REPORT

Alignment Analysis of Mathematics Standards and Michigan Merit Examination

Michigan
High School

Norman L. Webb
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This study is one of four alignment studies conducted for the State of Michigan. The Alignment Analysis Institute was held May 9-10, 2006, in Lansing, Michigan. The report consists of a description of the four criteria used to judge the alignment between Michigan Mathematics Standards and the Michigan assessments, with tables listing the results from the analysis of the coding by seven reviewers.

Acknowledgements

Reviewers:

Norman Webb (Group Leader)	WI
Deb Coyne	MI
Eric Hartley	MI
Joanna Secco	MI
Pam Metcalf	MI
Kathy Berry	MI
Debra Gardner	MI

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Executive Summary

A two-day alignment institute was held in Lansing, Michigan, May 9-10, 2006. Seven reviewers, including mathematics content experts, district mathematics supervisors, and mathematics teachers analyzed the agreement between the state's mathematics standards and the high school Michigan Merit Examination for mathematics. Six of the reviewers were from Michigan while the group leader was from Wisconsin.

The alignment between the Michigan Merit mathematics assessment and the 2006 mathematics standards needs significant improvement. The assessment was misaligned with every standard, particularly with respect to the range and breadth of the content coverage. Although it is difficult to achieve full alignment with such a massive set of standards (14) and benchmarks (172), many of the alignment weaknesses are caused by broad content over-emphases and omissions on the assessment. A vast number of items address only general calculation, but there is almost no coverage of non-linear functions, measurement, mathematical reasoning, and bivariate data. At least 68 items need to be added to supplement the assessment to correct these alignment weaknesses, and many of these need to be at a high depth-of-knowledge level.

The alignment between the Michigan Merit mathematics assessment and the 2004 mathematics standards is better, but still needs some improvement. There are still misalignments with respect to each of the six standards, largely caused by over-emphases and omissions on the assessment. The alignment shows that too many items address only calculation, and too few items address content like collecting, analyzing, and inferring from data, number types and properties, and discrete mathematics. At least 23 items need to be added in order to correct these alignment weaknesses, and some of these should be at a high depth-of-knowledge level.

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Introduction

The alignment of expectations for student learning with assessments for measuring students' attainment of these expectations is an essential attribute for an effective standards-based education system. Alignment is defined as the degree to which expectations and assessments are in agreement and serve in conjunction with one another to guide an education 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 an attribute of any one of these two system components. Alignment describes the match between expectations and assessment that can be legitimately improved by changing either student expectations or the assessments. As a relationship between two or more system components, alignment is 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 in Mathematics and Science Education* (Webb, 1997).

A two-day Alignment Analysis Institute was conducted May 9-10, 2006, in Lansing, Michigan. Seven reviewers, including mathematics content experts, district mathematics supervisors, and mathematics teachers analyzed the agreement between the state's mathematics learning standards and the high school Michigan Merit Examination (MME). Two alignment analyses were performed. One compared the MME to the content standards and benchmarks that have been in use through the 2005-2006 school year. These six standards were analyzed in an alignment study conducted in 2004 and are referred to in this report as the 2004 standards. The depth-of-knowledge (DOK) levels determined in the 2004 study were used in this analysis. The second analysis compared the MME to the new 2006 mathematics standards with 14 standards.

The State of Michigan uses the terminology of *standards* and *benchmarks* in their mathematics content expectations. Standards are the broad content requirements across all grades. Benchmarks specify what the standards mean at each grade level. There are only a few benchmarks for each standard at each grade level. Data for this analysis are entered at the benchmarks level and reported out at the standards level.

As part of the alignment institute, reviewers were trained to identify the depth-of-knowledge of the benchmarks and assessment items. This training included reviewing the definitions of the four depth-of-knowledge (DOK) levels and then reviewing examples of each. Then the reviewers participated in 1) a consensus process to determine the depth-of-knowledge levels of the benchmarks and 2) individual analyses of the assessment items. Following individual analyses of the items, reviewers participated in a debriefing discussion in which they

assessed the degree to which they had coded particular items or types of content to the benchmarks.

To derive the results from the analysis, the reviewers' responses are averaged. Any variance among reviewers is considered legitimate, with the true depth-of-knowledge level for the item falling somewhere in between the two or more assigned values. Such variation could signify a lack of clarity in how the standards were written, the robustness of an item that can legitimately correspond to more than one standard, and/or a depth of knowledge that falls in between two of the four defined levels. Reviewers were allowed to identify one assessment item as corresponding to up to three standards—one primary hit (standard) and up to two secondary hits. However, reviewers could only code one depth-of-knowledge level to each assessment item even if the item corresponded to more than one standard.

Reviewers were instructed to focus primarily on the alignment between the state standards and assessments. However, reviewers were encouraged to offer their opinion on the quality of the standards, or of the assessment activities/items, by writing a note about the item. Reviewers could also indicate whether there was a Source-of-Challenge issue with the item—i.e., a problem with the item that might cause the student who knows the material to give a wrong answer, or enable someone who does not have the knowledge being tested to answer the item correctly.

The results produced from the institute pertain only to the issue of alignment between the Michigan state standards and the state assessment instrument. Note that this alignment analysis does not serve as external verification of the general quality of the state's standards or assessments. Rather, only the degree of alignment is discussed in these results. For these results, the means of the reviewers' coding were used to determine whether the alignment criteria were met. When reviewers did vary in their judgments, the means lessened the error that might result from any one reviewer's finding. Standard deviations are reported in the tables provided in the appendix, which give one indication of the variance among reviewers.

This report describes the results of an alignment study of standards and the operational tests in mathematics for Grade 12 in Michigan. The study addressed specific criteria related to the content agreement between the state standards and grade-level assessments. Four criteria received major attention: categorical concurrence, depth-of-knowledge consistency, range-of-knowledge correspondence, and balance of representation.

Alignment Criteria Used for This Analysis

This analysis judged the alignment between the standards and the assessment on the basis of four criteria. Information is also reported on the quality of items by identifying items with Sources-of-Challenge and other issues. For each alignment criterion, an acceptable level was defined by what would be required to assure that a student had met the standards.

Categorical Concurrence

An important aspect of alignment between standards and assessments is whether both address the same content categories. The categorical-concurrence criterion provides a very general indication of alignment if both documents incorporate the same content. *The criterion of categorical concurrence between standards and assessment is met if the same or consistent categories of content appear in both documents.* This criterion was judged by determining whether the assessment included items measuring content from each standard. The analysis assumed that the assessment had to have at least six items measuring content from a standard in order for there to be an acceptable level of categorical concurrence between the standard and the assessment. The number of items, six, is based on estimating the number of items that could produce a reasonably reliable sub-scale for estimating students' mastery of content on that sub-scale. Of course, many factors have to be considered in determining what a reasonable number is, including the reliability of the sub-scale, the mean score, and 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 .1, it was estimated that six items would produce an agreement coefficient of at least .63. This indicates that about 63% of the group would be consistently classified as masters or nonmasters if two equivalent test administrations were employed. The agreement coefficient would increase if the cutoff score is increased to one standard deviation from the mean to .77 and, with a cutoff score of 1.5 standard deviations from the mean, to .88. Usually states do not report student results by standards or require students to achieve a specified cutoff score on sub-scales related to a standard. If a state did do this, then the state would seek a higher agreement coefficient than .63. Six items 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 items is 3 and one standard deviation is one item, then a cutoff score set at 4 would produce an agreement coefficient of .77. Any fewer items with a mean of one-half of the items would require a cutoff that would only allow a student to miss one item. This would be a very stringent requirement, considering a reasonable standard error of measurement on the sub-scale.

Depth-of-Knowledge Consistency

Standards and assessments can be aligned not only on the category of content covered by each, but also on the basis of the complexity of knowledge required by each. *Depth-of-knowledge consistency between standards and assessment indicates alignment if what is elicited from students on the assessment is as demanding cognitively as what students are expected to know and do as stated in the standards.* For consistency to exist between the assessment and the standard, as judged in this analysis, at least 50% of the items corresponding to a standard had to be at or above the level of knowledge of the standard: 50%, a conservative cutoff point, is based on the assumption that a minimal passing score for any one standard of 50% or higher would require the student to successfully answer at least some items at or above the depth-of-knowledge level of the corresponding standard. For example, assume an assessment included six items related to one standard and students were required to answer correctly four of those items to be judged proficient—i.e., 67% of the items. If three, 50%, of the six items were at or above the depth-of-knowledge level of the corresponding standards, then for a student to achieve a

proficient score would require the student to answer correctly at least one item at or above the depth-of-knowledge level of one standard. Some leeway was used in this analysis on this criterion. If a standard had between 40% and 50% of items at or above the depth-of-knowledge levels of the standards, then it was reported that the criterion was "weakly" met.

Interpreting and assigning depth-of-knowledge levels to both benchmarks within standards and assessment items is an essential requirement of alignment analysis. These descriptions help to clarify what the different levels represent in mathematics:

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 a 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 a 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 the objects or phenomenon 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 requiring mathematics information from the graph, also is 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 solely to number skills, but can involve visualization skills and probability skills. Other Level 2 activities include noticing and 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 a 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 using concepts to solve problems.

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 at 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 developing and proving conjectures; designing and conducting experiments; making connections between a finding and related concepts and phenomena; combining and synthesizing ideas into new concepts; and critiquing experimental designs.

Range-of-Knowledge Correspondence

For standards and assessments to be aligned, the breadth of knowledge required on both should 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 assessment items/activities.* The criterion for correspondence between span of knowledge for a standard and an assessment considers the number of skills within the standard with one related assessment item/activity. Fifty percent of the benchmarks for a standard had to have at least one related assessment item in order for the alignment on this criterion to be judged acceptable. This level is based on the assumption that students' knowledge should be tested on content from over half of the domain of knowledge for a standard. This assumes that each benchmark for a standard should be given equal weight. Depending on the balance in the distribution of items and the need to have a low number of items related to any one benchmark, the requirement that assessment items need to be related to more than 50% of the benchmarks for a standard increases the likelihood that students will have to demonstrate knowledge on more than one benchmark per standard to achieve a minimal passing score. As with the other criteria, a state may choose to make the acceptable level on this criterion more rigorous by requiring an assessment to include items related to a greater number of the benchmarks. However, any restriction on the number of items included on the test will place an upper limit on the number of benchmarks that can be assessed. Range-of-knowledge correspondence is more difficult to attain if the content expectations are partitioned among a greater number of standards and a large number of benchmarks. If 50% or more of the benchmarks for a standard had a corresponding assessment item, then the range-of-knowledge criterion was met. If between 40% and 50% of the benchmarks for a standard had a corresponding assessment item, the criterion was "weakly" met.

