	
Number Sense	6	25.14	1.86	40.38	16.87	44.31	11.49	15.31	10.33	Yes
Geometry / Measurement	5	12	1	11.83	9.26	64.27	16.77	23.90	13.29	Yes
Algebraic Concepts	3	13	5.80	22.81	21.34	61.23	22.33	15.96	9.47	Yes
Data Analysis / Probability	2	6.86	0.90	26.79	32.97	66.75	30.16	6.46	11.56	Yes
Total	16	14.25	7.74	25.45	11.79	59.14	10.14	15.41	7.13	

Table M3.2: Summary of Categorical Concurrence

Standard	Indicators	Level of Indicators			Hits		Categorical Concurrence
		Level	Number of Indicators	Percentage of Indicators	Mean	SD	
Number Sense	6	1 2 3	1 4 1	16.67% 66.67% 16.67%	25.14	1.86	Yes
Geometry / Measurement	5	1 2 3	3 2 0	60% 40% 0%	12	1	Yes
Algebraic Concepts	3	1 2 3	1 2 0	33.33% 66.67% 0%	13	5.80	Yes
Data Analysis / Probability	2	1 2 3	0 2 0	0% 100% 0%	6.86	0.90	Yes
Total	16	1 2 3	5 10 1	31.25% 62.5% 6.25%	14.25	7.74	

Grade 3 (continued)

Table M3.3: Summary of Range-of-Knowledge Correspondence

Standard	Indicators	Hits		Range of Indicators				Range of Knowledge Correspondence
				# of Indicators Hit		% of Total		
		Mean	SD	Mean	SD	Mean	SD	
Number Sense	6	25.14	1.86	6	0	100%	0	Yes
Geometry / Measurement	5	12	1	5	0	100%	0	Yes
Algebraic Concepts	3	13	5.80	3	0	100%	0	Yes
Data Analysis / Probability	2	6.86	0.90	1.86	0.38	92.86%	0.19	Yes
Total	16	14.25	7.74	3.96	1.88	98.21%	0.04	

Table M3.4: Summary of Balance of Representation

Standard	Indicators	Percentage of Total Hits		Index		Balance of Representation
		Mean	SD	Mean	SD	
Number Sense	6	44.11%	1.86	0.83	0.07	Yes
Geometry / Measurement	5	21.05%	1	0.85	0.03	Yes
Algebraic Concepts	3	22.81%	5.80	0.78	0.07	Yes
Data Analysis / Probability	2	12.03%	0.90	0.90	0.08	Yes
Total	16	25%	0.14	0.84	0.05	

Grade 4

Table M4.1: Summary of Depth-of-Knowledge Consistency

Standard	Indicators	Hits		Percent of Questions at DOK Level						DOK Consistency
		Mean	SD	Under		At		Above		
				Mean	SD	Mean	SD	Mean	SD	
Number Sense	10	28.71	3.04	30.43	17.16	60.84	17.64	8.73	6.31	Yes
Geometry / Measurement	8	14.29	0.76	6.05	10.45	86.12	14.06	7.82	9.85	Yes
Algebraic Concepts	4	13	3.79	18.33	16.27	78.10	14.19	3.57	7.48	Yes
Data Analysis / Probability	3	6.71	1.50	33.54	26.58	62.65	28.85	3.81	6.78	Yes
Total	25	15.68	9.30	22.09	12.54	71.93	12.23	5.98	2.68	

Table M4.2: Summary of Categorical Concurrence

Standard	Indicators	Level of Indicators			Hits		Categorical Concurrence
		Level	Number of Indicators	Percentage of Indicators	Mean	SD	
Number Sense	10	1 2 3	4 5 1	40% 50% 10%	28.71	3.04	Yes
Geometry / Measurement	8	1 2 3	5 3 0	62.5% 37.5% 0%	14.29	0.76	Yes
Algebraic Concepts	4	1 2 3	2 2 0	50% 50% 0%	13	3.79	Yes
Data Analysis / Probability	3	1 2 3	0 2 1	0% 66.67% 33.33%	6.71	1.50	Yes
Total	25	1 2 3	11 12 2	44% 48% 8%	15.68	9.30	

Grade 4 (continued)

Table M4.3: Summary of Range-of-Knowledge Correspondence

Standard	Indicators	Hits		Range of Indicators				Range of Knowledge Correspondence
				# of Indicators Hit		% of Total		
		Mean	SD	Mean	SD	Mean	SD	
Number Sense	10	28.71	3.04	9.71	0.76	97.14%	0.08	Yes
Geometry / Measurement	8	14.29	0.76	8	0	100%	0	Yes
Algebraic Concepts	4	13	3.79	3.71	0.49	92.86%	0.12	Yes
Data Analysis / Probability	3	6.71	1.50	2.71	0.49	90.48%	0.16	Yes
Total	25	15.68	9.30	6.04	3.36	95.12%	0.04	

Table M4.4: Summary of Balance of Representation

Standard	Indicators	Percentage of Total Hits		Index		Balance of Representation
		Mean	SD	Mean	SD	
Number Sense	10	45.79%	3.04	0.79	0.06	Yes
Geometry / Measurement	8	22.78%	0.76	0.79	0.03	Yes
Algebraic Concepts	4	20.73%	3.79	0.86	0.06	Yes
Data Analysis / Probability	3	10.71%	1.50	0.67	0.03	Yes*
Total	25	25%	0.15	0.78	0.08	

Grade 5

Table M5.1: Summary of Depth-of-Knowledge Consistency

Standard	Indicators	Hits		Percent of Questions at DOK Level						DOK Consistency
		Mean	SD	Under		At		Above		
				Mean	SD	Mean	SD	Mean	SD	
Number Sense	12	28.71	3.04	30.43	17.16	60.84	17.64	8.73	6.31	Yes
Geometry / Measurement	5	14.29	0.76	6.05	10.45	86.12	14.06	7.82	9.85	Yes
Algebraic Concepts	5	13	3.79	18.33	16.27	78.10	14.19	3.57	7.48	Yes
Data Analysis / Probability	5	6.71	1.50	33.54	26.58	62.65	28.85	3.81	6.78	Yes
Total	27	15.68	9.30	22.09	12.54	71.93	12.23	5.98	2.68	

Table M5.2: Summary of Categorical Concurrence

Standard	Indicators	Level of Indicators			Hits		Categorical Concurrence
		Level	Number of Indicators	Percentage of Indicators	Mean	SD	
Number Sense	12	1 2 3	4 8 0	33.33% 66.67%	28.71	3.04	Yes
Geometry / Measurement	5	1 2 3	5 0 0	100% 0% 0%	14.29	0.76	Yes
Algebraic Concepts	5	1 2 3	2 3 0	40% 60% 0%	13	3.79	Yes
Data Analysis / Probability	5	1 2 3	1 4 0	20% 80% 0%	6.71	1.50	Yes
Total	27	1 2 3	12 15 0	44.44% 55.56% 0%	15.68	9.30	

Grade 5 (continued)

Table M5.3: Summary of Range-of-Knowledge Correspondence

Standard	Indicators	Hits		Range of Indicators				Range of Knowledge Correspondence
				# of Indicators Hit		% of Total		
		Mean	SD	Mean	SD	Mean	SD	
Number Sense	12	28.71	3.04	12	0	100%	0	Yes
Geometry / Measurement	5	14.29	0.76	5.00	0	100%	0	Yes
Algebraic Concepts	5	13	3.79	4.71	0.49	94.29%	0.10	Yes
Data Analysis / Probability	5	6.71	1.50	4.57	1.13	91.43%	0.23	Yes
Total	27	15.68	9.30	6.57	3.62	96.43%	.04	

Table M5.4: Summary of Balance of Representation

Standard	Indicators	Percentage of Total Hits		Index		Balance of Representation
		Mean	SD	Mean	SD	
Number Sense	12	52.93%	6.08	0.75	0.02	Yes
Geometry / Measurement	5	17.57%	0.38	0.85	0.00	Yes
Algebraic Concepts	5	15.77%	2.00	0.83	0.03	Yes
Data Analysis / Probability	5	13.74%	0.76	0.81	0.07	Yes
Total	27	25%	0.19	0.81	0.04	

Grade 6

Table M6.1: Summary of Depth-of-Knowledge Consistency

Standard	Indicators	Hits		Percent of Questions at DOK Level						DOK Consistency
		Mean	SD	Under		At		Above		
				Mean	SD	Mean	SD	Mean	SD	
Number Sense	8	29.86	6.84	22.18	14.96	69.14	16.48	8.68	8.03	Yes
Geometry / Measurement	5	15.29	0.95	7.52	4.45	73.43	17.05	19.06	14.07	Yes
Algebraic Concepts	7	15.29	3.86	12.89	11.08	84.46	11.18	2.65	3.35	Yes
Data Analysis / Probability	4	10.71	0.95	12.97	10.43	70.87	17.49	16.16	15.68	Yes
Total	24	17.79	8.33	13.89	6.09	74.47	6.89	11.64	7.41	

Table M6.2: Summary of Categorical Concurrence

Standard	Indicators	Level of Indicators			Hits		Categorical Concurrence
		Level	Number of Indicators	Percentage of Indicators	Mean	SD	
Number Sense	8	1 2 3	3 5 0	37.5% 62.5% 0%	29.86	6.84	Yes
Geometry / Measurement	5	1 2 3	4 1 0	80% 20% 0%	15.29	0.95	Yes
Algebraic Concepts	7	1 2 3	2 5 0	28.57% 71.43% 0%	15.29	3.86	Yes
Data Analysis / Probability	4	1 2 3	3 1 0	75% 25% 0%	10.71	0.95	Yes
Total	24	1 2 3	12 12 0	50% 50% 0%	17.79	8.33	

Grade 6 (continued)

Table M6.3: Summary of Range-of-Knowledge Correspondence

Standard	Indicators	Hits		Range of Indicators				Range of Knowledge Correspondence
				# of Indicators Hit		% of Total		
		Mean	SD	Mean	SD	Mean	SD	
Number Sense	8	29.86	6.84	7.43	0.79	92.86%	0.10	Yes
Geometry / Measurement	5	15.29	0.95	5	0	100%	0	Yes
Algebraic Concepts	7	15.29	3.86	6.29	0.76	89.80%	0.11	Yes
Data Analysis / Probability	4	10.71	0.95	3.86	0.38	96.43%	0.09	Yes
Total	24	17.79	8.33	5.64	1.55	94.77%	.04	

Table M6.4: Summary of Balance of Representation

Standard	Indicators	Percentage of Total Hits		Index		Balance of Representation
		Mean	SD	Mean	SD	
Number Sense	8	41.97%	6.84	0.66	0.07	Yes*
Geometry / Measurement	5	21.49%	0.95	0.87	0.07	Yes
Algebraic Concepts	7	21.49%	3.86	0.85	0.05	Yes
Data Analysis / Probability	4	15.06%	0.95	0.82	0.05	Yes
Total	24	25%	0.12	0.80	0.09	

Grade 7

Table M7.1: Summary of Depth-of-Knowledge Consistency

Standard	Indicators	Hits		Percent of Questions at DOK Level						DOK Consistency
		Mean	SD	Under		At		Above		
				Mean	SD	Mean	SD	Mean	SD	
Number Sense	7	24.43	5.53	16.18	11.94	80.34	12.22	3.48	7.91	Yes
Geometry / Measurement	4	14.71	1.50	2.93	5.31	80.98	15.35	16.10	10.87	Yes
Algebraic Concepts	6	17.14	3.18	21.11	21.19	72.42	19.45	6.48	8.66	Yes
Data Analysis / Probability	4	9.14	2.34	33.61	27.79	66.39	27.79	0.00	0	Yes
Total	21	16.36	6.34	18.46	12.69	75.03	6.95	6.51	6.92	

Table M7.2: Summary of Categorical Concurrence

Standard	Indicators	Level of Indicators			Hits		Categorical Concurrence
		Level	Number of Indicators	Percentage of Indicators	Mean	SD	
Number Sense	7	1 2 3	3 4 0	42.86% 57.14% 0%	24.43	5.53	Yes
Geometry / Measurement	4	1 2 3	3 1 0	75% 25% 0%	14.71	1.50	Yes
Algebraic Concepts	6	1 2 3	2 4 0	33.33% 66.67% 0%	17.14	3.18	Yes
Data Analysis / Probability	4	1 2 3	0 4 0	0% 100% 0%	9.14	2.34	Yes
Total	21	1 2 3	8 13 0	38.1% 61.9% 0%	16.36	6.34	

Grade 7 (continued)

Table M7.3: Summary of Range-of-Knowledge Correspondence

Standard	Indicators	Hits		Range of Indicators				Range of Knowledge Correspondence
				# of Indicators Hit		% of Total		
		Mean	SD	Mean	SD	Mean	SD	
Number Sense	7	24.43	5.53	7	0	100%	0	Yes
Geometry / Measurement	4	14.71	1.50	3.86	0.38	96.43%	0.09	Yes
Algebraic Concepts	6	17.14	3.18	5.29	0.76	88.10%	0.13	Yes
Data Analysis / Probability	4	9.14	2.34	4	0	100%	0	Yes
Total	21	16.36	6.34	5.04	1.46	96.13%	.06	

Table M7.4: Summary of Balance of Representation

Standard	Indicators	Percentage of Total Hits		Index		Balance of Representation
		Mean	SD	Mean	SD	
Number Sense	7	37.34%	5.53	0.79	0.05	Yes
Geometry / Measurement	4	22.49%	1.50	0.88	0.03	Yes
Algebraic Concepts	6	26.20%	3.18	0.84	0.06	Yes
Data Analysis / Probability	4	13.97%	2.34	0.79	0.10	Yes
Total	21	25%	0.10	0.83	0.05	

Grade 8

Table M8.1: Summary of Depth-of-Knowledge Consistency

Standard	Indicators	Hits		Percent of Questions at DOK Level						DOK Consistency
		Mean	SD	Under		At		Above		
				Mean	SD	Mean	SD	Mean	SD	
Number Sense	8	24.57	9.45	14.07	13.98	74.01	14.43	11.92	12.16	Yes
Geometry / Measurement	6	16.71	1.80	10.93	6.13	66.91	14.33	22.16	13.52	Yes
Algebraic Concepts	5	22.71	4.82	15.08	18.42	80.73	19.68	4.19	2.05	Yes
Data Analysis / Probability	5	12.43	1.62	25.94	24.49	74.06	24.49	0	0	Yes
Total	24	19.11	5.57	16.50	6.53	73.93	5.64	9.57	9.74	

Table M8.2: Summary of Categorical Concurrence

Standard	Indicators	Level of Indicators			Hits		Categorical Concurrence
		Level	Number of Indicators	Percentage of Indicators	Mean	SD	
Number Sense	8	1 2 3	4 4 0	50% 50% 0%	24.57	9.45	Yes
Geometry / Measurement	6	1 2 3	3 3 0	50% 50% 0%	16.71	1.80	Yes
Algebraic Concepts	5	1 2 3	1 4 0	20% 80% 0%	22.71	4.82	Yes
Data Analysis / Probability	5	1 2 3	0 5 0	0% 100% 0%	12.43	1.62	Yes
Total	24	1 2 3	8 16 0	33.33% 66.67% 0%	19.11	5.57	

Grade 8 (continued)