Balance of Representation

In addition to comparable depth and breadth of knowledge, aligned standards and assessments require that knowledge be distributed equally in both. The range-of-knowledge criterion only considers the number of benchmarks within a standard hit (a standard with a corresponding item); it does not take into consideration how the hits (or assessment items/activities) are distributed among these benchmarks. *The balance-of-representation criterion is used to indicate the degree to which one benchmark is given more emphasis on the assessment than another.* An index is used to judge the distribution of assessment items. This index only considers the benchmarks for a standard that have at least one hit—i.e., one related assessment item per benchmark. The index is computed by considering the difference in the proportion of benchmarks and the proportion of hits assigned to the benchmark. An index value of 1 signifies perfect balance and is obtained if the hits (corresponding items) related to a standard are equally distributed among the benchmarks for the given standard. Index values that approach 0 signify that a large proportion of the hits are on only one or two of all of the benchmarks hit. Depending on the number of benchmarks and the number of hits, a unimodal distribution (most items related to one benchmark and only one item related to each of the remaining benchmarks) has an index value of less than .5. A bimodal distribution has an index value of around .55 or .6. Index values of .7 or higher indicate that items/activities are distributed among all of the benchmarks at least to some degree (e.g., every benchmark has at least two items) and is used as the acceptable level on this criterion. Index values between .6 and .7 indicate the balance-of-representation criterion has only been "weakly" met.

Source-of-Challenge Criterion

The Source-of-Challenge criterion is only used to identify items on which the major cognitive demand is inadvertently placed and is other than the targeted mathematical skill, concept, or application. Cultural bias or specialized knowledge could be reasons for an item to have a Source-of-Challenge problem. Such item characteristics may result in some students not answering an assessment item, or answering an assessment item incorrectly, or at a lower level, even though they possess the understanding and skills being assessed.

Findings

Standards

Seven reviewers participated in reaching a consensus on the Depth-of-Knowledge level for each benchmark at Grade 12. The results from their deliberation are presented in Table 1. The 2006 (modified) assessment spanned DOK levels 1-3, while the 2004 assessment had all four DOK levels represented. Reviewers judged that a higher proportion of the 2004 standards and benchmarks expected a more complex work than for the new 2006 standards. Less than one-fourth of the 44 2006 benchmarks were judged to have a DOK level 3 whereas more than one-third of the 2004 benchmarks were judged to have a DOK level 3 (strategic analysis). Another noticeable difference between the two sets of standards is the number of benchmarks with the new 2006 standards having nearly three times the number of benchmarks than the 2004

standards. This increase in the number of benchmarks makes it more difficult to achieve an acceptable level on the Range-of-Knowledge Correspondence criterion.

Table 1
Standards and Depth-of-Knowledge (DOK) Levels, Michigan Alignment Analysis for Mathematics

Assessment	Total number of benchmarks	DOK Level	# of benchmarks by Level	% within standard by Level
2006 (modified)	44	1 2 3	18 108 36	11 66 22
2004	15	1 2 3 4	10 40 24 3	12 51 31 3

No items were coded by reviewers to the generic standard level rather than to specific benchmarks or goals.

Alignment of Curriculum Standards and Assessments

The assessment for Grade 12 was comprised of 117 items. All were 1-point multiple-choice items, and there were no field test items. The 2006 assessment was made up mostly of ACT and WorkKey items, as well as a dozen supplemental items from science assessments.

The results of the analysis for each of the four alignment criteria are summarized in Table 2. More detailed data on each of the criteria are given in the appendix in the first three tables. In Table 2, "YES" indicates that an acceptable level was attained between the assessment and the standard on the criterion. "WEAK" indicates that the criterion was nearly met, within a margin that could simply be due to error in the system. "NO" indicates that the criterion was not met by a noticeable margin—10% over an acceptable level for Depth-of-Knowledge Consistency, 10% over an acceptable level for Range of Knowledge Correspondence, and .1 under an index value of .7 for Balance of Representation. If there were less than two items that corresponded to a standard, a "NO" appears for Categorical Concurrence but "NA" is used under the other criteria because the number of items is insufficient to determine a values for these criteria.

It is understood that the assessment may be supplemented but that items will probably not be removed in order to achieve full alignment. The recommendations made below in order to achieve alignment are thus made in terms of how to supplements the assessment.

Alignment of the Mathematics Merit Assessment with the Michigan 2004 Standards

Overall, the alignment of the Michigan Merit Examination (MME) with the 2004 mathematics standards needs some improvement, although it is better than with the 2006

standards. The alignment shows that too many items addressed only calculation, and too few items addressed content like collecting, analyzing, and inferring from data, number types and properties, and discrete mathematics. The MME included an adequate number of items for each of the six 2004 mathematics standards. The alignment issues between the assessment and standards related more to depth-of-knowledge and range. At least 23 items need to be added in order to bring assessment into good alignment with these standards. We will list how to supplement each standard.

In order to correct the DOK weakness for Standard I, at least two items should be added at a DOK Level 3, and these items can target any benchmarks (Table 2.1). In order to correct the Range and Balance weaknesses for Standard II, at least three items should be added targeting under-targeted benchmarks. To correct the DOK, Range, and Balance weaknesses for Standard III, at least five items should be added targeting untargeted benchmarks within Goals CS31 and CS33, and at a DOK Level of 3. To correct the Range weakness for Standard IV, at least four items should be added targeting untargeted benchmarks. The Balance weakness for Standard V is caused by a vast number of items targeting Benchmark 51.4, and may be very difficult to fix by adding items. At least six items should be added targeting benchmarks within Goal 52. Finally, the DOK and Range weaknesses for Standard VI can be most easily solved by adding three items targeting three of the untargeted benchmarks with DOK Level 2 (61.3, 61.4, 62.1, and 62.3).

Table 2.1
Summary of Acceptable Levels on Alignment Criteria for Mathematics Grade 12 Mathematics Assessment and 2004 Standards

2004	***Alignment Criteria***			
Standards	*Categorical Concurrence*	*Depth-of-Knowledge Consistency*	*Range of Knowledge*	*Balance of Representation*
I - Patterns, Relationships and Functions	YES	WEAK	YES	YES
II - Geometry and Measurement	YES	YES	NO	WEAK
III - Data Analysis and Statistics	YES	NO	NO	WEAK
IV - Number Sense and Numeration	YES	YES	NO	YES
V - Numerical and Algebraic Operations and Analytical...	YES	YES	YES	NO
VI - Probability and Discrete Mathematics	YES	NO	NO	YES

Alignment of the Mathematics Merit Assessment with the Michigan 2006 (modified) Standards

Overall, the alignment of the assessment with the 2006 (modified) mathematics standards is poor. Every standard failed to meet at least one of the alignment criteria (Table 2.2). The Categorical concurrence is low for Standards L3, L4, A3, G2, G3, S1, S2, S3, and S4. As a result, for these standards there are too few items to make a reliable judgment about the other

alignment criteria. However, even the standards that had enough items targeting them displayed weaknesses with respect to the other alignment criteria. Standards L1, L2, and A2 exhibited weaknesses with Range and Balance, and Standards A1 and G1 had Range and DOK deficiencies. The most serious Balance weakness is with respect to Standard L2, where a vast number of items were found to target only the generic Goal L2.1 (general calculation). There was essentially no coverage of non-linear functions, measurement, mathematical reasoning, and bivariate data.

Table 2.2
Summary of Acceptable Levels on Alignment Criteria for Mathematics Grade 12 Mathematics Assessment and 2006 Standards

2006 (modified)	***Alignment Criteria***			
Standards	*Categorical Concurrence*	*Depth-of-Knowledge Consistency*	*Range of Knowledge*	*Balance of Representation*
STANDARD L1: Reasoning about numbers, systems, and quantitative situations	YES	YES	NO	WEAK
STANDARD L2: Calculation, algorithms, and estimation	YES	YES	NO	NO
STANDARD L3: Measurement and precision	NO	NA	NA	NA
STANDARD L4: Mathematical reasoning, logic, and proof	NO	YES	NO	YES
STANDARD A1: Expressions, equations, and inequalities	YES	WEAK	WEAK	YES
STANDARD A2: Function	YES	YES	NO	YES
STANDARD A3: Mathematical modeling	NO	NA	NA	NA
STANDARD G1: Figures and their properties	YES	NO	NO	YES
STANDARD G2: Relationships between figures	NO	NA	NA	NA
STANDARD G3: Transformations of figures in the plane	NO	NA	NA	NA
STANDARD S1: Univariate data – examining distributions	NO	YES	NO	YES
STANDARD S2: Bivariate data – examining relationships	NO	NA	NA	NA
STANDARD S3: Samples, surveys, and experiments	NO	NO	NO	NO
STANDARD S4: Probability models and probability calculation	NO	NO	WEAK	YES

The 2006 standards are quite detailed and rigorous, so it may be difficult to achieve complete alignment with them. Nonetheless, we make the following recommendations with an

aim for full alignment. The assessment must be significantly supplemented, by at least 68 items. Of course, the alignment could be improved if items that now correspond to Standards L1, L2, and G1 could be strategically replaced with those that related to content related to the under served standards. At least 50 of these items measuring these three standards could be replaced to improve the over all alignment.

To correct the Categorical Concurrence problems, at least five items need to be added targeting Standard L3, four items targeting Standard L4, six items targeting Standard A3, five items targeting Standard G2, six items targeting Standard G3, two items targeting Standard S1, six items targeting Standard S2, two items targeting Standard S3, and three items targeting Standard S4. In order to meet the other three criteria, care must be taken that these items be added in such a way that they cover unaddressed benchmarks at an appropriate DOK level, especially for Standard G2, which has many benchmarks.

To correct the Range and Balance weaknesses with the other five standards, at least five items need to be added targeting Standard L1, six items targeting Standard L2, one item targeting Standard A1, 13 items targeting Standard A2, four items targeting Standard G1. These items must address *untargeted* benchmarks within these standards, and they *must be* at appropriate DOK Levels. This last requirement means, for instance, that all the new items targeting G1 must be at a DOK 3, which is difficult to do. These additions will help the Balance as well, but the balance with Standard G2 may still not be completely fixed.

General Comments Made by the Reviewers

After coding the assessment items, the reviewers were asked five questions about which types of content they coded to particular standards and about their opinion of the general alignment between the standards and the assessments. These responses indicate the reflections of reviewers at the time of coding. These reflections complement and inform the more rigorous analysis. The comments should be considered as the opinion of knowledgeable experts who have carefully analyzed each standard and each assessment item. The responses by the mathematics reviewers are presented verbatim below:

2004:
A. For each standard, did the items cover the most important topics you expected by the standard? If not, what topics were not assessed that should have been?

· Yes
· No, Many items were not covered.
· Yes
· Many of the standards had the same benchmarks assessed over and over and over. See the list of benchmarks covered and take the complement of that set.
· No. For example, in geometry, the previous standards emphasized transformations and there were few.

B. For each standard, did the items cover the most important performance (DOK levels) you expected by the standard? If not, what performance was not assessed?

· Yes
· Mostly
· Yes
· NO! Lots and lots of level 1 and some level 2...way, way too much outright look and do, follow the algorithm, apply well known and use principles w/o much thought
· Most were number two, however, there were few number 3s.

C. Were the standards written at an appropriate level of specificity and directed towards expectations appropriate for the grade level?

· No they were not specific enough
· Standards are not specific enough. Too many vague words such as "explore". Most are appropriate for the grade level.
· No
· NO - hence the rewrite and morph into the HSCE
· Yes.

D. What is your general opinion of the alignment between the standards and assessment?

iii. Needs slight improvement (4) : 67%
iv. Needs major improvement (2) : 33%

E. Comments

· It was difficult to match a benchmark with some of the items, examples under the benchmarks would have been helpful.
· Many standards are very vague and hard to correlate. Examples and definitions would be helpful.
· Needs broader coverage of benchmarks/expectations; The science material obscures the mathematics, which was such low level that kids who ought to answer these easily will be baffled by the context. WorkKeys section is fine for Special Education students, and elementary students, but not appropriate for HS. Perhaps the ASVAB or something with a similar flavor would be more appropriate.

2006 (modified):
A. For each standard, did the items cover the most important topics you expected by the standard? If not, what topics were not assessed that should have been?

· There are many standards that are not touched on the tests.
· No, several of the items were not as in-depth as the benchmarks, they never had to justify

or prove.
· In most cases but not all. Many of the standards under statistics and probability were not really addressed.
· In most cases, Yes
· QL - complex numbers not addressed at all; nothing on properties was asked; very little on irrational numbers. Nothing presently dealing with permutations, combinations. The computation part of the ACT test is geared toward middle school GLCE. Very minimal appearance of sequences/series/patterns. Measurement is hit to some extent on the WorkKeys, not on the ACT. Nothing on error. Some mathematical reasoning is present, but at a pretty low level. Algebra - dealt mainly with linear and quadratic functions. Did not really address what will be Michigan's Algebra 2 course. Not much mathematical modeling. Geo - hit somewhat more broadly across the expectations, but not at the levels we in MI are expecting. Saw nothing really on transformations. Stats/Prob - woefully below high school level questions!!! Also, the science in the science part may be challenging, but we've got to get beyond just asking students to read a table, read a graph, compare two simple graphs, etc. That is NOT stats at the HS level. WorkKeys -This test matches mainly with our elementary and some middle school expectations. Only a very few at the end would be considered to be at high school level, and even then, they are all doable by our 7-8 graders (other than converting units from customary to metric and v.v.). This test was mainly outright computation. We move beyond that beginning in 6th grade and deal more with applying algebra, geometry, and stats. In HS we deal more with mathematical modeling ideas.
· It's hard to tell without going back and gathering data from the test or keeping track as we go along.
· Quadratic Functions, Trigonometric functions,

B. For each standard, did the items cover the most important performance (DOK levels) you expected by the standard? If not, what performance was not assessed?

· Yes
· Yes. Except on the Work Keys portion of the test. Most to all of the Work Keys is too low level for high school. Work Keys does not match high school standards or Dok levels.
· Yes
· NO - mainly this test is at Levels 1 & 2. Only a few questions dealt with level 3.
· I believe the DOK levels were adequate for a multiple-choice test. It is difficult to write multiple-choice questions for DOK levels of 3 and 4.
· Yes

C. Were the standards written at an appropriate level of specificity and directed towards expectations appropriate for the grade level?

· Yes
· Yes.
· Yes, much better than the old ones.
· The MI Standards (5/06) are definitely specific and geared toward high school. They are not well reflected in the WorkKeys test, and only moderately reflected in the ACT and

MEAP (the same expectations were often use repeatedly).
· The standards were written at an appropriate grade level, provided all students master Algebra II content and basic statistics.
· Yes

D. What is your general opinion of the alignment between the standards and assessment?

ii. Acceptable Alignment (5) : 71%
iv. Needs major improvement (2) : 29%

E. Comments

· I thought it was easier to match the Expectations with the problems
· New standards are better with the depth, but could still use definitions and examples
· Standards are now clear and focused, and level of performance is fairly clear. The test as presented to us does not cover nearly enough of the expectations, nor cover them at the levels needed. Of course, this is probably irrelevant since the decision to use these tests has already been made. IF MATH IS GOING TO BE ASSESSED IN SCIENCE AND/OR IN SOCIAL STUDIES, GET MATH TEACHERS TO WRITE THOSE QUESTIONS. THE SCIENCE QUESTIONS PRESENTED HERE ARE INAPPROPRIATE FOR ASSESSING ANY REAL COMPREHENSION OF MATHEMATICS.
· The new standards are much easier to work with than the old ones.

Source-of-Challenge

In addition to participating in the debriefing discussion, reviewers were asked to indicate whether there was a Source-of-Challenge issue with any of the items. Only item 12 in the 2004 assessment was determined by two or more reviewers to have Source-of-Challenge issues. Reviewers did not indicate any Source-of-Challenge issues in the 2006 (modified) assessment.

Notes

Some reviewers made other comments about the items, which they recorded as notes. These notes are presented in the seventh table (Tables *grade*.7) in the appendix. These notes in general offered an opinion on the item or gave an explanation of the reviewers' coding. Some of the reviewers' notes indicate that the match between the item and the benchmark is weak. The comments under Source-of-Challenge and Notes should be considered together. Comments by some reviewers under Source-of-Challenge are frequently similar to comments other reviewers put under Notes.

Reliability Among Reviewers

The overall intraclass correlation among the reading reviewers' assignment of DOK levels to items was good. An intraclass correlation value greater than 0.8 generally indicates a high level of agreement among the reviewers. A pairwise comparison is used to determine the degree of reliability of reviewer coding at the benchmark level and at the standard level. The

standard pairwise comparison values are reasonably good, but the benchmark values are low. Some of this is due to the vast number of benchmarks in the 2004 and 2006 standards, 77 and 172 respectively.

Table 3
Intraclass and Pairwise Comparisons, Michigan Alignment Analysis for Mathematics, Grade 12

Assessment	Intraclass Correlation	Pairwise Comparison:	Pairwise: Benchmark	Pairwise: Standard
2006 (modified)	.80	.62	.42	.60
2004	.83	.64	.40	.74

Summary

The alignment between the Michigan Merit mathematics assessment and the 2006 mathematics standards needs significant improvement. The assessment was misaligned with every standard, particularly with respect to the range and breadth of the content coverage. Although it is difficult to achieve full alignment with such a massive set of standards (14) and benchmarks (172), many of the alignment weaknesses are caused by broad content over-emphases and omissions on the assessment. A vast number of items address only general calculation, but there is almost no coverage of non-linear functions, measurement, mathematical reasoning, and bivariate data. At least 68 items need to be added to supplement the assessment to correct these alignment weaknesses, and many of these need to be at a high depth-of-knowledge level.

The alignment between the Michigan Merit Examination for mathematics and the 2004 mathematics standards is better, but still needs some improvement. There are still misalignments with respect to each of the six standards, largely caused by over-emphases and omissions on the assessment. The alignment shows that too many items address only calculation, and too few items address content like collecting, analyzing, and inferring from data, number types and properties, and discrete mathematics. At least 23 items need to be added in order to correct these alignment weaknesses, and some of these should be at a high depth-of-knowledge level.

References

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Appendix A:

Michigan Mathematics Curriculum Standards and Group Consensus DOK Values

High School

Group Consensus
Michigan Math, Grade 12

2006 (modified):

Level	Description	DOK
L1	STANDARD L1: REASONING ABOUT NUMBERS, SYSTEMS, AND QUANTITATIVE SITUATIONS	2
L1.1	L1.1 Number Systems and Number Sense	2
L1.1.1	Know the different properties that hold in different number systems, and recognize that the applicable properties change in the transition from the positive integers, to all integers, to the rational numbers, and to the real numbers.	2
L1.1.2	Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse of a number has the opposite sign.	2
L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.	2
L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1.	2
L1.1.5	Justify numerical relationships (e.g., show that the sum of even integers is even; that every integer can be written as 3m+k, where k is 0, 1, or 2, and m is an integer; or that the sum of the first n positive integers is n (n+1)/2).	3
L1.1.6	Explain the importance of the irrational numbers and in basic right triangle trigonometry; the importance of p because of its role in circle relationships; and the role of e in applications such as continuously compounded interest.	3
L1.2	L1.2 Representations and Relationships	2
L1.2.1	Use mathematical symbols (e.g., interval notation, set notation, summation notation) to represent quantitative relationships and situations.	1
L1.2.2	Interpret representations that reflect absolute value relationships (e.g. l x - a l = b, or a ± b)) in such contexts as error tolerance.	2
L1.2.3	Use vectors to represent quantities that have magnitude and direction; interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors.	2
L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.	2
L1.3	L1.3 Counting and Probabilistic Reasoning	2
L1.3.1	Describe, explain, and apply various counting techniques (e.g., finding the number of different 4-letter passwords; permutations; and combinations); relate combinations to Pascal's triangle; know when to use each technique.	3
L1.3.2	Define and interpret commonly used expressions of probability (e.g., chances of an event, likelihood, odds).	2
L1.3.3	Recognize and explain common probability misconceptions such as "hot streaks" and "being due."	2
L2	STANDARD L2: CALCULATION, ALGORITHMS, AND ESTIMATION	2
L2.1	L2.1 Calculation Using Real and Complex Numbers	2
L2.1.1	Explain the meaning and uses of weighted averages (e.g., GNP, consumer price	2

Level	Description	DOK
	index, grade point average).	
L2.1.2	Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and exponents.	1
L2.1.3	Explain the exponential relationship between a number and its base 10 logarithm, and use it to relate rules of logarithms to those of exponents in expressions involving numbers.	3
L2.1.4	Know that the complex number i is one of two solutions to x2 = -1.	1
L2.1.5	Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers.	2
L2.1.6	Recognize when exact answers aren't always possible or practical; use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).	2
L2.2	L2.2 Sequences and Iteration	2
L2.2.1	Find the nth term in arithmetic, geometric, or other simple sequences.	2
L2.2.2	Compute sums of finite arithmetic and geometric sequences.	2
L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation procedures.	2
L3	STANDARD L3: MEASUREMENT AND PRECISION	2
L3.1	L3.1 Measurement Units, Calculations, and Scales	3
L3.1.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.	2
L3.1.2	Describe and interpret logarithmic relationships in contexts such as the Richter scale, the pH scale, or decibel measurements (e.g., explain why a small change in the scale can represent a large change in intensity); solve applied problems.	3
L3.2	L3.2 Understanding Error	2
L3.2.1	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize ac	3
L3.2.2	Describe and explain round-off error, rounding, and truncating.	2
L3.2.3	Know the meaning of and interpret statistical significance, margin of error, confidence level.	2
L4	STANDARD L4: MATHEMATICAL REASONING, LOGIC, AND PROOF	2
L4.1	Mathematical Reasoning	2
L4.1.1	Distinguish between inductive and deductive reasoning, identifying and providing examples of each.	2
L4.1.2	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic.	1
L4.1.3	Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics; identify and give examples of each.	2
L4.2	L4.2 Language and Laws of Logic	2