Table M8.3: Summary of Range-of-Knowledge Correspondence

Standard	Indicators	Hits		Range of Indicators				Range of Knowledge Correspondence
				# of Indicators Hit		% of Total		
		Mean	SD	Mean	SD	Mean	SD	
Number Sense	8	24.57	9.45	7.57	1.13	94.64%	0.14	Yes
Geometry / Measurement	6	16.71	1.80	6	0	100%	0	Yes
Algebraic Concepts	5	22.71	4.82	4.71	0.49	94.29%	0.10	Yes
Data Analysis / Probability	5	12.43	1.62	4.86	0.38	97.14%	0.08	Yes
Total	24	19.11	5.57	5.79	1.32	96.52%	.03	

Table M8.4: Summary of Balance of Representation

Standard	Indicators	Percentage of Total Hits		Index		Balance of Representation
		Mean	SD	Mean	SD	
Number Sense	8	32.15%	9.45	0.67	0.10	Yes*
Geometry / Measurement	6	21.87%	1.80	0.89	0.02	Yes
Algebraic Concepts	5	29.72%	4.82	0.82	0.05	Yes
Data Analysis / Probability	5	16.26%	1.62	0.87	0.03	Yes
Total	24	25%	0.07	0.81	0.10	

Grade 11

Table M11.1: Summary of Depth-of-Knowledge Consistency

Standard	Indicators	Hits		Percent of Questions at DOK Level						DOK Consistency
		Mean	SD	Under		At		Above		
				Mean	SD	Mean	SD	Mean	SD	
Number Sense	3	12.86	4.81	3.70	7.52	73.38	21.61	22.92	23.95	Yes
Geometry / Measurement	7	20.86	3.34	37.76	27.42	59.57	28.00	2.67	3.55	Yes
Algebraic Concepts	9	26.71	4.39	8.29	8.26	63.81	11.25	27.90	11.23	Yes
Data Analysis / Probability	4	10	1	22.84	22.59	77.16	22.59	0	0	Yes
Total	23	17.61	7.61	18.15	15.41	68.48	8.17	13.37	14.09	

Table M11.2: Summary of Categorical Concurrence

Standard	Indicators	Level of Indicators			Hits		Categorical Concurrence
		Level	Number of Indicators	Percentage of Indicators	Mean	SD	
Number Sense	3	1 2 3	2 1 0	66.67% 33.33% 0%	12.86	4.81	Yes
Geometry / Measurement	7	1 2 3	1 6 0	14.29% 85.71%	20.86	3.34	Yes
Algebraic Concepts	9	1 2 3	5 4 0	55.56% 44.44% 0%	26.71	4.39	Yes
Data Analysis / Probability	4	1 2 3	0 4 0	0% 100% 0%	10	1	Yes
Total	23	1 2 3	8 15 0	34.78% 65.22% 0%	17.61	7.61	

Grade 11 (continued)

Table M11.3: Summary of Range-of-Knowledge Correspondence

Standard	Indicators	Hits		Range of Indicators				Range of Knowledge Correspondence
				# of Indicators Hit		% of Total		
		Mean	SD	Mean	SD	Mean	SD	
Number Sense	3	12.86	4.81	3	0	100%	0	Yes
Geometry / Measurement	7	20.86	3.34	5.71	0.49	81.63%	0.07	Yes
Algebraic Concepts	9	26.71	4.39	7.71	0.49	85.71%	0.05	Yes
Data Analysis / Probability	4	10	1	4	0	100%	0	Yes
Total	23	17.61	7.61	5.11	2.07	91.84%	0.10	

Table M11.4: Summary of Balance of Representation

Standard	Indicators	Percentage of Total Hits		Index		Balance of Representation
		Mean	SD	Mean	SD	
Number Sense	3	18.26%	4.81	0.72	0.16	Yes
Geometry / Measurement	7	29.61%	3.34	0.76	0.07	Yes
Algebraic Concepts	9	37.93%	4.39	0.75	0.04	Yes
Data Analysis / Probability	4	14.20%	1	0.83	0.03	Yes
Total	23	25%	0.11	0.76	0.05	

Appendix E

DOK Levels by Item and Reviewers

and Results of Intra-Class Correlation

Grade 3

Table M3.5 DOK Levels by Item and Reviewers

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
1	2	1	1	1	1	2	2
2	2	2	1	1	1	1	2
3	3	1	1	2	2	2	2
4	1	2	2	1	1	1	2
5	3	2	2	1	2	2	2
6	1	2	1	1	1	1	1
7	3	2	2	2	1	2	3
8	2	1	1	1	1	1	2
9	3	2	2	2	2	2	3
10	1	1	1	1	1	1	1
11	3	3	1	1	2	2	3
12	1	1	2	1	1	1	1
13	2	2	2	2	1	2	2
14	2	2	2	1	1	2	2
15	3	3	2	2	2	2	2
16	3	3	1	2	1	2	3
17	2	1	1	1	1	2	2
18	1	1	1	1	1	1	1
19	2	1	2	1	1	1	1
20	2	3	2	2	2	2	1
21	2	2	2	1	1	1	1
22	2	2	2	1	1	2	1
23	2	1	1	1	1	1	1
24	2	2	1	2	2	2	2
25	1	1	1	1	1	1	1
26	2	2	2	1	1	1	1
27	2	2	2	1	1	2	1
28	2	2	2	1	1	1	1
29	2	2	2	2	2	1	2
30	2	2	2	2	2	1	2
31	2	2	2	2	2	2	3
32	2	2	2	1	1	2	1
33	1	1	1	1	1	1	1
34	2	2	2	2	2	2	2
35	2	2	2	2	1	2	1
36	2	2	2	2	2	3	1
37	2	1	2	2	1	2	2
38	2	1	1	2	1	2	1
39	2	2	1	1	2	2	1
40	2	2	1	2	1	1	1
41	2	2	1	2	1	2	3
42	2	1	2	1	1	1	2
43	1	1	1	1	1	1	1
44	2	1	2	1	1	2	1
45	2	2	2	1	1	2	2
46	2	1	2	1	1	2	1

Table M3.5 (continued)

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
47	3	3	2	2	3	2	3
48	1	1	2	1	1	1	2
49	1	1	2	1	1	2	2
50	1	1	2	1	1	2	2

Grade 4

Table M4.5 DOK Levels by Item and Reviewers

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
1	1	2	2	1	1	1	1
2	2	2	2	1	2	1	2
3	1	1	2	1	1	1	1
4	1	1	2	1	1	1	1
5	1	1	2	1	1	1	1
6	2	1	2	1	1	1	1
7	2	2	2	2	2	1	2
8	1	2	2	1	1	1	1
9	1	2	2	1	1	2	1
10	2	2	3	2	2	2	3
11	2	2	2	1	2	1	2
12	3	3	2	3	3	2	1
13	1	1	1	2	1	1	2
14	1	1	1	1	1	1	1
15	2	1	1	1	1	1	1
16	1	1	1	2	1	2	3
17	2	2	2	2	2	1	2
18	2	2	2	2	2	2	2
19	2	2	2	2	1	2	2
20	2	2	2	2	2	1	2
21	2	2	2	2	1	2	2
22	2	1	2	1	1	1	1
23	2	2	2	1	2	1	1
24	2	1	2	1	1	2	2
25	2	1	2	1	1	1	1
26	2	2	1	2	2	3	2
27	1	1	1	2	1	1	1
28	2	2	2	2	1	2	2
29	2	2	2	1	1	2	2
30	2	2	2	1	2	2	1
31	1	1	2	1	1	1	1
32	1	1	1	1	1	1	1
33	2	2	2	2	2	2	3
34	1	1	1	1	1	1	1
35	1	1	1	1	1	1	1
36	1	1	1	1	1	1	2
37	1	1	1	1	1	1	1
38	2	2	2	2	2	1	2
39	2	2	2	1	2	1	2
40	2	1	1	1	1	1	2
41	2	1	1	1	1	2	2
42	2	1	1	1	1	2	1
43	2	2	2	2	1	1	2
44	2	1	1	1	1	1	1
45	2	2	1	1	1	2	2
46	2	1	1	2	1	1	2

Table M4.5 (continued)

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
47	2	2	2	1	2	2	2
48	2	2	2	1	1	3	2
49	2	1	2	1	1	1	1
50	2	1	2	2	2	1	2
51	1	1	1	1	1	1	1
52	1	1	1	1	1	1	1
53	1	1	1	1	1	1	1
54	2	2	2	2	2	3	3
55	1	2	2	1	1	2	1

Grade 5

Table M5.5 DOK Levels by Item and Reviewers

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
1	1	2	2	1	1	2	2
2	2	1	2	1	1	2	1
3	1	2	1	1	2	1	2
4	1	2	1	1	2	1	2
5	2	2	2	1	1	2	1
6	1	1	1	1	1	1	1
7	2	2	2	2	3	2	3
8	2	2	2	1	2	2	2
9	2	2	2	2	2	2	2
10	3	3	2	2	2	2	3
11	2	1	1	1	1	2	2
12	1	1	1	1	1	1	1
13	1	2	1	1	1	2	2
14	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1
16	1	1	1	1	1	1	2
17	1	2	1	2	2	1	2
18	1	2	2	1	1	1	1
19	2	2	2	2	2	1	2
20	2	1	2	1	2	1	1
21	2	2	2	1	2	2	2
22	1	1	1	1	1	1	1
23	2	2	2	2	2	2	3
24	2	2	2	2	2	2	2
25	1	1	2	1	1	1	1
26	2	2	2	2	2	2	2
27	1	1	1	1	1	1	1
28	2	2	2	2	1	1	2
29	1	1	1	1	1	1	1
30	2	2	2	1	1	2	2
31	2	2	2	2	2	2	2
32	2	1	2	1	1	1	1
33	1	1	2	2	1	1	1
34	2	1	2	2	2	2	2
35	1	1	1	1	1	1	1
36	2	2	1	1	1	2	2
37	2	2	1	2	2	2	3
38	1	1	1	1	2	1	1
39	1	1	1	1	1	1	2
40	1	1	1	1	1	1	2
41	1	1	1	1	1	1	1
42	2	2	1	2	1	2	1
43	1	1	2	1	1	1	1
44	2	2	2	2	2	2	3
45	2	2	2	1	1	2	2
46	2	2	2	1	2	2	2

Table M5.5 (continued)

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
47	1	1	2	1	1	1	1
48	1	2	2	2	2	2	2
49	1	1	1	1	1	1	1
50	1	1	2	2	1	1	1
51	2	2	2	2	2	2	1
52	2	2	2	1	1	1	1
53	2	2	2	1	1	2	2
54	1	2	2	2	2	1	2
55	2	2	2	2	2	2	3

Grade 6

Table M6.5 DOK Levels by Item and Reviewers

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
1	1	2	1	1	1	1	1
2	2	2	2	1	1	1	2
3	2	2	2	2	1	1	2
4	2	2	2	2	1	2	1
5	1	1	2	1	1	1	1
6	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1
8	2	2	2	2	2	2	2
9	1	1	1	1	1	2	1
10	1	2	1	1	1	1	1
11	2	2	2	1	1	2	1
12	2	2	2	2	2	2	2
13	1	1	1	1	1	1	1
14	2	2	1	2	2	2	2
15	2	2	1	2	1	2	2
16	1	2	1	1	1	2	2
17	1	1	2	1	2	1	2
18	2	1	1	2	1	1	1
19	2	2	1	2	1	1	1
20	1	1	1	1	1	1	1
21	2	2	1	2	1	1	1
22	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1
24	2	1	2	1	1	1	1
25	2	2	2	2	1	2	1
26	2	1	2	1	2	2	1
27	1	1	2	2	1	2	2
28	2	2	2	2	2	2	2
29	2	2	2	1	1	2	2
30	2	2	2	2	2	2	2
31	2	2	2	2	1	2	2
32	1	2	2	2	2	2	2
33	2	1	2	1	1	2	1
34	2	2	1	2	1	2	2
35	3	2	2	2	2	2	3
36	2	1	2	2	1	2	2
37	3	2	2	2	2	2	2
38	1	2	1	1	1	1	1
39	2	1	1	1	1	2	2
40	2	1	1	1	1	1	1
41	2	2	1	1	1	1	2
42	1	1	1	1	1	1	1
43	1	1	1	2	2	1	1
44	1	1	1	1	1	1	1
45	1	1	1	1	1	1	1
46	1	2	1	1	1	1	1

Table M6.5 (continued)

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
47	1	1	2	2	2	2	1
48	1	1	2	2	1	2	1
49	1	1	1	1	1	1	1
50	2	2	2	1	1	2	1
51	1	2	2	2	2	2	1
52	1	2	2	1	2	2	1
53	1	2	2	1	1	2	1
54	1	2	2	1	1	1	1
55	2	2	2	2	2	2	2
56	1	1	1	2	1	1	1
57	1	1	1	1	1	1	1
58	1	1	1	1	1	1	1

Grade 7

Table M7.5 DOK Levels by Item and Reviewers

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
1	1	1	1	1	1	1	1
2	2	2	1	1	2	2	2
3	2	2	2	1	2	2	2
4	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2
6	2	2	1	1	2	2	1
7	1	1	1	1	1	1	1
8	1	2	1	2	1	1	1
9	1	1	1	1	1	1	1
10	1	2	2	1	1	1	2
11	1	1	2	1	1	1	2
12	2	2	2	2	2	2	2
13	2	2	2	2	1	2	2
14	2	2	2	2	2	2	2
15	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1
17	2	2	1	1	1	2	1
18	1	2	2	1	1	2	2
19	2	2	1	2	1	1	1
20	1	2	1	1	2	1	1
21	2	1	1	2	1	2	2
22	1	2	2	1	1	2	2
23	1	2	2	1	1	1	2
24	1	2	2	1	1	1	2
25	1	1	1	1	1	1	1
26	1	2	1	1	1	2	2
27	2	2	1	2	1	2	2
28	2	2	2	2	1	2	2
29	1	1	1	1	1	1	1
30	2	1	2	1	1	2	1
31	1	2	2	1	1	1	2
32	1	2	2	1	1	1	2
33	2	2	1	2	2	2	2
34	2	2	1	1	1	2	1
35	1	1	1	1	1	1	1
36	2	2	2	2	2	2	2
37	1	1	2	1	1	1	1
38	2	2	2	1	2	1	1
39	1	1	1	1	1	1	1
40	2	2	1	1	2	2	2
41	2	2	2	2	2	2	2
42	2	1	2	1	2	2	2
43	1	1	1	1	1	1	1
44	2	2	2	2	2	2	2
45	2	2	1	1	1	2	2
46	2	2	2	2	1	2	2

Table M7.5 (continued)

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
47	1	1	1	1	1	1	1
48	1	2	1	1	2	1	2
49	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1
51	1	1	1	1	1	2	1
52	1	1	1	1	1	1	1
53	1	1	1	2	1	1	1
54	1	1	1	1	1	1	2
55	1	1	1	1	1	1	1
56	2	2	2	1	1	2	2
57	2	1	2	1	2	2	2
58	2	2	2	1	1	2	2