Level	Description	DOK
L4.2.1	Know and use the terms of basic logic (e.g., proposition, negation, truth and falsity, implication, if and only if, contrapositive, and converse).	1
L4.2.2	Use the connectives "NOT," "AND," "OR," and "IF…,THEN," in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives.	2
L4.2.3	Use the quantifiers "THERE EXISTS" and "ALL" in mathematical and everyday settings and know how to logically negate statements involving them.	2
L4.2.4	Write the converse, inverse, and contrapositive of an "If…, then…" statement; use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original while the others are not.	2
L4.3	L4.3 Proof	3
L4.3.1	Know the basic structure for the proof of an "If…, then…" statement (assuming the hypothesis and ending with the conclusion) and know that proving the contrapositive is equivalent.	1
L4.3.2	Construct proofs by contradiction; use counterexamples, when appropriate, to disprove a statement.	3
L4.3.3	Explain the difference between a necessary and a sufficient condition within the statement of a theorem; determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfi	3
A1	STANDARD A1: EXPRESSIONS, EQUATIONS, AND INEQUALITIES	2
A1.1	A1.1 Construction, Interpretation, and Manipulation of Expressions (linear, quadratic, polynomial, rational, power, exponential, logarithmic, and trigonometric)	2
A1.1.1	Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables.	2
A1.1.2	Know the definitions and properties of exponents and roots, transition fluently between them, and apply them in algebraic expressions.	2
A1.1.3	Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities (e.g., differences of squares and cubes).	2
A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions (e.g., (x – 1) (1 – x2 + 3); 9x - x3x + 3)	2
A1.1.5	Divide a polynomial by a monomial.	2
A1.1.6	Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms including the inverse relationship between exponents and logarithms.	2
A1.2	A1.2 Solutions of Equations and Inequalities (linear, quadratic, polynomial, rational, power, exponential, logarithmic, and trigonometric)	3
A1.2.1	Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.	2
A1.2.2	Associate a given equation with a function whose zeros are the solutions of the equation.	1
A1.2.3	Solve (and justify steps in the solutions) linear and quadratic equations and inequalities, including systems of up to three linear equations with three unknowns; apply the quadratic formula appropriately.	2

Level	Description	DOK
A1.2.4	Solve absolute value equations and inequalities, (e.g. l x - 3 l = 6), and justify steps in the solution.	3
A1.2.5	Solve polynomial equations and equations involving rational expressions (e.g. solve -2x(x2 + 4x+3) = 0; x - 1x + 6 = 3), and justify steps in the solution.	3
A1.2.6	Solve power equations (e.g., (x + 1)3 = 8) and equations including radical expressions (e.g., 3x - 7 = 7), justify steps in the solution, and explain how extraneous solutions may arise.	3
A1.2.7	Solve exponential and logarithmic equations (e.g., 3(2x) = 7), 2 ln(x + 1) = 4), and justify steps in the solution.	3
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable, and justify steps in the solution.	3
A1.2.9	Know common formulas (e.g., slope, distance between two points, quadratic formula, compound interest, distance = velocity • time), and apply appropriately in contextual situations.	2
A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals (e.g., 2sin x – I = 0 for 0 = x = 2).	2
A2	STANDARD A2: FUNCTION	2
A2.1	A2.1 Definitions, Representations, and Attributes of Functions	2
A2.1.1	Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function; and identify its domain and range.	2
A2.1.2	Read, interpret, and use function notation, and evaluate a function at a value in its domain.	2
A2.1.3	Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations.	2
A2.1.4	Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined (e.g., absolute value and greatest integer functions).	1
A2.1.5	Recognize that functions may be defined recursively, and compute values of and graph simple recursively defined functions (e.g., f(0) = 5, and f(n) = f(n-1) + 2).	2
A2.1.6	Identify the zeros of a function and the intervals where the values of a function are positive or negative, and describe the behavior of a function, as x approaches postive or negative infinity, given the symbolic and graphical representations.	2
A2.1.7	Identify and interpret the key features of a function from its graph or its formula(e), (e.g. slope, intercept(s), asymptote(s), maximum and minimum value(s), symmetry, average rate of change over an interval, and periodicity).	2
A2.2	A2.2 Operations and Transformations	1
A2.2.1	Combine functions by addition, subtraction, multiplication, and division.	1
A2.2.2	Apply given transformations (e.g., vertical or horizontal shifts, stretching or shrinking, or reflections about the x- and y-axes) to basic functions, and represent symbolically.	2
A2.2.3	Recognize whether a function (given in tabular or graphical form) has and inverse and recognize simple inverse pairs (e.g., x3 and x1/3).	1
A2.3	A2.3 Families of Functions (linear, quadratic, polynomial, rational, power, exponential, logarithmic, and trigonometric)	2
A2.3.1	Identify a function as a member of a family of functions based on its symbolic, or	2

Level	Description	DOK
	graphical representation; recognize that different families of functions have different asymptotic behavior at infinity, and describe these behaviors.	
A2.3.2	Describe the tabular pattern associated with constant rate of change (linear); or variable rates of change.	2
A2.3.3	Write the general symbolic forms that characterize each family of functions. (e.g., f(x) = A0ax; f(x) = kxP; f(x) = AsinBx)	1
A2.4	A2.4 Lines and Linear Functions	2
A2.4.1	Write the symbolic forms of linear functions (standard [i.e., Ax + By = C, where B ? 0], point-slope, and slope-intercept) given appropriate information, and convert between forms.	2
A2.4.2	Graph lines (including those of the form x = h and y = k) given appropriate information.	2
A2.4.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.	2
A2.4.4	Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the fact that non-vertical parallel lines have equal slopes, that non-vertical perpendicular lines have slopes that multiply to give -1.	2
A2.5	A2.5 Exponential and Logarithmic Functions	2
A2.5.1	Write the symbolic form and sketch the graph of an exponential function given appropriate information. (e.g., given an initial value of 4 and a rate of growth of 1.5, write f(x) = 4 (1.5)x).	2
A2.5.2	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions (e.g., f(x) = 10 x, f(x) = log x, f(x) = ex, f(x) = ln x); recognize the logarithmic function as the inverse of the exponential.	2
A2.5.3	Apply properties of exponential and logarithmic functions (e.g., ax+y = axa y; log(ab)= log a + log b).	2
A2.5.4	Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and how the base affects the rate of growth or decay.	2
A2.5.5	Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.	3
A2.6	A2.6 Quadratic Functions	2
A2.6.1	Write the symbolic form and sketch the graph of a quadratic function given appropriate information (e.g., vertex, intercepts, etc.).	2
A2.6.2	Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function.	2
A2.6.3	Convert quadratic functions from standard to vertex form by completing the square.	1
A2.6.4	Relate the number of real solutions of a quadratic equation to graph of the associated quadratic function.	2
A2.6.5	Express quadratic functions in vertex form to identify their maxima or minima, and in factored form to identify their zeros.	2
A2.7	A2.7 Power Functions (including roots, cubics, quartics, etc.)	2
A2.7.1	Write the symbolic form and sketch the graph of power functions.	2
A2.7.2	Express direct and inverse relationships as functions (e.g., y = kxn and y = kx-n, n	2

Level	Description	DOK
	> 0) and recognize their characteristics (e.g., in y = x3, note that doubling x results in multiplying y by a factor of 8).	
A2.7.3	Analyze the graphs of power functions, noting reflectional or rotational symmetry.	2
A2.8	A2.8 Polynomial Functions	2
A2.8.1	Write the symbolic form and sketch the graph of simple polynomial functions.	2
A2.8.2	Understand the effects of degree, leading coefficient, and multiplicity of real zeros on the graphs of polynomial functions of degree greater than 2.	2
A2.8.3	Determine the maximum possible number of zeros of a polynomial function, and understand the relationship between the x-intercepts of the graph and the factored form of the function.	2
A2.9	A2.9 Rational Functions	2
A2.9.1	Write the symbolic form and sketch the graph of simple rational functions.	2
A2.9.2	Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain (e.g., 2x + 1x - 1xx2 - 4;).	2
A2.10	A2.10 Trigonometric Functions	2
A2.10.1	Use the unit circle to define sine and cosine; approximate values of sine and cosine (e.g., sin 3, or cos 0.5); use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic.	2
A2.10.2	Use the relationship between degree and radian measures to solve problems.	2
A2.10.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of /6 and /4.	1
A2.10.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima.	2
A2.10.5	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, and midline) and understand the relationship between constants in the formula and the transformed graph.	2
A3	STANDARD A3: MATHEMATICAL MODELING	2
A3.1	A3.1 Models of Real-world Situations Using Families of Functions.	2
A3.1.1	Identify the family of function best suited for modeling a given real-world situation (e.g., quadratic functions for motion of an object under the force of gravity; exponential functions for compound interest; trigonometric functions for periodic phenomen	2
A3.1.2	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. In the example above, substitute the given values P0 = 300 and a = 1.02 to obtain	2
A3.1.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. In the example above, the exact solution is 365.698, but for this problem an appropriate approximation is 365.	2
G1	STANDARD G1: FIGURES AND THEIR PROPERTIES	3
G1.1	G1.1 Lines and Angles; Basic Euclidean and Coordinate Geometry	3
G1.1.1	Solve multi-step problems and construct proofs involving vertical angles, linear pairs of angles supplementary angles, complementary angles, and right angles.	3
G1.1.2	Solve multi-step problems and construct proofs involving corresponding angles,	3

Level	Description	DOK
	alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles.	
G1.1.3	Perform and justify constructions, including midpoint of a line segment and bisector of an angle using straightedge and compass.	3
G1.1.4	Using straightedge and compass, given a line and a point, construct a line through the point that is parallel to the original line; given a line and a point, construct a line through the point that is perpendicular to the original line; justify the steps	3
G.1.1.5	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint.	1
G.1.1.6	Recognize Euclidean Geometry as an axiom system, knowing the key axioms and understanding the meaning of and distinguishing between undefined terms (e.g., point, line, plane), axioms, definitions, and theorems.	2
G1.2	G1.2 Triangles and Their Properties	3
G1.2.1	Prove that the angle sum of a triangle is 180° and that an exterior angle of a triangle is the sum of the two remote interior angles.	3
G1.2.2	Construct and justify arguments and solve multi-step problems involving angle measure, side length, perimeter, and area of all types of triangles.	3
G1.2.3	Know a proof of the Pythagorean Theorem and use the Pythagorean Theorem and its converse to solve multi-step problems.	2
G1.2.4	Prove and use the relationships among the side lengths and the angles of 30º- 60º- 90º triangles and 45º- 45º- 90º triangles.	3
G1.2.5	Solve multi-step problems and construct proofs about the properties of medians, altitudes, and perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle; using a straightedge and compass, construct these lines.	3
G1.3	G1.3 Triangles and Trigonometry	2
G1.3.1	Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides; solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles.	2
G1.3.2	Know and use the Law of Sines and the Law of Cosines and use them to solve problems; find the area of a triangle with sides a and b and included angle using the formula Area = (1/2) a b sin.	2
G1.3.3	Determine the exact values of sine, cosine, and tangent for 0°, 30°, 45°, 60°, and their integer multiples, and apply in various contexts.	2
G1.4	G1.4 Quadrilaterals and Their Properties	3
G1.4.1	Solve multi-step problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids.	3
G1.4.2	Solve multi-step problems and construct proofs involving quadrilaterals (e.g., prove that the diagonals of a rhombus are perpendicular) using Euclidean methods or coordinate geometry.	3
G1.4.3	Describe and justify hierarchical relationships among quadrilaterals, (e.g. every rectangle is a parallelogram).	3
G1.4.4	Prove theorems about the interior and exterior angle sums of a quadrilateral.	3
G1.5	G1.5 Other Polygons and Their Properties	3
G1.5.1	Know and use subdivision or circumscription methods to find areas of polygons	2

Level	Description	DOK
	(e.g., regular octagon, non-regular pentagon).	
G1.5.2	Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums.	3
G1.6	G1.6 Circles and Their Properties	3
G1.6.1	Solve multi-step problems involving circumference and area of circles.	2
G1.6.2	Solve problems and justify arguments about chords (e.g., if a line through the center of a circle is perpendicular to a chord, it bisects the chord) and tangents of circles (e.g., a line tangent to a circle is perpendicular to the radius drawn to the poin	3
G1.6.3	Solve problems and justify arguments about central angles, inscribed angles and triangles in circles.	3
G1.6.4	Know and use properties of arcs and sectors, and find lengths of arcs and areas of sectors.	2
G1.7	G1.7 Conic Sections and Their Properties	2
G.1.7.1	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and radius.	2
G1.7.2	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones.	2
G1.7.3	Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations.	2
G1.8	G1.8 Three- Dimensional Figures	2
G1.8.1	Solve multi-step problems involving surface area and volume of pyramids, prisms, cones, cylinders, hemispheres, and spheres.	2
G1.8.2	Identify symmetries of pyramids, prisms, cones, cylinders, hemispheres, and spheres.	1
G2	STANDARD G2: RELATIONSHIPS BETWEEN FIGURES	2
G2.1	G2.1 Relationships Between Area and Volume Formulas	2
G2.1.1	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid.	2
G2.1.2	Know and demonstrate the relationships between the area formulas of various quadrilaterals (e.g., explain how to find the area of a trapezoid based on the areas of parallelograms and triangles).	2
G2.1.3	Know and use the relationship between the volumes of pyramids and prisms (of equal base and height) and cones and cylinders (of equal base and height).	2
G2.2	G2.2 Relationships Between Two-dimensional and Three-dimensional Representations	2
G2.2.1	Identify or sketch a possible 3-dimensional figure, given 2-dimensional views (e.g., nets, multiple views); create a 2-dimensional representation of a 3-dimensional figure.	2
G2.2.2	Identify or sketch cross-sections of 3-dimensional figures; identify or sketch solids formed by revolving 2-dimensional figures around lines.	2
G2.3	G2.3 Congruence and Similarity	3
G2.3.1	Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria, and for right triangles, the hypotenuse-leg criterion.	3

Level	Description	DOK
G2.3.2	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without use of coordinates.	3
G2.3.3	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity.	3
G2.3.4	Use theorems about similar triangles to solve problems with and without use of coordinates.	2
G2.3.5	Know and apply the theorem stating that the effect of a scale factor k on length, area, and volume is to multiply each by k, k2, and k3, respectively.	2
G3	STANDARD G3: TRANSFORMATIONS OF FIGURES IN THE PLANE	1
G3.1	G3.1 Distance-preserving Transformations: Isometries	1
G3.1.1	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given isometry.	1
G3.1.2	Given two figures that are images of each other under an isometry, find the isometry and describe it completely.	1
G3.1.3	Find the image of a figure under the composition of two or more isometries, and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure.	2
G3.2	G3.2 Shape-preserving Transformations: Dilations and Isometries	2
G3.2.1	Know the definition of dilation, and find the image of a figure under a given dilation.	1
G3.2.2	Given two figures that are images of each other under some dilation, identify the center and magnitude of the dilation.	2
S1	STANDARD S1: UNIVARIATE DATA – EXAMINING DISTRIBUTIONS	2
S1.1	S1.1 Producing and Interpreting Plots	2
S1.1.1	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets	2
S1.1.2	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular atten	2
S1.2	S1.2 Measures of Center and Variation	2
S1.2.1	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context.	2
S1.2.2	Estimate the position of the mean, median, and mode in both symmetrical and skewed distributions, and from a frequency distribution or histogram.	2
S1.2.3	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, and standard deviation.	2
S1.3	S1.3 The Normal Distribution	2
S1.3.1	Explain the concept of distribution and the relationship between summary statistics for a data set and parameters of a distribution.	2
S1.3.2	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, median, and mode.	2

Level	Description	DOK
S1.3.3	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution.	2
S1.3.4	Calculuate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions	2
S2	STANDARD S2: BIVARIATE DATA – EXAMINING RELATIONSHIPS	2
S2.1	S2.1 Scatterplots and Correlation	2
S2.1.1	Construct a scatterplot for a bivariate data set with appropriate labels and scales.	2
S2.1.2	Given a scatterplot, identify patterns, clusters, and outliers; recognize no correlation, weak correlation, and strong correlation.	2
S2.1.3	Estimate and interpret Pearson's correlation coefficient for a scatterplot of a bivariate data set; recognize that correlation measures the strength of linear association.	2
S2.1.4	Differentiate between correlation and causation; know that a strong correlation does not imply a cause-and-effect relationship; recognize the role of lurking variables in correlation.	3
S2.2	S2.2 Linear Regression	2
S2.2.1	For bivariate data which appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line; interpret the slope of the equation for a regression line.	2
S2.2.2	Use the equation of the least squares regression line to make appropriate predictions.	2
S3	STANDARD S3: SAMPLES, SURVEYS, AND EXPERIMENTS	3
S3.1	S3.1 Data Collection and Analysis	3
S3.1.1	Know the meanings of a sample from a population and a census of a population, and distinguish between sample statistics and population parameters.	2
S3.1.2	Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and k	3
S3.1.3	Distinguish between an observational study and an experimental study, and identify, in context, the conclusions that can be drawn from each.	3
S4	STANDARD S4: PROBABILITY MODELS AND PROBABILITY CALCULATION	2
S4.1	S4.1 Probability	2
S4.1.1	Understand and construct sample spaces in simple situations (e.g., tossing two coins, rolling two number cubes and summing the results).	2
S4.1.2	Define mutually exclusive events, independent events, dependent events, compound events, complementary events and conditional probabilities; and use the definitions to compute probabilities.	2
S4.2	S4.2 Application and Representation	3
S4.2.1	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn diagrams, or other counting techniques.	2
S4.2.2	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology, to make informed decisions.	3

2004:

Level	Description	DOK
I	Patterns, Relationships and Functions	3
CS1	Students recognize similarities and generalize patterns, use patterns to create models and make predictions, describe the nature of patterns and relationships, and construct representations of mathematical relationships. (Patterns)	3
CS1.1.	Analyze and generalize mathematical patterns including sequences, series and recursive patterns.	3
CS1.2.	Analyze, interpret and translate among representations of patterns including tables, charts, graphs, matrices and vectors.	3
CS1.3.	Study and employ mathematical models of patterns to make inferences, predictions and decisions.	3
CS1.4.	Explore patterns (graphic, numeric, etc.) characteristic of families of functions; explore structural patterns within systems of objects, operations or relations.	2
CS1.5.	Use patterns and reasoning to solve problems and explore new content.	3
CS2	Students describe the relationships among variables, predict what will happen to one variable as another variable is changed, analyze natural variation and sources of variability, and compare patterns of change. (Variability and Change)	2
CS2.1.	Identify and describe the nature of change and begin to use the more formal language such as rate of change, continuity, limit, distribution and deviation.	2
CS2.2.	Develop a mathematical concept of function and recognize that functions display characteristic patterns of change (e.g., linear, quadratic, exponential).	2
CS2.3.	Expand their understanding of function to include non-linear functions, composition of functions, inverses of functions, and piecewise--and recursively--defined functions.	2
CS2.4.	Represent functions using symbolism such as matrices, vectors and functional representation (f(x)).	2
CS2.5.	Differentiate and analyze classes of functions including linear, power, quadratic, exponential, circular and trigonometric functions, and realize that many different situations can be modeled by a particular type of function.	3
CS2.6.	Increase their use of functions and mathematical models to solve problems in context.	3
II	Geometry and Measurement	2
CS21	Students develop spatial sense, use shape as an analytic and descriptive tool, identify characteristics and define shapes, identify properties and describe relationships among shapes. (Shape and Shape Relationships)	2
CS21.1.	Use shape to identify plane and solid figures, graphs, loci, functions and data distributions.	1
CS21.2.	Determine necessary and sufficient conditions for the existence of a particular shape and apply those conditions to analyze shapes.	2
CSD21.3.	Use transformational, coordinate or synthetic methods to verify (prove)the generalizations they have made about properties of classes of shapes.	3
CS21.4.	Draw and construct shapes in two and three dimensions and analyze and justify the steps of their constructions.	3
CS21.5.	Study transformations of shapes using isometries, size transformations and	2

Level	Description	DOK
	coordinate mappings.	
CS21.6.	Compare and analyze shapes and formally establish the relationships among them, including congruence, similarity, parallelism, perpendicularity and incidence.	3
CS21.7.	Use shape, shape properties and shape relationships to describe the physical world and to solve problems.	2
CS22	Students identify locations of objects, identify location relative to other objects, and describe the effects of transformations (e.g., sliding, flipping, turning, enlarging, reducing) on an object. (Position)	2
CS22.1.	Locate and describe objects in terms of their position, including polar coordinates, three-dimensional Cartesian coordinates, vectors and limits.	1
CS22.2.	Locate and describe objects in terms of their orientation and relative position, including displacement (vectors), phase shift, maxima, minima and inflection points; give precise mathematical descriptions of symmetries.	2
CS22.3.	Give precise mathematical descriptions of transformations and describe the effects of transformations on size, shape, position and orientation.	2
CS22.4.	Describe the locus of a point by a rule or mathematical expression; trace the locus of a moving point.	2
CS22.5.	Use concepts of position, direction and orientation to describe the physical world and to solve problems.	2
CS23	Students compare attributes of two objects, or of one object with a standard (unit), and analyze situations to determine what measurement(s) should be made and to what level of precision. (Measurement)	2
CS23.1.	Select and use appropriate tools; make accurate measurements using both metric and common units, and measure angles in degrees and radians.	1
CS23.2.	Continue to make and apply measurements of length, mass (weight), time, temperature, area, volume, angle; classify objects according to their dimensions.	1
CS23.3.	Estimate measures with a specified degree of accuracy and evaluate measurements for accuracy, precision and tolerance.	2
CS23.4.	Interpret measurements and explain how changes in one measure may affect other measures.	2
CS23.5.	Use proportional reasoning and indirect measurements, including applications of trigonometric ratios, to measure inaccessible distances and to determine derived measures such as density.	2
CS23.6.	Apply measurement to describe the real world and to solve problems.	2
III	Data Analysis and Statistics	3
CS31	Students collect and explore data, organize data into a useful form, and develop skill in representing and reading data displayed in different formats. (Collection, Organization and Presentation of Data)	3
CS31.1.	Collect and explore data through observation, measurement, surveys, sampling techniques and simulations.	2
CS31.2.	Organize data using tables, charts, graphs, spreadsheets and data bases.	2
CS31.3.	Present data using the most appropriate representation and give a rationale for their choice; show how certain representations may skew the data or bias the presentation.	3