Grade 8

Table M8.5 DOK Levels by Item and Reviewers

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
1	2	2	2	1	1	2	2
2	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1
4	1	2	1	2	1	2	2
5	1	2	1	2	1	1	1
6	1	1	1	1	1	1	1
7	1	1	1	1	1	2	1
8	1	2	1	1	1	1	1
9	2	2	1	1	1	2	2
10	2	2	1	2	1	2	2
11	2	2	2	2	1	2	2
12	2	2	1	2	1	2	2
13	2	2	2	1	2	2	2
14	1	1	1	1	1	1	1
15	2	1	2	2	1	2	2
16	2	2	2	2	2	2	2
17	2	2	2	1	1	2	2
18	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1
20	2	2	2	2	2	1	2
21	2	2	2	2	2	2	2
22	2	2	2	2	2	2	2
23	1	2	2	1	1	2	2
24	2	2	2	2	2	2	2
25	1	1	2	1	1	2	1
26	2	2	2	2	2	2	2
27	1	1	2	1	1	2	2
28	2	2	2	1	1	2	2
29	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1
31	2	2	2	1	2	2	2
32	1	2	2	1	1	1	1
33	1	2	2	1	1	1	1
34	1	2	2	1	1	1	1
35	1	1	1	1	1	1	1
36	1	1	2	1	1	1	2
37	2	2	2	2	1	2	2
38	1	1	2	1	1	2	1
39	2	2	2	1	2	2	2
40	2	2	2	2	2	1	2
41	2	2	2	2	2	2	2
42	2	2	2	1	1	2	2
43	2	2	2	2	1	2	2
44	1	1	1	1	1	1	1
45	2	1	1	2	1	2	2

Table M8.5 (continued)

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
46	2	2	1	1	1	2	2
47	2	2	2	2	2	2	2
48	2	2	2	2	2	2	2
49	2	1	2	1	1	2	2
50	2	2	2	1	1	2	1
51	2	2	2	2	1	2	2
52	2	2	2	1	2	2	2
53	2	2	2	1	2	2	2
54	2	2	2	1	2	2	2
55	2	2	2	2	3	2	2
56	1	1	2	1	1	2	2
57	2	2	2	2	2	2	2
58	2	2	2	1	2	2	2
59	1	1	1	1	1	1	1
60	1	2	1	1	1	1	1

Grade 11

Table M11.5 DOK Levels by Item and Reviewers

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
1	1	1	1	1	1	1	2
2	1	2	1	2	1	1	2
3	2	1	2	2	1	2	2
4	2	2	2	2	1	2	2
5	2	1	2	2	1	2	2
6	1	2	2	1	2	1	2
7	1	1	2	1	1	1	2
8	2	2	2	2	1	2	2
9	2	1	2	2	1	2	2
10	2	1	2	1	1	1	1
11	2	1	1	1	1	1	2
12	2	2	2	2	1	2	1
13	1	1	2	1	1	1	1
14	2	1	2	1	1	2	2
15	1	1	2	1	1	1	1
16	2	2	2	2	1	2	2
17	1	1	1	1	1	1	1
18	1	1	1	1	1	2	1
19	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1
21	2	2	2	1	2	2	2
22	2	2	2	1	2	2	1
23	2	2	2	1	1	2	1
24	2	2	2	1	1	2	1
25	2	2	2	1	1	2	1
26	1	1	2	1	1	1	1
27	1	2	2	1	1	2	2
28	2	1	2	1	1	1	2
29	2	1	2	1	2	2	2
30	2	2	2	1	1	2	2
31	2	2	2	1	1	2	1
32	1	1	1	1	1	1	1
33	2	2	2	1	1	2	2
34	2	2	2	1	1	2	1
35	2	2	2	1	1	2	2
36	1	1	1	1	1	2	2
37	1	2	1	2	1	2	2
38	2	2	2	1	2	2	2
39	2	2	1	1	2	2	2
40	1	1	1	1	1	1	2
41	1	1	1	1	1	1	1
42	1	1	1	1	1	2	2
43	2	2	2	2	2	2	2
44	2	2	2	1	1	2	2

Table M11.5 (continued)

Item	DOK R1	DOK R2	DOK R3	DOK R4	DOK R5	DOK R6	DOK R7
45	2	2	2	2	1	2	2
46	2	2	2	1	2	1	2
47	1	1	1	1	1	1	1
48	1	1	1	1	1	2	1
49	1	1	1	1	1	2	1
50	2	2	2	1	1	1	1
51	1	1	1	1	1	1	1
52	2	2	2	2	2	2	2
53	2	2	2	2	1	2	2
54	1	1	2	1	1	2	1
55	1	2	2	1	1	2	2
56	1	1	1	1	2	2	1
57	1	1	1	1	1	2	1
58	1	1	1	1	1	1	1
59	2	2	1	2	2	2	2
60	2	2	2	2	2	2	2

Grade 3

Table M3.6 ***DOK Levels and Indicators Coded by Each Reviewer***

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
1	2	3.1.1.e		1	3.1.1.e		1	3.1.1.e		1	3.1.1.e	
2	2	3.1.1.g		2	3.1.1.g		1	3.1.1.e		1	3.1.1.g	
3	3	3.1.1.g	3.1.1.e	1	3.1.1.g	3.1.1.e	1	3.1.1.e		2	3.1.1.g	
4	1	3.1.1.g		2	3.1.1.g		2	3.1.1.g		1	3.1.1.g	
5	3	3.1.1.i	3.1.1.g	2	3.1.1.i	3.1.1.e	2	3.1.1.g		1	3.1.1.i	
6	1	3.1.1.i		2	3.1.1.i		1	3.2.2.b		1	3.1.1.i	
7	3	3.1.2.a		2	3.1.2.a		2	3.1.2.a		2	3.1.2.d	3.2.1.a
8	2	3.2.1.b		1	3.2.1.b		1	3.2.1.b		1	3.2.1.b	
9	3	3.2.1.b		2	3.2.1.b		2	3.2.1.b		2	3.2.1.b	
10	1	3.2.2.b		1	3.2.2.b		1	3.2.2.b		1	3.2.2.b	
11	3	3.1.2.a		3	3.1.2.a		1	3.2.2.b		1	3.1.2.a	
12	1	3.2.5.e		1	3.2.5.e		2	3.2.5.e		1	3.2.5.e	
13	2	3.2.5.g	3.2.5.e	2	3.2.5.g		2	3.2.5.g		2	3.2.5.g	
14	2	3.3.1.a		2	3.3.1.a		2	3.3.1.a		1	3.3.1.a	
15	3	3.3.2.a		3	3.3.2.a		2	3.3.2.a		2	3.3.3.b	3.3.2.a
16	3	3.3.2.a		3	3.3.3.b	3.1.2.a	1	3.3.3.b		2	3.3.2.a	3.1.2.d
17	2	3.3.2.a		1	3.3.3.b		1	3.3.3.b		1	3.3.2.a	
18	1	3.3.3.b	3.3.2.a	1	3.3.3.b	3.3.2.a	1	3.3.3.b		1	3.3.2.a	
19	2	3.3.2.a		1	3.3.3.b		2	3.1.1.g		1	3.3.2.a	
20	2	3.4.1.c		3	3.4.1.a	3.4.1.c	2	3.4.1.c		2	3.4.1.c	
21	2	3.4.1.a		2	3.4.1.a		2	3.4.1.c		1	3.4.1.a	
22	2	3.4.1.a		2	3.4.1.a		2	3.4.1.c		1	3.4.1.a	
23	2	3.1.1.g		1	3.1.1.g		1	3.1.1.g		1	3.1.1.g	
24	2	3.3.2.a		2	3.1.1.g		1	3.1.1.g		2	3.1.1.i	3.1.1.g
25	1	3.1.1.h		1	3.1.1.h		1	3.1.1.h		1	3.1.1.h	
26	2	3.1.1.i		2	3.1.1.i		2	3.1.1.i		1	3.1.1.i	
27	2	NA		2	NA	3.1.2.a	2	3.4.1.c		1	3.1.2.a	
28	2	3.3.2.a		2	3.1.2.a		2	3.1.2.a		1	3.1.2.a	
29	2	3.2.5.e		2	3.2.5.e		2	3.2.5.e		2	3.2.5.e	
30	2	3.2.5.e		2	3.2.5.e		2	3.2.5.e		2	3.2.5.e	
31	2	3.2.5.g		2	3.2.5.g		2	3.2.5.e		2	3.2.5.g	
32	2	3.3.1.a		2	3.3.1.a		2	3.3.1.a		1	3.3.1.a	
33	1	3.3.3.b		1	3.3.3.b		1	3.3.3.b		1	3.3.3.b	
34	2	3.4.1.c	3.3.2.a	2	3.4.1.c		2	3.4.1.c		2	3.4.1.c	
35	2	3.4.1.c		2	3.4.1.c		2	3.4.1.c		2	3.4.1.c	

Table M3.6 (Continued)

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
36	2	3.4.1.c		2	3.4.1.c		2	3.4.1.c		2	3.4.1.c	
37	2	3.2.1.a		1	3.2.1.a		2	3.3.1.a		2	3.2.1.a	
38	2	3.2.1.a		1	3.2.1.a		1	3.2.1.a		2	3.2.1.a	
39	2	3.1.1.e		2	3.1.1.e		1	3.1.1.g		1	3.1.1.e	
40	2	3.1.1.e		2	3.1.1.e		1	3.1.1.g		2	3.1.1.e	
41	2	3.1.1.e		2	3.1.1.e		1	3.1.1.g		2	3.1.1.e	
42	2	3.1.1.e		1	3.1.1.e		2	3.1.1.e		1	3.1.1.e	
43	1	3.2.1.a		1	3.2.1.a		1	3.2.1.a		1	3.2.1.a	
44	2	3.1.2.a		1	3.1.2.a		2	3.1.2.d		1	3.1.2.a	
45	2	3.1.2.d		2	3.1.2.d		2	3.1.2.d		1	3.1.2.d	
46	2	NA		1	NA		2	3.1.1.h		1	NA	3.1.2.a
47	3	3.1.1.h	3.3.2.a	3	3.1.1.h	3.3.2.a	2	3.1.1.h		2	3.1.1.h	
48	1	3.1.1.h		1	3.1.1.h		2	3.1.1.h		1	3.1.1.h	
49	1	3.1.1.h		1	3.1.1.h		2	3.1.1.h		1	3.1.1.h	
50	1	3.1.1.h		1	3.1.1.h		2	3.1.1.h		1	3.1.1.h	

Table M3.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
1	1	3.1.1.e	3.3.2.a	2	3.1.1.e		2	3.1.1.e	
2	1	3.1.1.g		1	3.1.1.g		2	3.1.1.g	
3	2	3.1.1.g		2	3.1.1.g		2	3.1.1.g	
4	1	3.1.1.g		1	3.1.1.g		2	3.1.1.g	
5	2	3.1.1.i	3.1.1.g	2	3.1.1.i		2	3.1.1.i	
6	1	3.1.1.i	3.2.2.b	1	3.1.1.i		1	3.1.1.i	
7	1	3.1.2.a		2	3.1.2.d		3	3.1.2.d	3.1.2.a
8	1	3.2.1.b		1	3.2.1.b		2	3.2.1.b	
9	2	3.2.1.b		2	3.2.1.b		3	3.2.1.b	
10	1	3.2.2.b	3.3.3.b	1	3.2.2.b		1	3.2.2.b	
11	2	3.1.2.a	3.2.2.b	2	3.1.2.a		3	3.2.2.b	
12	1	3.2.5.e		1	3.2.5.e		1	3.2.5.e	
13	1	3.2.5.g	3.2.5.e	2	3.2.5.g		2	3.2.5.g	
14	1	3.3.1.a		2	3.3.1.a		2	3.3.1.a	
15	2	3.3.3.b		2	3.3.2.a	3.3.3.b	2	3.3.2.a	
16	1	3.3.3.b	3.3.2.a	2	3.3.2.a	3.3.3.b	3	3.3.2.a	
17	1	3.3.2.a	3.3.3.b	2	3.3.2.a		2	3.3.3.b	
18	1	3.3.2.a	3.3.3.b	1	3.3.3.b		1	3.3.3.b	
19	1	3.3.3.b	3.3.2.a	1	3.3.2.a		1	3.3.2.a	3.3.3.b
20	2	3.4.1.c	3.4.1.a	2	3.4.1.c		1	3.4.1.a	3.4.1.c
21	1	3.4.1.a		1	3.4.1.a		1	3.4.1.a	3.4.1.c
22	1	3.4.1.a	3.3.2.a	2	3.4.1.a		1	3.4.1.a	
23	1	3.1.1.g		1	3.1.1.g		1	3.1.1.e	
24	2	3.3.3.b	3.1.1.g	2	3.3.2.a		2	3.3.2.a	3.1.1.g
25	1	3.1.1.h		1	3.1.1.h		1	3.1.1.h	
26	1	3.1.1.i		1	3.1.1.i		1	3.1.1.i	
27	1	3.1.2.a	3.3.2.a	2	3.1.2.a		1	3.1.2.a	
28	1	3.1.2.a	3.3.3.b	1	3.1.2.a		1	3.3.2.a	3.1.2.a
29	2	3.2.5.e		1	3.2.5.e		2	3.2.5.e	
30	2	3.2.5.e		1	3.2.5.e		2	3.2.5.e	
31	2	3.2.5.g		2	3.2.5.g		3	3.2.5.g	
32	1	3.3.1.a	3.3.3.b	2	3.3.1.a		1	3.3.1.a	3.1.1.g
33	1	3.3.3.b		1	3.3.3.b		1	3.3.3.b	3.3.2.a
34	2	3.4.1.c	3.3.3.b	2	3.4.1.c		2	3.4.1.c	
35	1	3.4.1.c	3.4.1.a	2	3.4.1.c		1	3.4.1.c	

Table M3.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
36	2	3.4.1.c	3.3.3.b	3	3.4.1.c		1	3.4.1.c	
37	1	3.2.1.a	3.3.2.a	2	3.2.1.a		2	3.2.1.a	3.3.2.a
38	1	3.2.1.a		2	3.2.1.a		1	3.2.1.a	
39	2	3.1.1.e	3.1.1.g	2	3.1.1.e		1	3.1.1.e	
40	1	3.1.1.e	3.3.3.b	1	3.1.1.e		1	3.1.1.e	
41	1	3.1.1.e		2	3.1.1.e		3	3.1.1.e	
42	1	3.1.1.e		1	3.1.1.e		2	3.1.1.e	
43	1	3.2.1.a		1	3.2.1.a		1	3.2.1.a	
44	1	3.1.2.a		2	3.1.2.a		1	3.1.2.a	
45	1	3.1.2.d	3.1.2.a	2	3.1.2.d		2	3.1.2.d	
46	1	3.3.2.a	3.3.3.b	2	3.1.2.a		1	3.3.2.a	3.3.3.b
47	3	3.1.1.h		2	3.1.1.h		3	3.1.1.h	
48	1	3.1.1.h		1	3.1.1.h		2	3.1.1.h	
49	1	3.1.1.h		2	3.1.1.h		2	3.1.1.h	
50	1	3.1.1.h		2	3.1.1.h		2	3.1.1.h	