Level	Description	DOK
CS31.4.	Identify what data are needed to answer a particular question or solve a given problem and design and implement strategies to obtain, organize and present those data.	4
CS32	Students examine data and describe characteristics of a distribution, relate data to the situation from which they arose, and use data to answer questions convincingly and persuasively. (Description and Interpretation)	3
CS32.1.	Critically read data from tables, charts or graphs and explain the source of the data and what the data represent.	3
CS32.2.	Describe the shape of a data distribution and determine measures of central tendency, variability and correlation.	2
CS32.3.	Use the data and their characteristics to draw and support conclusions.	3
CS32.4.	Critically question the sources of data; the techniques used to collect, organize and present data; the inferences drawn from the data; and the sources of bias and measures taken to eliminate such bias.	3
CS32.5.	Formulate questions and problems and gather and interpret data to answer those questions.	4
CS33	Students draw defensible inferences about unknown outcomes, make predictions, and identify the degree of confidence they have in their predictions. (Inference and Prediction)	3
CS33.1.	Make and test hypotheses.	3
CS33.2.	Design investigations to model and solve problems; also employ confidence intervals and curve fitting in analyzing the data.	3
CS33.3.	Formulate and communicate arguments and conclusions based on data and evaluate their arguments and those of others.	3
CS33.4.	Make predictions and decisions based on data, including interpolations and extrapolations.	3
CS33.5.	Employ investigations, mathematical models, and simulations to make inferences and predictions to answer questions and solve problems.	4
IV	Number Sense and Numeration	2
CS41	Students experience counting and measuring activities to develop intuitive sense about numbers, develop understanding about properties of numbers, understand the need for and existence of different sets of numbers, and investigate properties of special numbers. (Concepts and Properties of Numbers)	2
CS41.1.	Develop an understanding of irrational, real and complex numbers.	2
CS41.2.	Use the (a+bi) and polar forms of complex numbers.	1
CS41.3.	Develop an understanding of the properties of the real and complex number systems and of the properties of special numbers including, pi, i.e., and conjugates.	2
CS41.4.	Apply their understanding of number systems to model, and solve mathematical and applied problems.	2
CS42	Students recognize that numbers are used in different ways such as counting, measuring, ordering and estimating, understand and produce multiple representations of a number, and translate among equivalent representations. (Representation and Uses of Numbers)	2
CS42.1.	Give decimal representations of rational and irrational numbers and coordinate	1

Level	Description	DOK
	and vector representations of complex numbers.	
CS42.2.	Develop an understanding of more complex representations and numbers, including exponential and logarithmic expressions, and select an appropriate representation to facilitate problem solving.	2
CS42.3.	Determine when to use rational approximations and the exact values of numbers such as e, pi and the irrational.	2
CS42.4.	Apply estimation in increasingly complex situations.	2
CS42.5.	Select appropriate representations for numbers, including representations of rational and irrational numbers and coordinate and vector representations of complex numbers, in order to simplify and solve problems.	2
CS43	Students investigate relationships such as equality, inequality, inverses, factors and multiples, and represent and compare very large and very small numbers. (Number Relationships)	1
CS43.1.	Compare and order real numbers and compare rational approximations to exact values.	1
CS43.2.	Express numerical comparisons as ratios and rates.	1
CS43.3.	Extend the relationships of primes, factors, multiples and divisibility in an algebraic setting.	2
CS43.4.	Express number relationships using positive and negative rational exponents, logarithms and radicals.	1
CS43.5.	Apply their understanding of number relationships in solving problems.	2
V	Numerical and Algebraic Operations and Analytical Thinking	2
CS51	Students understand and use various types of operations (e.g., addition, subtraction, multiplication, division) to solve problems. (Operations and their Properties)	2
CS51.1.	Present and explain geometric and symbolic models for operations with real and complex numbers and algebraic expressions.	2
CS51.2.	Compute with real numbers, complex numbers, algebraic expressions, matrices and vectors using technology and, for simple instances, with paper-and-pencil algorithms.	1
CS51.3.	Describe the properties of operations with numbers, algebraic expressions, vectors and matrices, and make generalizations about the properties of given mathematical systems.	3
CS51.4.	Efficiently and accurately apply operations with real numbers, complex numbers, algebraic expressions, matrices and vectors in solving problems.	2
CS52	Students analyze problems to determine an appropriate process for solution, and use algebraic notations to model or represent problems. (Algebraic and Analytic Thinking)	2
CS52.1.	Identify important variables in a context, symbolize them and express their relationships algebraically.	2
CS52.2.	Represent algebraic concepts and relationships with matrices, spreadsheets, diagrams, graphs, tables, physical models, vectors, equations and inequalities; and translate among the various representations.	2
CS52.3.	Solve linear equations and inequalities algebraically and non-linear equations using graphing, symbol-manipulating or spreadsheet technology; and solve linear	2

Level	Description	DOK
	and non-linear systems using appropriate methods.	
CS52.4.	Analyze problems that can be modeled by functions, determine strategies for solving the problems and evaluate the adequacy of the solutions in the context of the problems.	3
CS52.5.	Explore problems that reflect the contemporary uses of mathematics in significant contexts and use the power of technology and algebraic and analytic reasoning to experience the ways mathematics is used in society.	3
VI	Probability and Discrete Mathematics	2
CS61	Students develop an understanding of the notion of certainty and of probability as a measure of the degree of likelihood that can be assigned to a given event based on the knowledge available, and make critical judgments about claims that are made in probabilistic situations. (Probability)	2
CS61.1.	Develop an understanding of randomness and chance variation and describe chance and certainty in the language of probability.	2
CS61.2.	Give a mathematical definition of probability and determine the probabilities of more complex events, and generate and interpret probability distributions.	2
CS61.3.	Analyze events to determine their dependence or independence and calculate probabilities of compound events.	2
CS61.4.	Use sampling and simulations to determine empirical probabilities and, when appropriate, compare them to the corresponding theoretical probabilities; understand and apply the law of large numbers.	2
CS61.5.	Conduct probability experiments and simulations, to model and solve problems, including compound events.	3
CS62	Students investigate practical situations such as scheduling, routing, sequencing, networking, organizing and classifying, and analyze ideas like recurrence relations, induction, iteration, and algorithm design. (Discrete Mathematics)	3
CS62.1.	Derive and use formulas for calculating permutations and combinations.	2
CS62.2.	Use sets and set relationships to represent algebraic and geometric concepts.	2
CS62.3.	Use vertex-edge graphs to solve network problems such as finding circuits, critical paths, minimum spanning trees and adjacency matrices.	2
CS62.4.	Analyze and use discrete ideas, such as induction, iteration and recurrence relations.	3
CS62.5.	Describe and analyze efficient algorithms to accomplish a task or solve a problem in a variety of contexts, including practical, mathematical and computer-related situations.	3
CS62.6.	Use discrete mathematics concepts as described above to model situations and solve problems; and look for whether or not there is a solution (existence problems), determine how many solutions there are (counting problems) and decide upon a best solution (optimization problems).	3

Appendix B:
Tables

Michigan Mathematics Curriculum Standards and Assessments

High School

Brief Explanation of Data in the Alignment Tables by Column

Tables *grade*.1

Standards #	Number of standards plus one for a generic standard for each standard.
Standards #	Average number of standards for reviewers. If the number is greater than the actual number in the standard, then at least one reviewer coded an item for the standard/standard but did not find any standard in the standard that corresponded to the item.
Level	The Depth-of-Knowledge level coded by the reviewers for the standards for each standard.
# of standards by Level	The number of standards coded at each level
% w/in std by Level	The percent of standards coded at each level
Hits Mean & SD	Mean and standard deviation number of items reviewers coded as corresponding to standard. The total is the total number of coded hits.
Cat. Conc. Accept.	"Yes" indicates that the standard met the acceptable level for criterion. "Yes" if mean is six or more. "Weak" if mean is five to six. "No" if mean is less than five.

Tables *grade*.2

	First five columns repeat columns from Table 1.
Level of Item w.r.t. Stand	Mean percent and standard deviation of items coded as "under" the Depth-of-Knowledge level of the corresponding standard, as "at" (the same) the Depth-of-Knowledge level of the corresponding standard, and as "above" the Depth-of-Knowledge level of the corresponding standard.
Depth-of-Know. Consistency Accept.	"Yes" indicates that 50% or more of the items were rated as "at" or "above" the Depth-of-Knowledge level of the corresponding standards. "Weak" indicates that 40% to 50% of the items were rated as "at" or "above" the Depth-of-Knowledge level of the corresponding standards. "No" indicates that less than 40% items were rated as "at" or "above" the Depth-of-Knowledge level of the corresponding standards.

Tables *grade*.3

First five columns repeat columns from Table 1 and 2.

Range of Standards

Standards Hit — Average number and standard deviation of the standards hit coded by reviewers.

% of Total — Average percent and standard deviation of the total standards that had at least one item coded.

Range of Know.

Accept. — "Yes" indicates that 50% or more of the standards had at least one coded standard.
"Weak" indicates that 40% to 50% of the standards had at least one coded standard.
"No" indicates that 40% or less of the standards had at least one coded standard.

Balance Index

% Hits in Std/Ttl Hits — Average and standard deviation of the percent of the items hit for a standard of total number of hits (see total under the Hits column).

Index — Average and standard deviation of the Balance Index.

Note: BALANCE INDEX $1 - (\sum_{k=1} \left| 1/(O) - I_{(k)} /(H) \right|)/2$

Where O = Total number of standards hit for the standard
$I_{(k)}$ = Number of items hit corresponding to standard (k)
H = Total number of items hit for the standard

Bal. of Rep Accept. — "Yes" indicates that the Balance Index was .7 or above (items evenly distributed among standards).
"Weak" indicates that the Balance Index was .6 to .7 (a high percentage of items coded as corresponding to two or three standards).
"No" indicates that the Balance Index was .6 or less (a high percentage of items coded as corresponding to one standard.)

Tables *grade*.4

Summary if standard met the acceptable level for the four criteria by each standard.

Tables *grade*.5

Comments made by reviewers on items identified as having a Source-of-Challenge issue by item number.

Tables *grade*.6

The DOK value for each assessment item given by each reviewer. The intraclass correlation for the group of reviewers is given on the last row.

Tables *grade*.7

All notes made by reviewers on items by item number.

Tables *grade*.8

The DOK level and standard code assigned by each reviewer for each item.

Tables *grade*.9

This list for each item all of the standards coded by the thirty-two reviewers as corresponding to the item. Repeat of a standard indicates the number of reviewers who coded that standard as corresponding to the item.

Tables *grade*.10

This lists for each standard all of the items coded by the seven reviewers as corresponding to the standard. Repeat of an item indicates the number of reviewers who coded the item as corresponding to the standard.

Tables *grade*.12

This table summarizes the number of reviewers who coded an item as corresponding to a standard. It contains the same information as in Table 10.

Tables *grade*.13

This table can be used to compare the DOK level of a standard to the average DOK level of the items reviewers assigned to the standard. This table is helpful to identify items with a lower DOK level that should be replaced by an item with a higher DOK level to improve the Depth-of-Knowledge Consistency.

Table 12.1
Categorical Concurrence Between Standards and Assessment as Rated by Six Reviewers
Michigan Mathematics to 2004 Standards Study 2006
Number of Assessment Items - 117

Standards			Level by Objective			Hits		Cat. Concurr.
Title	Goals #	Objs #	Level	# of objs by Level	% w/in std by Level	Mean	S.D.	
I - Patterns, Relationships and Functions	2	11.67	2 3	5 6	45 54	13	2.77	YES
II - Geometry and Measurement	3	18.33	1 2 3	4 11 3	22 61 16	22	1.91	YES
III - Data Analysis and Statistics	3	14.17	2 3 4	3 8 3	21 57 21	22.67	2.49	YES
IV - Number Sense and Numeration	3	14.67	1 2	5 9	35 64	7	1.15	YES
V - Numerical and Algebraic Operations and Analytical...	2	9.33	1 2 3	1 5 3	11 55 33	52.17	4.81	YES
VI - Probability and Discrete Mathematics	2	11.83	2 3	7 4	63 36	5.67	0.47	NO
Total	15	80.00	1 2 3 4	10 40 24 3	12 51 31 3	122.5	3.59	

Table 12.2
Depth-of-Knowledge Consistency Between Standards and Assessment as Rated by Six Reviewers
Michigan Mathematics to 2004 Standards Study 2006
Number of Assessment Items - 117

Standards			Hits		Level of Item w.r.t. Standard						DOK Consistency
					% Under		% At		% Above		
Title	Goals #	Objs #	M	S.D.	M	S.D.	M	S.D.	M	S.D.	
I - Patterns, Relationships and Functions	2	11.67	13	2.77	59	44	39	43	2	8	WEAK
II - Geometry and Measurement	3	18.33	22	1.91	29	42	48	45	23	37	YES
III - Data Analysis and Statistics	3	14.17	22.67	2.49	77	38	18	32	6	21	NO
IV - Number Sense and Numeration	3	14.67	7	1.15	28	40	49	44	24	40	YES
V - Numerical and Algebraic Operations and Analytical...	2	9.33	52.17	4.81	47	38	48	35	5	12	YES
VI - Probability and Discrete Mathematics	2	11.83	5.67	0.47	62	38	38	38	0	0	NO
Total	15	80.00	122.5	3.59	48	44	42	42	10	27	

Table 12.3
Range-of-Knowledge Correspondence and Balance of Representation Between Standards and Assessment as Rated by Six Reviewers
Michigan Mathematics to 2004 Standards Study 2006
Number of Assessment Items - 117

Standards			Hits		Range of Objectives				Rng. of Know.	Balance Index				Bal. of Represent.
					# Objs Hit		% of Total			% Hits in Std/Ttl Hits		Index		
Title	Goals #	Objs #	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
I - Patterns, Relationships and Functions	2	11.67	13	2.77	6.67	0.75	57	6	YES	11	2	0.75	0.05	YES
II - Geometry and Measurement	3	18.33	22	1.91	7	1.83	38	9	NO	18	1	0.64	0.05	WEAK
III - Data Analysis and Statistics	3	14.17	22.67	2.49	3.67	1.37	26	9	NO	18	2	0.66	0.10	WEAK
IV - Number Sense and Numeration	3	14.67	7	1.15	4.17	1.07	28	7	NO	6	1	0.83	0.12	YES
V - Numerical and Algebraic Operations and Analytical...	2	9.33	52.17	4.81	6.83	1.07	74	12	YES	43	3	0.47	0.07	NO
VI - Probability and Discrete Mathematics	2	11.83	5.67	0.47	3.17	0.69	27	5	NO	5	0	0.87	0.06	YES
Total	15	80.00	122.5	3.59	5.25	2.01	42	20		17	13	0.70	0.16	

Table 12.4
Summary of Attainment of Acceptable Alignment Level on Four Content Focus Criteria as Rated by Six Reviewers
Michigan Mathematics to 2004 Standards Study 2006
Number of Assessment Items - 117

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range of Knowledge	Balance of Representation
I - Patterns, Relationships and Functions	YES	WEAK	YES	YES
II - Geometry and Measurement	YES	YES	NO	WEAK
III - Data Analysis and Statistics	YES	NO	NO	WEAK
IV - Number Sense and Numeration	YES	YES	NO	YES
V - Numerical and Algebraic Operations and Analytical...	YES	YES	YES	NO
VI - Probability and Discrete Mathematics	NO	NO	NO	YES

Table 12.5
Source-of-Challenge Issues by Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item Number	Comments by Reviewer
12	The marks used on the angle in question may indicate to some students that the angle is congruent to the 35 degree angle in the diagram. My textbooks use that notation to indicate congruence. Also, all the textbooks I have used, reference/name a line with only two points, never three.
12	Writing of ABC is parallel to DEF is not use by our school district and I'm not sure how many in our state use it???????
29	This question is not clear as to whether you want the Empirical probability from the chart or the theoretical probability given that each roll of the die is an independent event. A student could answer either way. If you give the chart that implies that you should use it.
31	NOTE: Students could also get B(3) an a correct answer if they use the point (0,3) or (3,0) thus getting the correct answer in the wrong way. Why not just ask where they intersect and be done with it (w/o the graph)?
46	Is this overly tied to students understanding the idea of displacement (from science), which many may not have seen? Or is it the case that since they're asked only for the volume of the rock, knowledge of displacement adds no value here?
50	The maximum mean is 84.4, which is very close to 85. Students might choose 85 figuring it was close enough. Perhaps change the 86 choice to 86.
53	With the answer choices you've given, the only set that actually forms a triangle anyway is D (4,5,8) - no need to apply the information in the problem. Come up with a couple other foils that actually make triangles but fail the other tests. Also, what is a triangle with "positive" area??? In high school we don't deal with any other kind.
70	Kids are going to read all this science stuff and get bogged down - the science part is way more difficult than the math part as presented here.
74	students will need to realize that for "today's date" the depth of ice will be 0 m. It is strange for them to look for current data on the far left side of a graph.
76	Please don't use "you". also, with an amount of $380, the customer will NOT get 12 equal monthly payments...the exact amount is $31.66666... so, technically there is NO answer to this question.
77	Please don't use "you", "your"
78	Don't use "you". Also, no one "distributes" pigs...herding pigs is a lot like herding cats (having done that). Perhaps "separate evenly".
79	"you" again
80	"you" again.
81	"you" again
82	"you"...please change. Also, the average turns out to be 18.8 orders. How does one take 0.8 orders (does that mean they have waited on 4 of 5 people at the table?)
83	"you"...
84	"you"...

Table 12.5
Source-of-Challenge Issues by Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item Number	Comments by Reviewer
85	"you"...
86	"you"...
87	"you"...; also, the term "average frequency" is used twice, but referring to two different things; this will confuse students.
88	"you"...
89	"you"...
90	"you"...
91	"you"...
92	"you..."
93	"you..." ALSO, using the dat provided, the customer could get "4.8" steaks. So, should we round this up to 5 (since we're estimating) or should truncate this to 4 since she is quite likely to get 4 steaks. 4 and 5 are both choices,and students would be correct to choose either one.
94	"you"...
95	"you"
96	"you"...also, it is highly unlikely that a van would get such different MPG from one day to the next. If it did, it should be serviced.
97	"you"
98	"you"...
99	"you"...
100	"you"...
101	"you"...
102	"YOU"...
103	"you"....
104	"you"...
105	"you"...
109	BTW, there is only one graph opening downward, and the first thing students see in the equation is the "-...",instantly saying "opens down"...
117	should say "these sets of polygons", not "the" set of polygons.

Table 12.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
Michigan Mathematics to 2004 Standards Study 2006

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6
1	1	1	1	2	1	1
2	1	2	2	2	1	2
3	2	2	2	2	1	2
4	2	1	1	2	1	1
5	1	2	2	1	2	1
6	2	2	2	2	2	2
7	2	2	2	2	1	2
8	2	2	3	2	1	2
9	2	2	2	3	1	1
10	1	1	1	1	1	1
11	1	2	2	2	1	2
12	2	1	2	1	2	2
13	1	1	2	1	1	1
14	1	1	1	1	1	1
15	1	1	1	1	1	1
16	1	2	2	2	1	2
17	2	1	1	2	1	1
18	2	2	2	3	1	2
19	1	1	2	1	1	1
20	1	1	1	2	1	1
21	1	1	3	1	1	2
22	1	1	1	1	1	1
23	1	1	2	1	1	2
24	1	1	1	1	1	1
25	3	3	3	3	3	2
26	1	2	2	2	2	2
27	2	3	3	3	2	2
28	1	1	1	1	1	1
29	1	2	2	2	1	2
30	1	1	2	2	1	2
31	1	2	1	3	1	1
32	1	1	2	2	1	1
33	1	2	2	2	1	2
34	2	3	3	3	2	2
35	1	2	2	2	2	2
36	2	2	2	1	1	2
37	2	2	1	2	1	2
38	1	1	1	1	1	1
39	2	2	2	2	2	2
40	1	2	2	2	1	1

Table 12.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
Michigan Mathematics to 2004 Standards Study 2006

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6
41	2	2	2	2	2	2
42	1	3	2	3	2	2
43	2	1	1	1	1	1
44	1	2	1	2	2	1
45	2	2	2	2	1	1
46	2	2	2	2	2	2
47	2	1	2	2	1	2
48	3	2	3	2	2	3
49	1	1	1	1	1	1
50	3	2	2	2	2	2
51	2	2	2	2	2	1
52	2	2	2	2	2	2
53	2	2	1	2	2	1
54	2	2	2	3	2	2
55	2	2	2	1	3	2
56	2	2	2	2	2	1
57	2	2	2	3	3	2
58	2	2	1	2	2	1
59	1	1	2	2	1	1
60	2	3	2	2	3	3
61	2	2	2	2	2	2
62	1	1	2	1	1	2
63	1	1	2	1	1	2
64	2	2	2	1	1	2
65	1	1	2	2	1	2
66	2	2	1	1	1	1
67	2	2	3	3	1	3
68	1	1	3	1	1	3
69	2	3	3	3	2	3
70	1	3	3	3	2	3
71	2	1	2	1	1	2
72	1	1	1	1	1	1
73	2	2	3	1	1	1
74	1	2	2	2	2	1
75	2	2	2	2	1	2
76	1	1	1	1	1	1
77	1	1	1	1	1	1
78	1	1	1	1	1	1
79	1	1	1	1	1	1
80	1	1	1	1	1	1

Table 12.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
Michigan Mathematics to 2004 Standards Study 2006