Grade 4

Table M4.6 ***DOK Levels and Indicators Coded by Each Reviewer***

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
1	1	4.4.2.a		2	4.1.3.f		2	4.1.3.f		1	4.1.3.f	
2	2	4.3.1.c		2	4.3.1.c	4.3.1.d	2	4.3.1.c		1	4.3.1.c	
3	1	4.3.3.d		1	4.3.3.d		2	4.3.1.d		1	4.3.3.d	
4	1	4.3.3.d		1	4.3.3.d		2	4.3.3.d		1	4.3.3.d	
5	1	4.3.3.d		1	4.3.3.d		2	4.3.3.d		1	4.3.3.d	
6	2	4.3.1.d		1	4.3.1.d		2	4.3.1.d		1	4.3.1.d	
7	2	4.3.1.d		2	4.3.1.c	4.3.1.d	2	4.3.1.d		2	4.3.1.c	
8	1	4.4.2.a		2	4.4.1.b		2	4.4.1.c		1		4.4.1.b
9	1	4.4.2.a		2	4.4.1.b		2	4.4.1.c		1		4.4.1.c
10	2	4.4.2.a		2	4.4.1.b		3	4.4.2.a		2		4.4.1.c
11	2	4.4.1.c		2	4.4.1.c		2	4.4.1.c		1	4.4.1.c	
12	3	4.4.2.a		3	4.4.2.a		2	4.4.1.c		3	4.4.2.a	
13	1	4.2.1.a		1	4.2.1.a		1	4.2.1.a		2	4.2.1.a	
14	1	4.2.1.b		1	4.2.1.b		1	4.2.1.b		1	4.2.1.b	
15	2	4.2.1.c		1	4.2.1.c		1	4.2.1.c		1	4.2.1.c	
16	1	4.2.1.a		1	4.2.1.a		1	4.2.1.a		2	4.2.1.a	
17	2	4.2.5.d		2	4.2.5.d		2	4.1.3.f		2	4.2.5.d	
18	2	4.2.5.c		2	4.2.5.c		2	4.2.5.c		2	4.2.5.c	
19	2	4.2.5.c		2	4.2.5.c		2	4.2.5.c		2	4.2.5.c	
20	2	4.2.5.d		2	4.2.5.d		2	4.2.5.d		2	4.2.5.d	
21	2	4.1.1.c		2	4.1.1.c		2	4.3.1.d		2	4.3.1.d	4.1.1.c
22	2	4.1.1.c	4.3.1.c	1	4.1.1.c		2	4.3.1.d		1	4.3.1.c	4.3.1.d
23	2	4.1.1.c	4.2.5.c	2	4.1.1.c		2	4.2.5.c		1	4.1.1.c	
24	2	4.1.1.f		1	4.1.1.f		2	4.1.1.f		1	4.1.1.f	
25	2	4.1.1.h		1	4.1.1.h		2	4.1.1.h		1	4.1.1.h	
26	2	4.1.2.a	4.1.3.f	2	4.1.2.a		1	4.1.3.c		2	4.1.2.a	
27	1	4.1.3.c		1	4.1.3.c		1	4.1.3.c		2	4.1.3.c	
28	2	4.1.3.f		2	4.1.3.f		2	4.1.3.f		2	4.1.3.f	
29	2	4.1.3.f		2	4.1.3.f		2	4.1.3.f		1	4.1.2.a	
30	2	4.3.1.d		2	4.3.1.c	4.3.1.d	2	4.3.1.d		1	4.3.1.c	
31	1	4.1.3.c		1	4.3.3.c		2	4.1.3.f		1	4.3.3.c	
32	1	4.3.3.d		1	4.3.3.c		1	4.3.3.d		1	4.3.3.c	

Table M4.6 (Continued)

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
33	2	4.4.2.a		2	4.4.1.b		2	4.4.1.c		2	4.4.1.c	
34	1	4.2.1.a		1	4.2.1.a		1	4.2.1.a		1	4.2.1.a	
35	1	4.2.1.b		1	4.2.1.b		1	4.2.1.b		1	4.2.1.b	
36	1	4.2.2.a		1	4.2.2.a		1	4.2.2.a		1	4.2.2.a	
37	1	4.2.5.b		1	4.2.5.b		1	4.2.5.b		1	4.2.5.b	
38	2	4.2.5.d		2	4.2.5.d		2	4.1.3.f		2	4.2.5.d	
39	2	4.2.5.g		2	4.2.5.g		2	4.2.5.g		1	4.2.5.g	
40	2	4.1.1.b		1	4.1.1.b		1	4.1.1.b		1	4.1.1.b	
41	2	4.1.1.b		1	4.1.1.b		1	4.1.1.f		1	4.1.1.b	
42	2	4.1.1.b		1	4.1.1.b		1	4.1.1.b		1	4.1.1.b	
43	2	4.1.1.c		2	4.1.1.c		2	4.1.1.c		2	4.1.1.c	
44	2	4.1.1.e	4.1.1.f	1	4.1.1.e		1	4.1.1.e		1	4.1.1.f	
45	2	4.1.1.e		2	4.1.1.e		1	4.1.1.e		1	4.1.1.e	
46	2	4.1.1.f	4.1.1.e	1	4.1.1.e		1	4.1.1.e		2	4.1.1.f	
47	2	4.1.1.h		2	4.1.1.h		2	4.1.1.h		1	4.1.1.h	
48	2	4.1.3.f		2	4.1.3.f		2	4.1.3.f		1	4.1.2.a	4.1.3.f
49	2	4.1.3.b		1	4.1.3.b		2	4.1.3.f		1	4.1.3.b	
50	2	4.1.3.b		1	4.1.3.b		2	4.1.3.f		2	4.1.3.b	
51	1	4.1.3.c		1	4.1.3.c		1	4.1.3.c		1	4.1.3.c	
52	1	4.1.3.e		1	4.1.3.e		1	4.1.3.e		1	4.1.3.e	
53	1	4.1.3.e		1	4.1.3.e		1	4.1.3.e		1	4.1.3.e	
54	2	4.1.3.f		2	4.1.3.f		2	4.1.3.f		2	4.1.3.f	
55	1	4.1.3.f		2	4.1.3.f		2	4.1.3.f		1	4.1.3.f	

Table M4.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
1	1	4.1.3.f	4.3.3.d	1	4.3.3.d	4.3.1.d	1	4.3.1.d	
2	2	4.3.1.c	4.3.1.d	1	4.3.1.c		2	4.3.1.d	4.3.1.c
3	1	4.3.3.d		1	4.1.2.a	4.3.3.d	1	4.3.3.d	
4	1	4.3.3.d		1	4.1.2.a	4.3.3.d	1	4.3.3.d	
5	1	4.3.3.d		1	4.1.2.a	4.3.3.d	1	4.3.3.d	
6	1	4.1.3.f	4.3.1.d	1	4.1.2.a		1	4.1.2.a	4.3.1.d
7	2	4.3.1.c	4.3.1.d	1	4.3.1.c		2	4.3.1.d	4.3.1.c
8	1	4.4.1.c		1	4.1.1.b		1	4.4.2.a	
9	1	4.4.1.c	4.4.1.b	2	4.4.1.c		1	4.4.2.a	
10	2	4.4.1.b	4.4.1.c	2	4.4.1.c		3	4.4.2.a	
11	2	4.4.1.c		1	4.4.1.c		2	4.4.1.c	
12	3	4.4.2.a	4.4.1.c	2	4.4.2.a		1	4.4.2.a	
13	1	4.2.1.a		1	4.2.1.a		2	4.2.1.a	
14	1	4.2.1.b		1	4.2.1.b		1	4.2.1.b	
15	1	4.2.1.c		1	4.2.1.c		1	4.2.1.c	
16	1	4.2.1.a		2	4.2.1.a		3	4.2.1.a	
17	2	4.2.5.d		1	4.2.5.d		2	4.2.5.d	
18	2	4.2.5.c	4.1.3.f	2	4.2.5.c		2	4.2.5.c	
19	1	4.2.5.c	4.2.5.b	2	4.2.5.c		2	4.2.5.c	4.2.5.b
20	2	4.2.5.d		1	4.2.5.d		2	4.2.5.d	
21	1	4.1.1.b	4.3.1.c	2	4.3.1.d		2	4.1.1.c	4.3.1.d
22	1	4.1.1.c	4.3.1.c	1	4.3.1.c		1	4.1.1.c	4.3.1.c
23	2	4.1.1.c		1	4.1.1.c		1	4.1.1.c	
24	1	4.1.1.f		2	4.1.1.f	4.4.1.b	2	4.1.1.f	4.1.1.e
25	1	4.1.1.h		1	4.1.1.h		1	4.1.1.h	
26	2	4.1.3.f	4.1.2.a	3	4.1.2.a		2	4.1.2.a	4.1.3.f
27	1	4.1.3.c		1	4.1.3.c		1	4.1.3.c	
28	1	4.1.3.f	4.3.3.d	2	4.1.3.f		2	4.3.1.d	
29	1	4.1.3.f	4.3.3.d	2	4.1.2.a		2	4.1.2.a	4.1.3.f
30	2	4.3.1.c	4.3.1.d	2	4.3.1.c		1	4.1.2.a	4.3.1.c
31	1	4.3.3.c		1	4.3.3.c		1	4.3.3.c	
32	1	4.3.3.c		1	4.3.3.c		1	4.3.3.c	4.3.3.d

Table M4.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
33	2	4.4.1.c	4.4.1.b	2	4.4.1.c		3	4.4.1.b	
34	1	4.2.1.a		1	4.2.1.a		1	4.2.1.a	
35	1	4.2.1.b		1	4.2.1.b		1	4.2.1.b	
36	1	4.2.2.a		1	4.2.2.a		2	4.2.2.a	
37	1	4.2.5.b		1	4.2.5.b		1	4.2.5.b	
38	2	4.2.5.d		1	4.2.5.d		2	4.2.5.d	
39	2	4.2.5.g	4.1.3.e	1	4.2.5.g		2	4.2.5.g	
40	1	4.1.3.e	4.1.1.b	1	4.1.1.b		2	4.1.1.b	
41	1	4.1.1.b	4.1.1.e	2	4.1.1.b		2	4.1.1.b	
42	1	4.1.1.b	4.1.1.e	2	4.1.1.b		1	4.1.1.b	
43	1	4.1.1.c		1	4.1.1.c		2	4.1.1.c	
44	1	4.1.1.e	4.1.1.b	1	4.1.1.e		1	4.1.1.e	
45	1	4.1.1.e		2	4.1.1.e		2	4.1.1.e	
46	1	4.1.1.e		1	4.1.1.e		2	4.1.1.e	4.1.1.f
47	2	4.1.1.h		2	4.1.1.h		2	4.1.1.h	
48	1	4.1.3.f	4.3.1.d	3	4.1.2.a	4.1.3.f	2	4.1.2.a	4.1.3.f
49	1	4.1.3.b	4.3.3.d	1	4.1.3.b		1	4.1.3.b	
50	2	4.1.3.b	4.3.3.d	1	4.1.3.b		2	4.1.3.b	
51	1	4.1.3.c		1	4.1.3.c		1	4.1.3.c	
52	1	4.1.3.e		1	4.1.3.e		1	4.1.3.e	
53	1	4.1.3.e		1	4.1.3.e		1	4.1.3.e	
54	2	4.1.3.f		3	4.1.3.f		3	4.1.3.f	
55	1	4.1.3.f		2	4.1.3.f		1	4.1.3.f	

Grade 5

Table M5.6 ***DOK Levels and Indicators Coded by Each Reviewer***

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
1	1	5.3.3.d	5.1.3.b	2	5.3.2.a		2	5.3.2.a		1	5.3.2.a	
2	2	5.3.3.b		1	5.3.3.b		2	5.3.3.e		1	5.3.3.b	
3	1	5.3.3.c		2	5.3.3.c		1	5.3.3.d		1	5.1.2.c	
4	1	5.3.3.c		2	5.3.3.c		1	5.3.3.c		1	5.3.3.c	
5	2	5.1.3.b	5.3.3.e	2	5.1.3.b	5.1.3.a	2	5.1.3.b		1	5.1.3.b	
6	1	5.3.3.d		1	5.3.3.d	5.1.3.a	1	5.3.3.d		1	5.3.3.d	
7	2	5.4.1.b	5.4.1.c	2	5.4.1.b	5.1.1.c	2	5.4.1.c		2	5.4.1.b	
8	2	5.1.3.b	5.4.1.c	2	5.4.1.b	5.1.3.b	2	5.4.1.c		1	5.1.3.b	5.4.1.c
9	2	5.4.1.c		2	5.4.1.b		2	5.4.1.c		2	5.4.1.c	
10	3	5.4.1.c		3	5.4.1.c	5.1.1.b	2	5.4.1.c		2	5.4.1.c	
11	2	5.4.3.c		1	5.4.3.c		1	5.4.3.b		1	5.4.3.c	
12	1	5.2.1.a		1	5.2.1.a		1	5.2.1.a		1	5.2.1.a	
13	1	5.2.1.a		2	5.2.1.a		1	5.2.1.a		1	5.2.1.a	
14	1	5.2.1.d		1	5.2.1.d		1	5.2.1.d		1	5.2.1.d	
15	1	5.2.5.b		1	5.2.5.b		1	5.2.5.b		1	5.2.5.b	
16	1	5.2.5.b		1	5.2.5.b		1	5.2.5.b		1	5.2.5.b	
17	1	5.2.5.b		2	5.2.5.b		1	5.2.5.b		2	5.2.5.b	
18	1	5.1.1.b		2	5.1.1.b		2	5.1.1.b		1	5.1.1.b	
19	2	5.1.1.b		2	5.1.1.b		2	5.1.1.b		2	5.1.1.b	
20	2	5.1.1.d		1	5.1.1.d		2	5.1.1.b		1	5.1.1.d	
21	2	5.1.1.a		2	5.1.1.d		2	5.1.1.b		1	5.1.1.d	
22	1	5.1.1.e		1	5.1.1.e		1	5.1.1.e		1	5.1.1.e	
23	2	5.1.2.c		2	5.1.2.c		2	5.1.2.c		2	5.1.2.c	
24	2	5.1.2.c		2	5.1.2.c		2	5.1.2.c		2	5.1.2.c	
25	1	5.1.3.a		1	5.1.3.a		2	5.1.3.a		1	5.1.3.a	
26	2	5.1.3.a	5.1.3.b	2	5.1.3.b	5.1.3.a	2	5.1.3.a		2	5.1.3.b	5.1.3.a
27	1	5.1.3.c		1	5.1.3.c		1	5.1.3.c		1	5.1.3.c	
28	2	5.1.3.d	5.1.3.b	2	5.1.3.b	5.1.3.d	2	5.1.3.a		2	5.1.3.b	5.1.3.d
29	1	5.1.3.d		1	5.1.3.d		1	5.1.3.d		1	5.1.3.d	
30	2	5.3.3.d	5.1.3.b	2	5.3.2.a		2	5.3.2.a		1	5.3.2.a	
31	2	5.3.3.d	5.1.3.b	2	5.3.2.a		2	5.3.2.a		2	5.3.2.a	
32	2	5.3.3.b		1	5.3.3.b		2	5.3.3.b		1	5.3.3.b	
33	1	5.3.3.e		1	5.3.3.e		2	5.3.3.e		2	5.3.3.e	
34	2	5.4.1.a		1	5.4.1.a		2	5.4.1.c		2	5.4.1.a	

Table M5.6 (Continued)

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
35	1	5.4.3.b		1	5.4.3.b		1	5.4.3.b		1	5.4.3.b	
36	2	5.4.3.c		2	5.4.3.c		1	5.4.3.b		1	5.4.3.c	
37	2	5.4.3.b		2	5.4.3.b		1	5.4.3.b		2	5.4.3.b	
38	1	5.2.1.a		1	5.2.1.a		1	5.2.1.a		1	5.2.1.a	
39	1	5.2.1.d		1	5.2.1.d		1	5.2.1.d		1	5.2.1.d	
40	1	5.2.2.a		1	5.2.2.a		1	5.2.2.a		1	5.2.2.a	
41	1	5.2.5.f		1	5.2.5.f		1	5.2.5.f		1	5.2.5.f	
42	2	5.2.5.f		2	5.2.5.f		1	5.2.5.f		2	5.2.5.f	
43	1	5.1.1.d	5.1.1.a	1	5.1.1.a		2	5.1.1.d		1	5.1.1.a	
44	2	5.1.1.a		2	5.1.1.a		2	5.1.1.a		2	5.1.1.a	
45	2	5.1.1.a		2	5.1.1.a		2	5.1.1.a		1	5.1.1.a	
46	2	5.1.1.c		2	5.1.1.c		2	5.1.1.c		1	5.1.1.c	
47	1	5.1.1.c		1	5.1.1.c		2	5.1.1.c		1	5.1.1.c	5.1.1.d
48	1	5.1.1.b		2	5.1.1.b		2	5.1.1.b		2	5.1.1.b	
49	1	5.1.1.f		1	5.1.1.f		1	5.1.1.f		1	5.1.1.f	
50	1	5.1.3.a		1	5.1.3.a		2	5.1.3.a		2	5.1.3.a	
51	2	5.1.3.a		2	5.1.3.a		2	5.1.3.a		2	5.1.3.a	
52	2	5.1.3.b		2	5.1.3.b		2	5.1.3.b		1	5.1.3.b	
53	2	5.1.3.b		2	5.1.3.b		2	5.1.3.b		1	5.1.3.b	
54	1	5.1.4.a		2	5.1.4.a		2	5.1.4.a		2	5.1.4.a	
55	2	5.1.4.a		2	5.1.4.a	5.1.3.a	2	5.1.4.a		2	5.1.4.a	5.1.3.b

Table M5.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
1	1	5.3.3.d		2	5.3.2.a		2	5.3.2.a	
2	1	5.3.3.b		2	5.3.3.b		1	5.3.3.b	
3	2	5.3.3.c	5.3.3.b	1	5.3.3.c		2	5.3.3.c	
4	2	5.3.3.c	5.3.3.b	1	5.3.3.c		2	5.3.3.c	
5	1	5.1.3.a	5.3.3.e	2	5.3.2.a	5.1.3.a	1	5.1.3.a	5.1.3.b
6	1	5.3.3.d		1	5.3.3.d	5.1.3.a	1	5.3.3.d	
7	3	5.4.1.b	5.2.1.d	2	5.4.1.b		3	5.4.1.b	5.4.1.c
8	2	5.4.1.b	5.3.3.e	2	5.4.1.b	5.1.3.b	2	5.4.1.b	
9	2	5.4.1.c	5.1.3.a	2	5.4.1.c		2	5.4.1.c	
10	2	5.4.1.c		2	5.4.1.c		3	5.4.1.c	
11	1	5.4.3.b		2	5.4.3.c		2	5.4.3.c	
12	1	5.2.1.a		1	5.2.1.a		1	5.2.1.a	
13	1	5.2.1.a		2	5.2.1.a		2	5.2.1.a	
14	1	5.2.1.d		1	5.2.1.d		1	5.2.1.d	
15	1	5.2.5.b		1	5.2.5.b		1	5.2.5.b	
16	1	5.2.5.b		1	5.2.5.b		2	5.2.5.b	
17	2	5.2.5.b		1	5.2.5.b		2	5.2.5.b	
18	1	5.1.1.b		1	5.1.1.b		1	5.1.1.b	
19	2	5.1.1.a	5.1.1.b	1	5.1.1.b		2	5.1.1.b	
20	2	5.1.1.c	5.1.1.a	1	5.1.1.c		1	5.1.1.c	5.1.1.d
21	2	5.1.1.c	5.1.1.d	2	5.1.1.d	5.1.1.a	2	5.1.1.a	5.1.1.d
22	1	5.1.1.e		1	5.1.1.e		1	5.1.1.e	
23	2	5.1.2.c	5.1.3.b	2	5.1.2.c		3	5.1.2.c	5.1.3.b
24	2	5.1.2.c	5.1.3.b	2	5.1.2.c		2	5.1.2.c	
25	1	5.1.3.a	5.1.3.b	1	5.1.3.a		1	5.1.3.a	
26	2	5.1.3.a	5.1.3.b	2	5.1.3.a		2	5.1.3.a	5.1.3.b
27	1	5.1.3.c		1	5.1.3.c		1	5.1.3.c	
28	1	5.1.3.d	5.1.3.b	1	5.1.3.d		2	5.1.3.d	5.1.3.b
29	1	5.1.3.d		1	5.1.3.d		1	5.1.3.d	
30	1	5.3.3.d	5.1.3.b	2	5.3.3.d		2	5.3.2.a	
31	2	5.3.3.d	5.1.3.b	2	5.3.3.d		2	5.3.2.a	
32	1	5.3.3.b		1	5.3.3.b		1	5.3.3.b	
33	1	5.3.3.e	5.3.3.d	1	5.3.3.e	5.1.3.a	1	5.3.3.e	
34	2	5.4.1.a	5.4.1.b	2	5.4.1.a	5.4.1.b	2	5.4.1.a	5.4.1.b

Table M5.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
35	1	5.4.3.b		1	5.4.3.b		1	5.4.3.b	
36	1	5.4.3.c		2	5.4.3.c	5.4.3.b	2	5.4.3.c	
37	2	5.4.3.b		2	5.3.3.b		3	5.4.3.b	
38	2	5.2.1.a		1	5.2.1.a		1	5.2.1.a	
39	1	5.2.1.d		1	5.2.1.d		2	5.2.1.d	
40	1	5.2.2.a		1	5.2.2.a		2	5.2.2.a	
41	1	5.2.5.f		1	5.2.5.f		1	5.2.5.f	
42	1	5.1.3.b	5.2.5.f	2	5.2.5.f		1	5.2.5.f	
43	1	5.1.1.a	5.1.1.d	1	5.1.1.d	5.1.1.a	1	5.1.1.a	
44	2	5.1.1.b		2	5.1.1.d		3	5.1.1.a	
45	1	5.1.1.a		2	5.1.1.a		2	5.1.1.a	
46	2	5.1.1.c	5.1.1.d	2	5.1.1.c		2	5.1.1.c	
47	1	5.1.1.c	5.1.1.d	1	5.1.1.c		1	5.1.1.c	
48	2	5.1.1.b		2	5.1.1.b		2	5.1.1.b	
49	1	5.1.1.f	5.1.1.e	1	5.1.1.f		1	5.1.1.f	
50	1	5.1.3.a		1	5.1.3.a		1	5.1.3.a	
51	2	5.1.3.a	5.1.1.c	2	5.1.3.a		1	5.1.3.a	
52	1	5.1.3.b		1	5.1.3.b		1	5.1.3.b	
53	1	5.1.3.b	5.1.3.c	2	5.1.3.b		2	5.1.3.b	
54	2	5.1.4.a	5.1.3.a	1	5.1.4.a		2	5.1.4.a	
55	2	5.1.4.a	5.1.3.b	2	5.1.4.a		3	5.1.4.a	5.1.3.b

Grade 6

Table M6.6 ***DOK Levels and Indicators Coded by Each Reviewer***

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
1	1	6.1.1.e		2	6.1.1.e		1	6.1.1.e		1	6.1.1.e	
2	2	6.1.3.b	6.3.2.a	2	6.3.1.a		2	6.4.1.b		1	6.3.1.a	
3	2	6.4.1.b		2	6.4.1.b		2	6.4.1.b		2	6.4.1.b	
4	2	6.4.1.b		2	6.4.1.b		2	6.4.1.b		2	6.4.1.b	
5	1	6.4.1.c		1	6.4.1.c		2	6.3.3.e		1	6.4.1.c	
6	1	6.2.2.a		1	6.2.2.a		1	6.2.2.a		1	6.2.2.a	
7	1	6.2.2.a		1	6.2.2.a		1	6.2.2.a		1	6.2.2.a	
8	2	6.2.4.a		2	6.2.4.a		2	6.2.4.a		2	6.2.4.a	
9	1	6.2.4.a		1	6.2.4.a		1	6.2.5.f		1	6.2.4.a	
10	1	6.1.1.e		2	6.1.1.e		1	6.1.1.e		1	6.1.1.e	
11	2	6.3.1.a	6.1.3.b	2	6.3.1.a	6.1.3.b	2	6.3.1.b		1	6.3.1.a	
12	2	6.3.1.b		2	6.3.1.b	6.1.3.b	2	6.3.1.a		2	6.3.1.b	
13	1	6.3.3.d		1	6.3.3.d		1	6.3.3.d		1	6.3.3.d	
14	2	6.2.5.d	6.3.1.b	2	6.2.5.d		1	6.2.5.d		2	6.3.3.d	6.3.1.b
15	2	6.3.2.a	6.3.3.d	2	6.3.3.e		1	6.3.3.d		2	6.3.2.a	6.3.2.a
16	1	6.4.1.c		2	6.4.1.c		1	6.4.1.c		1	6.4.1.c	
17	1	6.2.4.a		1	6.2.4.a		2	6.2.4.a		1	NA	
18	2	6.2.5.d		1	6.2.5.d		1	6.2.5.d		2	6.2.5.d	
19	2	6.2.5.e		2	6.2.5.e	6.1.3.a	1	6.2.5.d		2	6.2.5.e	
20	1	6.2.5.e		1	6.2.5.e	6.1.3.a	1	6.2.5.e		1	6.2.5.e	
21	2	6.2.5.e		2	6.2.5.e		1	6.2.5.d		2	6.2.5.e	
22	1	6.2.5.f		1	6.2.5.f	6.1.3.a	1	6.2.5.f		1	6.2.5.f	
23	1	6.2.5.f		1	6.2.5.f	6.1.3.a	1	6.2.5.f		1	6.2.5.f	
24	2	6.1.1.d		1	6.1.1.b		2	6.1.1.d		1	6.1.1.d	
25	2	6.1.3.b	6.1.2.a	2	6.1.3.b		2	6.1.3.b		2	6.1.3.b	
26	2	6.1.2.a		1	6.1.2.a		2	6.1.3.b		1	NA	6.1.2.a
27	1	6.1.2.b		1	6.1.2.b		2	6.1.3.b		2	NA	6.1.2.b
28	2	6.1.3.b		2	6.1.3.b		2	6.1.3.b		2	6.1.3.b	
29	2	6.1.4.a		2	6.1.4.a		2	6.1.3.b		1	6.1.4.a	
30	2	6.3.1.b		2	6.3.1.b	6.1.3.b	2	6.1.3.b		2	6.3.1.b	
31	2	6.1.3.b	6.3.2.a	2	6.3.1.a		2	6.1.3.b		2	6.3.1.a	
32	1	6.3.3.b		2	6.3.3.b		2	6.1.3.b		2	6.3.3.b	
33	2	6.3.3.b		1	6.3.3.b		2	6.1.3.b		1	6.3.3.b	

Table M6.6 (Continued)

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
34	2	6.3.1.a	6.2.5.d	2	6.3.1.a	6.1.3.b	1	6.2.5.d		2	6.2.5.d	6.3.1.a
35	3	6.1.2.a		2	6.3.2.a		2	6.3.1.a		2	6.3.2.a	
36	2	6.4.1.b		1	6.4.1.b		2	6.4.1.b		2	6.4.1.b	6.3.2.a
37	3	6.4.1.b		2	6.4.1.b		2	6.4.1.b		2	6.3.2.a	
38	1	6.4.3.b		2	6.4.3.b		1	6.4.3.b		1	6.4.3.b	
39	2	6.4.3.c		1	6.4.3.c		1	6.4.3.b		1	6.4.3.c	
40	2	6.4.3.c		1	6.4.3.c		1	6.4.3.b		1	6.4.3.c	
41	2	6.4.3.b		2	6.4.3.b		1	6.4.3.b		1	6.4.3.b	
42	1	6.2.5.f		1	6.2.5.f		1	6.2.5.f		1	6.2.5.f	
43	1	6.2.5.d		1	6.2.5.d		1	6.2.5.d		2	6.2.5.d	6.1.3.b
44	1	6.1.1.b		1	6.1.1.b		1	6.1.1.b		1	6.1.1.b	
45	1	6.1.1.b		1	6.1.1.b		1	6.1.1.b		1	6.1.1.b	
46	1	6.1.1.e		2	6.1.1.e	6.1.3.a	1	6.1.1.e		1	6.1.1.e	
47	1	6.1.3.b		1	6.1.2.a	6.1.3.b	2	6.1.3.b		2	6.1.3.b	
48	1	6.1.3.b		1	6.1.3.b		2	6.1.3.b		2	6.1.3.b	
49	1	6.1.3.a		1	6.1.3.a		1	6.1.3.a		1	6.1.3.a	
50	2	6.1.3.b	6.1.3.a	2	6.1.3.b	6.1.3.a	2	6.1.3.b		1	6.1.3.b	
51	1	6.1.4.a		2	6.1.4.a		2	6.1.4.a		2	6.1.4.a	
52	1	6.1.4.a		2	6.1.4.a		2	6.1.4.a		1	6.1.4.a	
53	1	6.1.3.b		2	6.3.1.a	6.1.3.b	2	6.1.3.b		1	6.1.3.b	
54	1	6.1.3.b	6.4.1.b	2	6.1.3.a	6.4.1.b	2	6.4.1.b		1	6.4.1.b	
55	2	6.1.3.b		2	6.1.3.a	6.1.3.b	2	6.1.3.b		2	6.1.3.b	
56	1	6.2.5.d		1	6.2.5.d		1	6.2.5.d		2	6.2.5.d	6.1.3.a
57	1	6.3.3.c		1	6.3.3.c		1	6.3.3.c		1	6.3.3.c	
58	1	6.3.3.c	6.1.3.a	1	6.3.3.c	6.1.3.a	1	6.3.3.c		1	6.3.3.c	6.1.3.a

Table M6.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
1	1	6.1.1.e		1	6.1.1.e		1	6.1.1.e	
2	1	6.3.1.a	6.1.3.b	1	6.3.1.a		2	6.3.1.a	6.3.2.a
3	1	6.4.1.b	6.1.4.a	1	6.4.1.b		2	6.4.1.b	6.3.2.a
4	1	6.4.1.b		2	6.4.1.b		1	6.4.1.b	
5	1	6.4.1.c		1	6.4.1.c		1	6.4.1.c	
6	1	6.2.2.a		1	6.2.2.a		1	6.2.2.a	
7	1	6.2.2.a		1	6.2.2.a		1	6.2.2.a	
8	2	6.2.4.a		2	6.2.4.a		2	6.2.4.a	
9	1	6.2.4.a		2	6.2.4.a		1	6.2.4.a	
10	1	6.3.3.b	6.1.3.a	1	6.1.1.e	6.1.3.a	1	6.1.1.e	
11	1	6.3.1.a	6.1.3.b	2	6.3.1.a		1	6.3.1.a	6.1.3.b
12	2	6.3.1.b	6.3.1.a	2	6.3.1.b		2	6.3.1.b	6.1.3.b
13	1	6.3.3.d	6.1.3.a	1	6.3.3.d	6.3.1.a	1	6.3.3.d	
14	2	6.2.5.d	6.1.3.b	2	6.2.5.d	6.1.3.b	2	6.2.5.d	6.3.3.d
15	1	6.3.2.a	6.3.3.d	2	6.3.2.a	6.3.3.e	2	6.3.2.a	6.3.3.e
16	1	6.4.1.c		2	6.4.1.c		2	6.4.1.c	
17	2	6.2.4.a		1	6.2.4.a		2	6.2.4.a	
18	1	6.2.5.d	6.1.3.b	1	6.2.5.d	6.1.3.b	1	6.2.5.d	
19	1	6.2.5.e	6.1.3.b	1	6.2.5.e	6.1.3.a	1	6.2.5.e	
20	1	6.2.5.e	6.1.3.a	1	6.2.5.e	6.1.3.a	1	6.2.5.e	
21	1	6.3.3.d	6.3.3.c	1	6.2.5.e	6.1.3.a	1	6.2.5.e	
22	1	6.2.5.f	6.1.3.a	1	6.2.5.f	6.1.3.a	1	6.2.5.f	
23	1	6.2.5.f	6.1.3.a	1	6.2.5.f	6.1.3.a	1	6.2.5.f	
24	1	6.1.1.d		1	6.1.1.d		1	6.1.1.d	
25	1	6.1.3.b		2	6.1.3.b	6.1.2.a	1	6.1.3.b	6.1.2.a
26	2	6.1.3.b		2	6.1.2.a		1	6.1.2.a	
27	1	6.1.3.b		2	6.1.2.b		2	6.1.2.b	
28	2	6.1.3.a	6.1.3.b	2	6.1.3.b	6.1.3.a	2	6.1.3.a	6.1.3.b
29	1	6.1.4.a		2	6.1.4.a		2	6.1.4.a	
30	2	6.3.1.b	6.3.1.a	2	6.3.1.b		2	6.3.1.b	6.1.3.b
31	1	6.1.3.b		2	6.3.1.a		2	6.1.3.b	6.3.1.a
32	2	6.3.3.b		2	6.3.3.b	6.1.3.a	2	6.3.3.b	
33	1	6.3.3.b		2	6.3.3.b		1	6.3.3.b	

Table M6.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
34	1	6.3.1.a	6.3.2.a	2	6.2.5.d	6.3.1.a	2	6.2.5.d	6.3.1.b
35	2	6.3.2.a	6.1.2.a	2	6.3.2.a		3	6.1.2.a	6.1.3.b
36	1	6.4.1.b	6.1.3.b	2	6.4.1.b	6.1.3.a	2	6.4.1.b	
37	2	6.4.1.b		2	6.3.2.a		2	6.4.1.b	
38	1	6.4.3.b		1	6.4.3.b		1	6.4.3.b	
39	1	6.4.3.c		2	6.4.3.c		2	6.4.3.b	
40	1	6.4.3.c		1	6.4.3.c		1	6.4.3.c	
41	1	6.4.3.b		1	6.4.3.b		2	6.4.3.b	
42	1	6.2.5.f	6.1.3.b	1	6.2.5.f	6.1.3.a	1	6.2.5.f	
43	2	6.2.5.d	6.1.3.b	1	6.2.5.d		1	6.2.5.d	
44	1	6.1.1.b		1	6.1.1.b		1	6.1.1.b	
45	1	6.1.1.b		1	6.1.1.b		1	6.1.1.b	
46	1	6.1.1.e	6.1.1.d	1	6.1.1.e		1	6.1.1.e	
47	2	6.1.3.b	6.1.4.a	2	6.1.2.a		1	6.1.2.a	6.1.3.b
48	1	6.1.3.b		2	6.1.2.b		1	6.1.2.b	
49	1	6.1.3.a		1	6.1.3.a		1	6.1.3.a	
50	1	6.1.3.b	6.1.3.a	2	6.1.3.b	6.1.3.a	1	6.1.3.a	
51	2	6.1.4.a		2	6.1.4.a		1	6.1.4.a	
52	2	6.1.4.a		2	6.1.4.a		1	6.1.4.a	
53	1	6.1.3.b		2	6.1.3.b		1	6.1.3.b	
54	1	6.4.1.b	6.4.1.c	1	6.1.3.b		1	6.4.1.b	
55	2	6.3.1.b	6.1.3.b	2	6.1.3.b		2	6.1.3.b	6.3.3.b
56	1	6.2.5.d	6.1.3.a	1	6.2.5.d	6.1.3.a	1	6.2.5.d	
57	1	6.3.3.c	6.1.3.a	1	6.3.3.c		1	6.3.3.c	
58	1	6.3.3.c	6.1.3.a	1	6.3.3.c		1	6.3.3.c	

Grade 7

Table M7.6 ***DOK Levels and Indicators Coded by Each Reviewer***

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
1	1	7.1.1.c		1	7.1.1.c		1	7.1.1.c		1	7.1.1.c	
2	2	7.1.3.b		2	7.1.3.b		1	7.1.3.a		1	7.1.4.a	7.1.3.a
3	2	7.1.3.b		2	7.1.3.b		2	7.1.3.b		1	NA	7.1.3.b
4	2	7.1.3.c		2	7.1.3.c		2	7.1.4.a		2	7.1.3.c	
5	2	7.1.3.c		2	7.1.3.c		2	7.1.3.c		2	7.1.3.c	
6	2	7.1.4.a		2	7.1.4.a		1	7.1.3.a		1	7.1.4.a	
7	1	7.2.2.a		1	7.2.2.a		1	7.2.2.a		1	7.2.2.a	
8	1	7.2.5.b		2	7.2.5.b		1	7.2.5.b		2	7.2.5.b	
9	1	7.2.5.b		1	7.2.5.b		1	7.2.5.b		1	7.2.5.b	
10	1	7.3.1.a		2	7.3.1.a		2	7.3.1.a		1	7.3.1.a	
11	1	7.3.3.c		1	7.3.3.c		2	7.3.3.d		1	7.3.3.c	
12	2	7.1.3.c		2	7.1.3.c		2	7.4.1.a		2	7.4.1.a	7.1.3.c
13	2	7.4.3.b		2	7.4.3.b		2	7.4.3.b		2	7.4.3.b	
14	2	7.4.3.b		2	7.4.3.b		2	7.4.3.b		2	7.4.3.b	
15	1	7.1.1.c		1	7.1.1.c		1	7.1.1.c		1	7.1.1.c	
16	1	7.1.3.a		1	7.1.3.a		1	7.1.3.a		1	7.1.3.a	
17	2	7.1.3.b		2	7.1.3.b		1	7.1.3.a		1	7.1.1.a	
18	1	7.1.3.b		2	7.1.3.b		2	7.1.3.b		1	7.1.3.b	
19	2	7.2.2.a		2	7.2.2.a		1	7.2.2.a		2	7.2.2.a	7.2.2.c
20	1	7.2.5.b		2	7.2.5.b		1	7.2.5.b		1	7.2.5.b	
21	2	7.2.5.b		1	7.2.5.b		1	7.2.5.b		2	7.2.5.b	
22	1	7.3.1.a		2	7.3.1.a	7.1.3.b	2	7.3.1.a		1	7.3.1.a	
23	1	7.3.1.a		2	7.3.1.a	7.3.2.a	2	7.3.1.a		1	7.3.1.a	
24	1	7.3.1.a		2	7.3.1.a	7.3.2.a	2	7.3.1.a		1	7.3.1.a	
25	1	7.3.3.c		1	7.3.3.c		1	7.3.3.c		1	7.3.3.c	
26	1	7.3.3.c		2	7.3.3.c		1	7.3.3.c		1	7.3.3.c	
27	2	7.3.3.d		2	7.3.3.d		1	7.3.3.c		2	7.3.3.d	
28	2	7.3.3.d		2	7.3.3.d		2	7.3.3.d		2	7.3.3.d	
29	1	7.3.3.e		1	7.3.3.e		1	7.3.3.e		1	7.3.3.e	
30	2	7.4.1.a		1	7.4.1.a		2	7.1.3.c		1	7.4.1.a	
31	1	7.4.1.b		2	7.4.1.b		2	7.4.1.b		1	7.4.1.b	7.4.1.a
32	1	7.4.1.b		2	7.4.1.b		2	7.4.1.b		1	7.4.1.b	
33	2	7.1.1.b		2	7.1.1.b		1	7.1.1.b		2	7.1.1.b	

Table M7.6 (Continued)

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
34	2	7.1.1.b		2	7.1.1.b		1	7.1.1.b		1	7.1.1.b	
35	1	7.1.3.a		1	7.1.3.a		1	7.1.3.a		1	7.1.3.a	
36	2	7.1.3.c		2	7.1.3.c		2	7.1.3.c		2	7.1.3.c	
37	1	7.1.3.c		1	7.1.3.c		2	7.1.3.c		1	7.1.3.c	
38	2	7.1.4.a		2	7.1.4.a		2	7.1.4.a		1	7.1.4.a	
39	1	7.2.2.a		1	7.2.2.a		1	7.2.2.a		1	7.2.2.a	
40	2	7.2.3.b		2	7.2.3.b		1	7.2.2.a		1	7.2.3.b	
41	2	7.2.3.b		2	7.2.3.b		2	7.2.3.b		2	7.2.3.b	
42	2	7.2.3.b		1	7.2.3.b		2	7.2.3.b		1	7.2.3.b	
43	1	7.2.5.b		1	7.2.5.b		1	7.2.5.b		1	7.2.5.b	
44	2	7.3.1.a		2	7.3.1.a		2	7.3.1.a		2	7.3.1.a	
45	2	7.3.1.b		2	7.3.1.b		1	7.3.3.e		1	7.3.1.b	
46	2	7.3.3.d		2	7.3.3.d		2	7.3.3.d		2	7.3.3.d	
47	1	7.3.3.e		1	7.3.3.e		1	7.3.3.e		1	7.3.3.e	
48	1	7.3.3.e		2	7.3.3.e		1	7.3.3.e		1	7.3.3.e	
49	1	7.1.1.a		1	7.1.1.a		1	7.1.1.a		1	7.1.1.a	
50	1	7.1.1.a		1	7.1.1.a		1	7.1.1.a		1	7.1.1.a	
51	1	7.1.1.a		1	7.1.1.a		1	7.1.1.a		1	7.1.1.a	
52	1	7.2.2.c		1	7.2.2.c		1	7.2.2.a		1	7.2.2.c	
53	1	7.2.2.c		1	7.2.2.c		1	7.2.2.a		2	7.2.2.c	
54	1	7.2.2.c		1	7.2.2.c		1	7.2.2.a		1	7.2.2.c	
55	1	7.1.1.a		1	7.1.1.a		1	7.1.1.a		1	7.4.1.a	
56	2	7.4.1.a		2	7.4.1.a		2	7.4.1.a		1	7.4.1.a	
57	2	7.4.3.a		1	7.4.3.a		2	7.4.3.a		1	7.4.3.a	
58	2	7.4.1.a		2	7.4.1.a		2	7.4.1.a		1	7.4.1.a	

Table M7.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
1	1	7.1.1.c		1	7.1.1.c		1	7.1.1.c	
2	2	7.1.4.a	7.1.3.b	2	7.1.3.b		2	7.1.3.b	
3	2	7.1.3.b	7.3.2.a	2	7.1.3.b		2	7.1.3.b	
4	2	7.1.3.c		2	7.1.3.c		2	7.1.3.c	
5	2	7.1.3.c		2	7.1.3.c		2	7.1.3.c	
6	2	7.1.4.a		2	7.1.4.a		1	7.1.4.a	
7	1	7.2.2.a		1	7.2.2.a		1	7.2.2.a	
8	1	7.2.5.b		1	7.2.5.b	7.1.3.a	1	7.2.5.b	
9	1	7.2.5.b	7.3.2.a	1	7.2.5.b		1	7.2.5.b	
10	1	7.3.1.a	7.3.2.a	1	7.3.1.a		2	7.3.1.a	
11	1	7.3.3.c		1	7.3.3.c	7.1.3.a	2	7.3.3.c	
12	2	7.1.3.c	7.1.1.a	2	7.1.3.c		2	7.1.3.c	7.4.1.a
13	1	7.4.3.b	7.4.1.a	2	7.4.3.b		2	7.4.3.b	
14	2	7.4.3.b	7.4.1.a	2	7.4.3.b		2	7.4.3.b	
15	1	7.1.1.c	7.1.3.b	1	7.1.1.c		1	7.1.1.c	
16	1	7.1.3.a		1	7.1.3.a		1	7.1.3.a	
17	1	7.1.3.b	7.1.4.a	2	7.1.3.b		1	7.1.1.a	
18	1	7.1.3.b		2	7.1.3.b		2	7.1.3.b	
19	1	7.2.2.a	7.2.2.c	1	7.2.2.a		1	7.2.2.a	
20	2	7.2.5.b	7.1.3.b	1	7.2.5.b	7.1.3.a	1	7.2.5.b	
21	1	7.2.5.b	7.3.2.a	2	7.2.5.b	7.1.3.a	2	7.2.5.b	
22	1	7.3.1.a		2	7.3.1.a		2	7.3.1.a	
23	1	7.3.1.a		1	7.3.1.a		2	7.3.1.a	
24	1	7.3.1.a		1	7.3.1.a		2	7.3.1.a	
25	1	7.3.3.c		1	7.3.3.c	7.1.3.a	1	7.3.3.c	
26	1	7.3.3.c		2	7.3.3.c	7.1.3.a	2	7.3.3.c	
27	1	7.3.1.a	7.1.4.a	2	7.3.3.d	7.1.3.a	2	7.3.3.d	
28	1	7.3.3.d	7.1.3.b	2	7.3.3.d	7.1.3.a	2	7.3.3.d	
29	1	7.3.3.e		1	7.3.3.e		1	7.3.3.e	
30	1	7.1.3.c	7.1.3.b	2	7.1.3.c	7.1.3.a	1	7.4.1.a	
31	1	7.4.1.b	7.4.1.a	1	7.4.1.b		2	7.4.1.b	7.4.1.a
32	1	7.4.1.b	7.4.1.a	1	7.4.1.b		2	7.4.1.b	
33	2	7.1.1.b		2	7.1.1.b		2	7.1.1.b	

Table M7.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
34	1	7.1.1.b	7.4.1.a	2	7.1.1.b		1	7.1.1.b	
35	1	7.1.3.a		1	7.1.3.a		1	7.1.3.a	
36	2	7.1.3.c		2	7.1.3.c		2	7.1.3.c	
37	1	7.1.3.c		1	7.1.3.c		1	7.1.3.c	
38	2	7.1.4.a	7.1.3.b	1	7.1.4.a		1	7.1.3.b	
39	1	7.2.2.a		1	7.2.2.a		1	7.2.2.a	
40	2	7.2.3.b	7.2.2.a	2	7.2.3.b		2	7.2.3.b	
41	2	7.2.3.b	7.2.2.a	2	7.2.3.b		2	7.2.3.b	
42	2	7.2.3.b	7.2.2.a	2	7.2.3.b		2	7.2.3.b	
43	1	7.2.5.b	7.3.2.a	1	7.2.5.b		1	7.2.5.b	
44	2	7.3.1.a	7.3.2.a	2	7.3.1.a		2	7.3.1.a	
45	1	7.3.1.b		2	7.3.1.b		2	7.3.1.b	7.3.3.e
46	1	7.3.3.d	7.3.3.c	2	7.3.3.d	7.1.3.a	2	7.3.3.d	
47	1	7.3.3.e		1	7.3.3.e	7.3.1.b	1	7.3.3.e	7.3.1.b
48	2	7.3.3.c	7.1.4.a	1	7.3.3.e	7.1.3.a	2	7.3.3.e	
49	1	7.1.1.a		1	7.1.1.a		1	7.1.1.a	
50	1	7.1.1.a		1	7.1.1.a		1	7.1.1.a	
51	1	7.1.1.a		2	7.1.1.a		1	7.1.1.a	
52	1	7.2.2.c		1	7.2.2.c		1	7.2.2.c	
53	1	7.2.2.c		1	7.2.2.c		1	7.2.2.c	
54	1	7.2.2.c		1	7.2.2.c		2	7.2.2.c	
55	1	7.1.1.a	7.3.2.a	1	7.1.1.a		1	7.1.1.a	
56	1	7.4.1.a		2	7.4.1.a		2	7.4.1.a	
57	2	7.4.3.a	7.4.1.a	2	7.4.3.a		2	7.4.3.a	
58	1	7.4.1.a	7.3.2.a	2	7.3.2.a		2	7.4.1.a	

Grade 8

Table M8.6 ***DOK Levels and Indicators Coded by Each Reviewer***

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
1	2	8.1.1.a	8.3.2.a	2	8.1.1.a		2	8.4.1.b		1	8.1.1.a	
2	1	8.1.1.c		1	8.1.1.c		1	8.1.1.c		1	8.1.1.c	
3	1	8.1.1.d		1	8.1.1.d		1	8.1.1.d		1	8.1.1.d	
4	1	8.1.3.a		2	8.1.3.a		1	8.1.3.a		2	8.1.3.a	
5	1	8.1.3.a	8.1.3.d	2	8.1.3.a	8.1.3.d	1	8.1.3.a		2	8.1.3.d	8.1.3.a
6	1	8.1.3.a		1	8.1.3.a		1	8.1.3.a		1	8.1.3.a	
7	1	8.1.3.a		1	8.1.3.a		1	8.1.3.a		1	8.1.3.a	
8	1	8.1.3.b		2	8.1.3.b		1	8.1.3.a		1	8.1.3.b	
9	2	8.1.3.d		2	8.1.3.d		1	8.1.3.a		1	8.1.3.d	
10	2	8.1.3.d	8.3.2.a	2	8.1.3.d		1	8.1.3.a		2	8.3.1.b	8.3.2.a
11	2	8.1.3.e		2	8.1.3.e	8.1.3.d	2	8.1.1.d		2	8.1.3.e	
12	2	8.1.3.e		2	8.1.3.e	8.1.3.d	1	8.1.3.a		2	8.1.3.e	
13	2	8.1.4.a		2	8.1.4.a		2	8.1.4.a		1	8.1.4.a	
14	1	8.2.1.d		1	8.2.1.d		1	8.2.1.d		1	8.2.1.d	
15	2	8.2.5.d	8.2.5.c	1	8.2.5.d	8.1.3.e	2	8.2.5.c		2	8.2.5.d	
16	2	8.2.5.d	8.1.3.e	2	8.2.5.d	8.1.3.e	2	8.2.5.d		2	8.2.5.d	
17	2	8.3.1.b		2	8.3.1.b		2	8.3.1.b		1	8.3.1.b	
18	1	8.3.3.b		1	8.3.3.b		1	8.3.3.b		1	8.3.3.b	8.1.3.a
19	1	8.3.3.b		1	8.3.3.b		1	8.3.3.b		1	8.3.3.b	
20	2	8.3.3.c		2	8.3.3.c		2	8.3.3.c		2	8.3.3.c	
21	2	8.3.3.c		2	8.3.3.b		2	8.3.3.c		2	8.3.3.c	
22	2	8.3.3.d		2	8.3.3.d		2	8.3.3.d		2	8.3.3.d	
23	1	8.3.3.d		2	8.3.3.d		2	8.3.3.d		1	8.3.3.d	
24	2	8.4.1.b		2	8.4.1.b		2	8.3.1.b		2	8.4.1.b	
25	1	8.4.1.d		1	8.4.1.b		2	8.3.1.b		1	8.4.1.d	
26	2	8.4.1.b		2	8.4.1.b		2	8.4.1.b		2	8.4.1.b	
27	1	8.4.1.d		1	8.4.1.b		2	8.4.1.d		1	8.4.1.d	
28	2	8.4.3.a		2	8.4.3.b		2	8.4.3.a		1	8.4.3.a	
29	1	8.1.1.a		1	8.1.1.a		1	8.1.1.a		1	8.1.1.a	
30	1	8.1.1.c		1	8.1.1.c		1	8.1.1.c		1	8.1.1.c	
31	2	8.3.2.a		2	8.4.1.b	8.3.2.a	2	8.4.1.b		1	8.4.1.b	
32	1	8.2.1.c	8.2.1.d	2	8.2.1.c		2	8.2.1.c		1	8.2.1.c	
33	1	8.2.1.c	8.2.1.d	2	8.2.1.d		2	8.2.1.c		1	8.2.1.d	8.2.1.c
34	1	8.2.1.c	8.2.1.d	2	8.2.1.c		2	8.2.1.c		1	8.2.1.c	8.2.1.d

Table M8.6 (Continued)

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
35	1	8.2.1.d		1	8.2.1.d		1	8.2.1.d		1	8.2.1.d	
36	1	8.2.2.a		1	8.2.2.a		2	8.2.2.a		1	8.2.2.a	
37	2	8.2.2.a		2	8.2.2.a		2	8.2.2.a		2	8.2.2.a	
38	1	8.2.2.a		1	8.2.2.a		2	8.2.2.a		1	8.2.2.a	
39	2	8.2.5.c		2	8.2.5.c	8.1.3.a	2	8.2.5.c		1	8.2.5.c	
40	2	8.2.5.c	8.3.2.a	2	8.2.5.c	8.1.3.a	2	8.2.5.c		2	8.2.5.c	
41	2	8.2.5.d	8.1.3.e	2	8.2.5.d	8.1.3.a	2	8.2.5.d		2	8.2.5.d	
42	2	8.3.1.b		2	8.3.1.b		2	8.3.1.b		1	8.3.1.b	
43	2	8.3.1.b		2	8.3.1.b		2	8.3.1.b		2	8.3.1.b	
44	1	8.3.3.b		1	8.3.3.b	8.1.3.a	1	8.1.3.a		1	8.3.3.b	
45	2	8.3.3.b		1	8.3.3.b	8.1.3.a	1	8.1.3.a		2	8.3.3.b	
46	2	8.3.3.c		2	8.3.3.c		1	8.1.3.a		1	8.3.3.c	
47	2	8.3.3.c		2	8.3.3.c	8.1.3.a	2	8.3.3.c		2	8.3.3.c	
48	2	8.3.3.d		2	8.3.3.d		2	8.3.3.d		2	8.3.3.d	
49	2	8.4.1.b		1	8.4.1.b		2	8.4.1.b		1	8.4.1.b	
50	2	8.4.3.a		2	8.4.3.a		2	8.4.3.b		1	8.4.3.a	
51	2	8.4.3.b		2	8.4.3.a		2	8.4.3.b		2	8.4.3.b	
52	2	8.4.1.e		2	8.4.1.e		2	8.4.1.e		1	8.4.1.e	
53	2	8.3.1.b	8.3.2.a	2	8.3.1.b	8.3.2.a	2	8.3.1.b		1	8.3.1.b	
54	2	8.3.1.b	8.3.2.a	2	8.3.1.b	8.3.2.a	2	8.3.1.b		1	8.3.1.b	
55	2	8.3.1.b		2	8.3.1.b	8.3.2.a	2	8.3.1.b		2	8.3.1.b	
56	1	8.3.1.b		1	8.3.2.a		2	8.3.1.b		1	8.3.1.b	
57	2	8.4.1.e		2	8.4.1.e		2	8.4.1.e		2	8.4.1.e	
58	2	8.4.1.e		2	8.4.1.b		2	8.4.1.b		1	8.3.2.a	
59	1	8.2.1.e		1	8.2.1.e		1	8.2.1.e		1	8.2.1.e	
60	1	8.2.1.e		2	8.2.1.e		1	8.2.1.e		1	8.2.1.e	

Table M8.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
1	1	8.1.1.a	8.1.4.a	2	8.1.1.a		2	8.1.1.a	
2	1	8.1.1.c		1	8.1.1.c		1	8.1.1.c	
3	1	8.1.1.d		1	8.1.1.d		1	8.1.1.d	
4	1	8.1.3.a	8.1.3.d	2	8.1.3.a		2	8.1.3.a	
5	1	8.1.3.a	8.1.3.d	1	8.1.3.a		1	8.1.3.a	
6	1	8.1.3.a	8.1.3.d	1	8.1.3.a		1	8.1.3.a	
7	1	8.1.3.a	8.1.3.d	2	8.1.3.a		1	8.1.3.a	
8	1	8.1.3.b	8.1.3.a	1	8.1.3.b		1	8.1.3.b	8.1.3.a
9	1	8.1.3.d		2	8.1.3.d		2	8.1.3.d	
10	1	8.1.3.d		2	8.1.3.d		2	8.1.3.d	
11	1	8.1.3.e	8.1.3.d	2	8.1.3.e	8.1.3.a	2	8.1.3.e	
12	1	8.1.3.e	8.1.3.d	2	8.1.3.e	8.1.3.a	2	8.1.3.e	8.3.2.a
13	2	8.1.4.a	8.1.3.d	2	8.1.4.a		2	8.1.4.a	8.3.2.a
14	1	8.2.1.c	8.2.1.d	1	8.2.1.d		1	8.2.1.d	8.3.2.a
15	1	8.2.5.d	8.1.3.e	2	8.1.3.e	8.2.5.d	2	8.2.5.c	
16	2	8.2.5.d	8.1.3.e	2	8.2.5.d	8.1.3.e	2	8.1.3.e	8.3.2.a
17	1	8.3.1.b		2	8.3.1.b		2	8.3.1.b	
18	1	8.3.1.b	8.1.3.a	1	8.3.3.b	8.1.3.a	1	8.3.3.b	
19	1	8.1.3.a	8.3.3.b	1	8.3.3.b	8.1.3.a	1	8.3.3.b	
20	2	8.3.3.c		1	8.3.3.c	8.1.3.a	2	8.3.3.c	
21	2	8.3.3.c		2	8.3.3.c	8.1.3.a	2	8.3.3.c	
22	2	8.3.3.d	8.3.3.c	2	8.3.3.d	8.1.3.a	2	8.3.3.d	
23	1	8.3.3.d	8.3.1.b	2	8.3.3.d	8.1.3.d	2	8.1.3.d	8.3.3.d
24	2	8.4.1.b	8.1.3.d	2	8.4.1.b	8.1.3.a	2	8.4.1.b	
25	1	8.4.1.b	8.1.3.d	2	8.4.1.d	8.4.1.b	1	8.4.1.d	8.4.1.b
26	2	8.4.1.b	8.1.3.d	2	8.4.1.b		2	8.4.1.b	
27	1	8.4.1.b	8.4.1.d	2	8.4.1.d	8.4.1.b	2	8.4.1.d	
28	1	8.4.3.a	8.4.3.b	2	8.4.3.a		2	8.4.3.a	
29	1	8.1.1.a		1	8.1.1.a		1	8.1.1.a	
30	1	8.1.1.c		1	8.1.1.c		1	8.1.1.c	
31	2	8.4.1.b	8.1.3.d	2	8.1.4.a	8.1.3.d	2	8.4.1.b	8.4.1.d
32	1	8.2.1.c	8.2.1.d	1	8.2.1.c		1	8.2.1.c	8.2.1.d
33	1	8.2.1.d	8.2.1.c	1	8.2.1.c		1	8.2.1.c	8.2.1.d
34	1	8.2.1.d	8.2.1.c	1	8.2.1.c		1	8.2.1.c	8.2.1.d

Table M8.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
35	1	8.2.1.d		1	8.2.1.d		1	8.2.1.d	
36	1	8.2.2.a	8.3.2.a	1	8.2.2.a		2	8.2.2.a	
37	1	8.2.2.a	8.3.2.a	2	8.2.2.a		2	8.2.2.a	
38	1	8.2.2.a	8.1.3.d	2	8.2.2.a	8.1.3.a	1	8.2.2.a	
39	2	8.2.5.c		2	8.2.5.c		2	8.2.5.c	
40	2	8.2.5.c	8.1.3.d	1	8.2.5.c		2	8.2.5.c	
41	2	8.1.3.e	8.2.5.d	2	8.1.3.e	8.2.5.d	2	8.2.5.d	
42	1	8.3.1.b		2	8.3.1.b		2	8.3.1.b	
43	1	8.3.1.b	8.3.2.a	2	8.3.1.b		2	8.3.1.b	
44	1	8.1.3.a	8.3.3.b	1	8.3.3.b		1	8.3.3.b	
45	1	8.3.3.b	8.1.3.a	2	8.3.3.b		2	8.3.3.b	
46	1	8.3.3.b	8.3.1.b	2	8.3.3.c	8.1.3.d	2	8.1.3.d	8.3.3.c
47	2	8.3.3.c	8.1.3.a	2	8.3.3.c	8.1.3.a	2	8.3.3.c	
48	2	8.3.3.d	8.3.2.a	2	8.3.3.d	8.1.3.a	2	8.3.3.d	
49	1	8.4.1.b		2	8.4.1.b		2	8.4.1.b	
50	1	8.4.3.a		2	8.4.3.a		1	8.4.3.a	
51	1	8.4.3.b		2	8.4.3.b	8.1.3.a	2	8.4.3.b	
52	2	8.4.1.e		2	8.4.1.e		2	8.4.1.e	
53	2	8.3.1.b	8.3.2.a	2	8.3.1.b		2	8.3.1.b	8.3.2.a
54	2	8.3.1.b	8.3.2.a	2	8.3.1.b		2	8.3.1.b	8.3.2.a
55	3	8.3.1.b	8.3.2.a	2	8.3.1.b		2	8.3.1.b	8.3.2.a
56	1	8.3.1.b	8.3.2.a	2	8.3.1.b		2	8.3.1.b	8.3.2.a
57	2	8.4.1.e	8.4.1.b	2	8.4.1.e		2	8.4.1.e	
58	2	8.4.1.b	8.1.4.a	2	8.4.1.e		2	8.4.1.e	8.1.3.e
59	1	8.2.1.e	8.3.3.c	1	8.2.1.e	8.1.3.a	1	8.2.1.e	
60	1	8.2.1.e	8.3.3.c	1	8.2.1.e	8.1.3.a	1	8.2.1.e	

Grade 11

Table M11.6 ***DOK Levels and Indicators Coded by Each Reviewer***

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
1	1	12.2.2.c		1	12.2.2.c		1	12.2.2.c		1	12.2.2.c	
2	1	12.2.2.c		2	12.2.1.e		1	12.2.2.c		2	12.2.2.c	12.2.1.e
3	2	12.3.1.a		1	12.3.1.a		2	12.3.1.a		2	12.3.1.d	12.3.1.f
4	2	12.3.1.a		2	12.1.3.a		2	12.3.1.a		2	12.3.1.a	12.3.1.f
5	2	12.3.1.a		1	12.3.1.d		2	12.3.1.a		2	12.3.1.d	12.3.1.a
6	1	12.3.3.b	12.3.1.a	2	12.3.1.a	12.1.3.a	2	12.3.3.b		1	12.3.3.b	12.1.3.a
7	1	12.2.1.e		1	12.2.1.e		2	12.2.2.d		1	12.2.1.e	
8	2	12.2.1.d		2	12.2.2.a	12.2.1.d	2	12.2.1.d		2	12.2.2.a	
9	2	12.2.2.d		1	12.2.2.a		2	12.2.2.a		2	12.2.2.a	12.2.2.d
10	2	12.2.1.d		1	12.2.1.d		2	12.2.1.d		1	12.2.1.d	
11	2	12.2.5.d		1	12.2.5.d	12.1.3.a	1	12.1.3.a		1	12.2.5.d	
12	2	12.2.5.d		2	12.2.5.d	12.1.3.a	2	12.3.1.f		2	12.2.5.d	
13	1	12.2.5.d		1	12.2.5.d	12.1.3.a	2	12.3.1.f		1	12.2.5.d	
14	2	12.3.1.f	12.2.2.a	1	12.3.1.f		2	12.3.1.f		1	12.3.1.f	
15	1	12.3.1.c	12.3.1.d	1	12.3.1.f	12.3.1.a	2	12.3.1.f		1	12.3.1.f	
16	2	12.3.2.b		2	12.3.2.b		2	12.3.2.b		2	12.3.2.b	
17	1	12.2.1.d	12.3.3.c	1	12.3.3.c		1	12.3.3.c		1	12.3.3.c	
18	1	12.3.3.c		1	12.3.3.c		1	12.3.3.c		1	12.3.3.c	
19	1	12.3.3.d		1	12.3.3.d		1	12.3.3.d		1	12.3.3.d	
20	1	12.3.3.d		1	12.3.3.d		1	12.3.3.c		1	12.3.3.d	
21	2	12.4.3.c	12.4.3.b	2	12.4.3.c		2	12.4.3.c		1	12.4.3.b	12.4.3.c
22	2	12.4.3.b	12.4.3.d	2	12.4.3.b	12.1.3.a	2	12.4.3.b		1	12.4.3.b	
23	2	12.2.1.e	12.1.4.a	2	12.2.1.e	12.1.3.a	2	12.2.1.e		1	12.2.1.e	12.1.4.a
24	2	12.2.1.d		2	12.2.1.d	12.1.3.a	2	12.2.2.d		1	12.2.1.d	
25	2	12.2.1.d		2	12.2.1.d	12.1.3.a	2	12.2.1.d		1	12.2.1.d	
26	1	12.2.1.e		1	12.2.1.e		2	12.2.1.d		1	12.2.1.e	
27	1	12.2.1.e		2	12.2.1.e		2	12.2.1.d		1	12.2.1.e	
28	2	12.2.2.a	12.2.2.d	1	12.2.1.d		2	12.2.2.a		1	12.2.2.a	12.2.1.d
29	2	12.2.2.a	12.2.2.d	1	12.2.2.a		2	12.2.2.a		1	12.2.2.a	
30	2	12.2.4.b		2	12.2.1.d		2	12.2.1.d		1	12.2.4.b	
31	2	12.2.4.b		2	12.2.4.b		2	12.2.1.d		1	12.2.4.b	
32	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
33	2	12.3.1.f	12.3.1.c	2	12.3.1.f		2	12.3.1.a		1	12.3.1.f	

Table M11.6 (Continued)

Item	DOK R1	R1P	R1S	DOK R2	R2P	R2S	DOK R3	R3P	R3S	DOK R4	R4P	R4S
34	2	12.3.2.b		2	12.3.2.b		2	12.3.2.b		1	12.3.2.b	
35	2	12.3.2.b		2	12.3.2.b		2	12.3.2.b		1	12.3.2.b	
36	1	12.3.3.b		1	12.3.3.b		1	12.3.3.d		1	12.3.3.d	
37	1	12.3.3.f		2	12.3.3.f		1	12.3.3.f		2	12.3.3.f	
38	2	12.4.3.b		2	12.4.3.b		2	12.4.3.b		1	12.4.3.b	
39	2	12.4.3.d		2	12.4.3.d		1	12.4.3.d		1	12.4.3.d	
40	1	12.1.3.b		1	12.1.3.b	12.1.3.a	1	12.3.3.b		1	12.1.3.a	
41	1	12.1.3.a		1	12.1.3.a		1	12.1.3.a		1	12.1.3.a	
42	1	12.1.3.b	12.3.3.b	1	12.3.3.b	12.1.3.a	1	12.1.3.a		1	12.1.3.b	12.1.3.a
43	2	12.1.4.a		2	12.1.4.a		2	12.1.4.a		2	12.1.4.a	
44	2	12.1.4.a		2	12.1.4.a	12.1.3.a	2	12.1.4.a		1	12.1.4.a	
45	2	12.2.1.d		2	12.2.1.d	12.1.3.a	2	12.2.1.d		2	12.2.1.d	
46	2	12.2.1.d		2	12.2.1.d		2	12.2.1.d		1	12.2.1.d	
47	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
48	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
49	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
50	2	12.3.1.a		2	12.3.1.a	12.1.3.a	2	12.3.1.a		1	12.3.1.a	
51	1	12.3.3.b		1	12.3.3.b		1	12.3.3.b		1	12.3.3.d	
52	2	12.4.1.d		2	12.4.1.d		2	12.4.1.d		2	12.4.1.d	
53	2	12.4.3.b		2	12.4.3.b		2	12.4.3.b		2	12.4.3.b	
54	1	12.4.3.c		1	12.4.3.c		2	12.4.3.c		1	12.4.3.c	
55	1	12.4.3.c		2	12.4.3.c		2	12.4.3.c		1	12.4.3.c	
56	1	12.1.3.b		1	12.1.3.b		1	12.1.3.b		1	12.1.3.b	
57	1	12.1.3.b		1	12.1.3.b		1	12.1.3.b		1	12.1.3.b	
58	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
59	2	12.3.1.d		2	12.3.1.c		1	12.3.1.c		2	12.3.1.d	
60	2	12.4.1.d		2	12.4.1.d		2	12.4.1.d		2	12.4.1.d	

Table M11.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
1	1	12.2.2.c		1	12.2.2.c		2	12.2.2.c	
2	1	12.2.2.a	12.2.2.c	1	12.2.2.a	12.2.2.d	2	12.2.2.a	12.2.2.c
3	1	12.3.1.f	12.3.1.a	2	12.3.1.a	12.3.1.c	2	12.3.1.f	12.3.1.d
4	1	12.3.1.a	12.3.1.f	2	12.3.1.a	12.3.1.c	2	12.3.1.c	12.3.1.a
5	1	12.3.1.d		2	12.3.1.d	12.3.1.a	2	12.3.1.a	12.3.1.d
6	2	12.3.3.b	12.3.1.a	1	12.3.1.a		2	12.3.1.a	
7	1	12.2.1.e	12.2.1.d	1	12.2.1.e		2	12.2.1.e	12.2.1.d
8	1	12.3.2.b	12.3.1.a	2	12.2.2.a		2	12.2.2.a	
9	1	12.2.2.a	12.2.4.b	2	12.2.2.d	12.2.2.c	2	12.2.2.a	12.2.2.d
10	1	12.2.1.d	12.2.4.b	1	12.2.4.b		1	12.2.4.b	
11	1	12.1.3.a	12.2.5.d	1	12.1.3.a		2	12.2.5.d	
12	1	12.2.5.d		2	12.2.5.d	12.1.3.a	1	12.2.5.d	
13	1	12.2.5.d		1	12.2.5.d	12.3.1.f	1	12.2.5.d	
14	1	12.3.1.a	12.3.1.f	2	12.3.1.a		2	12.3.1.c	12.3.1.f
15	1	12.3.1.c	12.3.1.f	1	12.3.1.f	12.3.1.c	1	12.3.1.c	
16	1	12.3.2.b	12.3.1.f	2	12.3.2.b		2	12.3.2.b	12.3.1.f
17	1	12.3.3.b	12.3.3.f	1	12.3.3.c		1	12.3.3.c	
18	1	12.3.3.b		2	12.3.3.c	12.1.3.a	1	12.3.3.c	
19	1	12.3.3.b	12.3.3.d	1	12.3.3.d	12.1.3.a	1	12.3.3.d	
20	1	12.3.3.b	12.3.3.d	1	12.3.3.d	12.1.3.a	1	12.3.3.d	
21	2	12.4.3.b		2	12.4.3.b	12.4.3.d	2	12.4.3.b	
22	2	12.4.3.b	12.4.3.d	2	12.4.3.d	12.4.3.b	1	12.4.3.b	
23	1	12.2.1.e	12.2.1.d	2	12.2.1.e	12.1.4.a	1	12.2.1.e	12.1.3.a
24	1	12.2.1.d	12.2.4.b	2	12.2.1.d		1	12.2.1.d	
25	1	12.2.1.d	12.1.3.a	2	12.2.1.d		1	12.2.1.d	
26	1	12.2.1.e		1	12.2.1.e		1	12.2.1.e	
27	1	12.2.1.e	12.2.1.d	2	12.2.1.e	12.2.1.d	2	12.2.1.e	12.2.1.d
28	1	12.2.2.a	12.2.4.b	1	12.2.2.a		2	12.2.2.a	
29	2	12.2.2.a	12.2.4.b	2	12.2.2.a		2	12.2.2.a	12.2.2.d
30	1	12.1.3.a	12.2.4.b	2	12.2.4.b	12.1.3.a	2	12.1.3.a	12.2.4.b
31	1	12.1.3.a	12.2.4.b	2	12.2.4.b		1	12.1.3.a	12.2.4.b
32	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
33	1	12.3.3.b	12.3.1.f	2	12.3.1.f		2	12.3.1.c	12.3.1.f

Table M11.6 (Continued)

Item	DOK R5	R5P	R5S	DOK R6	R6P	R6S	DOK R7	R7P	R7S
34	1	12.3.2.b	12.3.1.a	2	12.3.2.b		1	12.3.2.b	
35	1	12.3.2.b	12.3.1.a	2	12.3.2.b		2	12.3.2.b	
36	1	12.3.3.b		2	12.3.3.b		2	12.3.3.b	
37	1	12.3.1.a	12.3.3.f	2	12.3.3.f		2	12.3.3.f	12.3.1.a
38	2	12.4.3.c	12.4.3.b	2	12.4.3.b		2	12.4.3.b	
39	2	12.4.3.b		2	12.4.3.d		2	12.4.3.d	
40	1	12.1.3.a		1	12.3.3.b	12.1.3.a	2	12.1.3.a	12.1.3.b
41	1	12.1.3.a		1	12.1.3.a		1	12.1.3.a	
42	1	12.1.3.a		2	12.1.3.b		2	12.1.3.a	12.1.3.b
43	2	12.1.3.a	12.1.4.a	2	12.3.2.b		2	12.1.3.a	
44	1	12.1.4.a	12.1.3.a	2	12.1.4.a		2	12.1.4.a	12.1.3.a
45	1	12.2.2.d	12.2.1.e	2	12.2.1.d		2	12.2.1.d	
46	2	12.2.1.d		1	12.2.1.d		2	12.2.1.d	
47	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
48	1	12.3.1.c		2	12.3.1.c		1	12.2.2.a	12.3.1.c
49	1	12.3.1.c		2	12.3.1.c		1	12.3.1.c	
50	1	12.3.3.b	12.1.3.a	1	12.3.1.a		1	12.3.1.d	12.1.3.a
51	1	12.3.3.b	12.1.3.a	1	12.3.3.b		1	12.3.3.b	
52	2	12.4.1.d		2	12.4.1.d		2	12.4.1.d	
53	1	12.4.3.b	12.4.3.d	2	12.4.3.b		2	12.4.3.b	
54	1	12.2.4.b		2	12.4.3.c		1	12.4.3.c	
55	1	12.4.3.c		2	12.4.3.c		2	12.4.3.c	
56	2	12.1.3.a	12.1.3.b	2	12.3.3.b	12.1.3.a	1	12.1.3.b	12.1.3.a
57	1	12.1.3.b	12.1.3.a	2	12.3.3.b	12.1.3.a	1	12.1.3.b	
58	1	12.3.1.c		1	12.3.1.c		1	12.3.1.c	
59	2	12.3.1.d		2	12.3.1.c		2	12.3.1.d	
60	2	12.4.1.d		2	12.4.1.d		2	12.4.1.d	

Results of Intra-Class Correlation

Reliability can be increased by adding more training to reduce the One-judge Reliability or by adding more judges to reduce the variability of the mean.

Number of Judges needed to reach Aspiration Level of Reliability

Aspiration Level	One Judge Reliability			Number of Judges Needed		
	0.335	0.421	0.399	Mathematics	Mathematics	Science
0.7	4.6	3.2	3.5	5	4	4
0.8	7.9	5.5	6.0	8	6	7
0.9	17.9	12.4	13.6	18	13	14
0.95	37.7	26.1	28.6	38	27	29

Notes: The minimum number of judges calculation is based on the Spearman Browne Prophecy formula, $m = \left\{ \frac{\frac{\rho^*}{1-\rho^*}}{\frac{\rho_L}{1-\rho_L}} \right\} = \frac{\rho^*(1-\rho_L)}{\rho_L(1-\rho^*)}$, where ρ^* is the reliability aspired to and ρ_L is the reliability estimate for a single judge.

The two-way analysis assuming both random items and fixed judges gives a result for the mean correlation identical to Cronbach's Alpha, i.e., $\alpha = \frac{\sigma^2_{Bet} - \sigma^2_e}{\sigma^2_{Bet}}$. While SPSS allows the user to select between the random and mixed models, the calculations come out the same with either model. Assuming the judges are fixed would imply these are the only judges that would ever be used so there is no component of variance associated with them. *Random judges* assume the judges used are one of many possible selections of judges; then the variability among judges must be taken into account, which will result in a lower value for the intra-class correlation (or any other measure of reliability).

For the mixed model (i.e., fixed judges), the intra-class correlation would be calculated identically to Alpha,

$$ICC_{FixedJudges} = \frac{ItemMS - EMS}{ItemMS}$$

For the random model, the correct calculation is:

$$ICC_{RandomJudges} = \frac{ItemMS - EMS}{ItemMS + \frac{(JudgeMS - EMS)}{n}}$$

Calculation Modes

Calculation for two-way model with both questions and judges random

Grade 3:

	Mathematics	
	DF	MS
questions	49	1.04
judges	6	2.26
error	294	0.21
Intra-Class Correlation		.76
Cronbach's Alpha		.79

Grade 4:

	Mathematics	
	DF	MS
questions	54	1.03
judges	6	1.01
error	324	0.18
Intra-Class Correlation		.81
Cronbach's Alpha		.82

Grade 5:

	Mathematics	
	DF	MS
questions	54	1.13
judges	6	0.62
error	324	0.15
Intra-Class Correlation		.86
Cronbach's Alpha		.86

Grade 6:

	Mathematics	
	DF	MS
questions	57	0.88
judges	6	0.57
error	342	0.15
Intra-Class Correlation		.82
Cronbach's Alpha		.82

Calculation Modes (continued)

Grade 7:

	Mathematics	
	DF	MS
questions	57	0.86
judges	6	0.84
error	342	0.13
Intra-Class Correlation		.83
Cronbach's Alpha		.84

Grade 8:

	Mathematics	
	DF	MS
questions	59	0.94
judges	6	1.28
error	354	0.12
Intra-Class Correlation		.86
Cronbach's Alpha		.87

Grade 11:

	Mathematics	
	DF	MS
questions	59	0.69
judges	6	1.97
error	354	0.15
Intra-Class Correlation		.75
Cronbach's Alpha		.79