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6
81	1	1	1	1	1	1
82	2	1	1	1	1	1
83	2	1	1	1	1	1
84	1	1	1	1	1	1
85	1	1	1	1	1	1
86	1	1	1	1	1	1
87	2	1	1	1	1	2
88	2	1	2	1	1	1
89	2	1	1	1	1	2
90	2	1	1	1	1	1
91	1	1	1	1	1	1
92	2	1	2	1	2	1
93	1	1	2	1	1	2
94	2	1	1	1	2	2
95	2	2	2	1	2	2
96	2	2	2	2	2	2
97	2	2	2	2	2	2
98	2	2	1	2	2	2
99	2	2	2	2	2	2
100	1	2	1	2	2	1
101	2	2	2	1	2	1
102	2	2	2	2	2	2
103	2	2	2	2	2	2
104	2	2	2	2	2	2
105	1	2	2	2	2	1
106	1	1	3	1	1	1
107	2	2	2	2	1	2
108	1	1	1	1	1	1
109	1	2	1	1	1	1
110	2	1	1	1	1	1
111	2	2	1	2	1	2
112	2	1	2	1	1	1
113	2	2	2	2	3	2
114	2	2	3	2	3	2
115	2	2	1	1	2	2
116	2	2	2	2	2	2
117	1	2	1	2	1	1

Intraclass Correlation: 0.8301
Pairwise Comparison: 0.6422

Table 12.7
Notes by Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item Number	Comments by Reviewer
2	Fits standard but does not fit a single benchmark.
5	It would good to have as a foil $10800 so that we can differentiate between students who understand the compounding effect of percentage growth vs. the "simple interest" approach.
6	If the intent of the problem is to see if the student can divide up the figure to obtain the area, what is the point of not giving enough information for the student to solve? What are you testing with this question?
6	Is the point of this question to see if students realize they don't have enough information to solve? If so, then I don't know that CS23.6 is appropriate, but we don't have anything in the MIS&B about dealing with irrelevant and/or missing information; the new HSCE do.
10	the "sequence" here is just a context for some basic evaluation of an algebraic expression
27	CS2 nails it with the first part of the standard (up to the first comma). Unfortunately that isn't repeated so clearly in any benchmarks.
34	Although, really CS2 up to the second comma, is the best fit.
54	Nice question.
55	Also ties nicely to CS43.5
56	Nice problem.
57	this problem is really a combo of these two expectations (23.5 and 43.5)
61	Too simplistic for a high school level test.
61	A section such as this should be closer to the beginning of the test.
62	Too simplistic for a high school level test.
63	Too simplistic for a high school level test.
64	Too simplistic for a high school level test.
65	Too simplistic for a high school level test.
66	Too simplistic for a high school level test.
67	Too simplistic for a high school level test.
68	Way, way too many questions on just picking data off graphs - this is NOT high school (nor middle school) statistics in Michigan!!
69	Can be done by elimination of the options given.
70	This is a more realistic high school level question.
71	Way, way to easy for high school stats.
72	Way, way to easy for high school stats.
73	Way, way to easy for high school stats.
75	Way, way too easy for HS math. Also, your y-axis doesn't begin at zero with a zig-zag to indicate omitted values under 200. We would consider these graphs all to be deceptive.
76	This is a 4th or 5th grade level question under the GLCE
77	This could be solved by Michigan 3rd graders and their knowledge of money and fractions...
78	Done in grade 4 under the GLCE
79	Done in elementary school by 3rd/4th grade.
80	My 3rd grader last year did problems like this under the MI GLCE...

Table 12.7
Notes by Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item Number	Comments by Reviewer
81	Adding four 3-digit numbers...sounds like 3rd and 4th grade GLCE...
82	This is done in grade 5 GLCE.
83	Done in 5th grade GLCE...
84	Done in 5th grade GLCE (finding a percent of a number).
85	Done in 5th grade GLCE (mixed number times whole number...)
86	Done in 3rd grade GLCE...
87	Done in 5th grade GLCE -
88	Done in 4th grade GLCE (daughter just did an assignment like this question)
89	Unit rates are in the 6th grade GLCE, although teachers often include them in grade 5.
90	Done in 5th grade GLCE...
91	turning 2/8 into a percent is done in 4th, 5th grade GLCE.
92	Done in 5th, 6th grade.
94	We generally don't do unit conversions in K-8 (english/metric).
95	Now on this one, certainly the students must round up to 5...
97	This problem is suitable for 6th grade, as in the GLCE students make such unit conversions and also study area.
98	Unit conversions between systems not done in middle school; rest of math is at 6th grade level.
99	A nice, realistic, multi-step problem. The computation is actually at a 6th grade level.
100	OK question, but still at 6th grade level.
101	Typical of 6th grade percent problems under GLCE
102	typical of 6th grade problems
103	Nice problem - could be done by 6th graders; much easier with unit analysis which is part of 8th grade/hs.
104	could be Level 1 by starting with 10.5 ft, taking off 6 feet for the paintings, and splitting the difference by 3... 6th grade or lower problem.
105	done in 8th grade GLCE
106	This type of graph and the pattern presented would be fair game for 4th or 5th grade...
107	This problem is considerably easier than the "logic problem" that has appeared on the HS MEAP tests for several years. This is at the elementary school level.
108	Done in 6th grade GLCE
110	slope can be counted right off the graph; done in 7th grade GLCE
111	Can be done by straight computation without any understanding really of sequences...we do problems like this in grade 6, 7.
112	Done in 6th grade GLCE.
113	Aha! Finally a high school level problem; deals with piecewise defined functions :-)
114	Nice HS problem; will fit well with HSCE.

Table 12.7
Notes by Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item Number	Comments by Reviewer
114	Use a different character if h(x) is the composition of f(x) and g(x). If it is multiplication write it as f(x)g(x).
115	We do this in 7th grade...
116	Pretty basic set question...

Table 12.8
DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	S1Obj3	S2Obj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5
1	1	CS51.1.		1	CS41.4.		1	CS41.4.		2	CS41.4.			1	CS51.2.		1	CS41.1.	
2	1	CS52.2.	CS32.2.	2	CS52.2.		2	CS52		2	CS2.2.			1	CS43.5.		2	CS52.2.	
3	2	CS23.5.		2	CS51.4.		2	CS21.7.		2	CS23.5.			1	CS23.5.		2	CS21.6.	
4	2	CS51.4.		1	CS51.2.		1	CS51.4.		2	CS51.2.			1	CS51.4.		1	CS51.2.	
5	1	CS51.4.		2	CS51.4.		2	CS51.4.		1	CS51.4.	CS2.6.		2	CS51.4.		1	CS51.4.	
6	2	CS23.2.	CS33.3.	2	CS23.2.		2	CS23.6.		2	CS51.4.			2	CS23.6.		2	CS21.6.	
7	2	CS51.4.		2	CS52.1.	CS51.3.	2	CS51.4.		2	CS52.3.			1	CS51.2.		2	CS52.2.	
8	2	CS51.2.	CS32.1.	2	CS32.3.		3	CS41.4.	CS23.6.	2	CS32.3.			1	CS33.4.		2	CS41.4.	
9	2	CS51.2.		2	CS51.4.		2	CS41.4.		3	CS52.3.			1	CS51.4.		1	CS51.1.	
10	1	CS51.2.		1	CS1		1	CS51.4.		1	CS51.2.	CS1.4.	CS1.5.	1	CS1.5.		1	CS1	
11	1	CS52.1.		2	CS52.1.		2	CS52.1.		2	CS52.1.			1	CS52.1.		2	CS52.1.	
12	2	CS21.6.		1	CS21.6.		2	CS21.7.		1	CS21.6.			2	CS21.7.		2	CS21.6.	
13	1	CS23.2.		1	CS51.4.		2	CS21.7.		1	CS23.1.			1	CS23.2.		1	CS51.4.	
14	1	CS51.4.		1	CS51.2.		1	CS51.4.		1	CS43.4.	CS52.1.		1	CS51.2.		1	CS51.4.	
15	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
16	1	CS52.2.		2	CS2.4.		2	CS52.2.		2	CS2.1.			1	CS1.4.		2	CS2.1.	CS52.2.
17	2	CS51.4.		1	CS51.2.		1	CS2.1.		2	CS52.4.			1	CS22.1.		1	CS22	
18	2	CS23.5.		2	CS23.5.		2	CS23.5.		3	CS21.6.			1	CS23.5.		2	CS21.6.	
19	1	CS43.4.		1	CS43.1.		2	CS43.1.		1	CS51.2.			1	CS42.2.		1	CS42.2.	
20	1	CS52.1.		1	CS51.1.		1	CS52.1.		2	CS52.2.			1	CS52.1.		1	CS52.2.	
21	1	CS2.1.		1	CS32.3.		3	CS2.1.		1	CS2.1.			1	CS2.1.		2	CS32.1.	CS2.1.
22	1	CS51.4.		1	CS51.2.		1	CS2.6.		1	CS52.3.			1	CS51.4.		1	CS2.2.	
23	1	CS51.4.		1	CS51.4.		2	CS51.4.		1	CS42.2.			1	CS43.3.		2	CS43.3.	
24	1	CS52.3.		1	CS51.4.		1	CS23.6.		1	CS23.1.			1	CS51.2.		1	CS2.1.	
25	3	CS23.5.		3	CS23.5.		3	CS23.5.		3	CS23.5.			3	CS23.5.		2	CS23.5.	
26	1	CS23.5.		2	CS23.5.		2	CS23.5.		2	CS23.5.			2	CS23.5.		2	CS23.5.	
27	2	CS43.2.		3	CS52.4.		3	CS52		3	CS23.4.			2	CS2.6.		2	CS2	
28	1	CS52		1	CS51.4.		1	CS51.4.		1	CS52.3.			1	CS52.3.		1	CS51.4.	
29	1	CS61		2	CS61.2.		2	CS61.3.		2	CS32.3.			1	CS61.1.		2	CS61.2.	
30	1	CS52.1.		1	CS52.1.		2	CS52.1.		2	CS52.2.			1	CS52.1.		2	CS52.4.	
31	1	CS52.2.		2	CS32.3.		1	CS52.3.		3	CS52.4.			1	CS22.1.		1	CS52.3.	
32	1	CS32.1.	CS51.2.	1	CS32.3.	CS51.2.	2	CS31.4.		2	CS31.4.			1	CS32.3.		1	CS32.3.	
33	1	CS51.2.		2	CS32.3.	CS51.2.	2	CS31.4.	CS51.4.	2	CS32			1	CS43.5.		2	CS32.3.	
34	2	CS52.2.		3	CS32.3.		3	CS33.4.		3	CS32.3.	CS32.2.		2	CS32.3.		2	CS32.1.	
35	1	CS52.2.		2	CS52.1.		2	CS21.6.		2	CS21.6.			2	CS21.7.		2	CS23.4.	

Table 12.8
DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	S1Obj3	S2Obj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5
36	2	CS52.2.		2	CS52.3.		2	CS52.3.		1	CS52.3.			1	CS52.3.		2	CS52.3.	
37	2	CS23.2.		2	CS23.2.		1	CS23.6.		2	CS21.2.	CS23.3.		1	CS51.4.		2	CS21.7.	
38	1	CS42.1.		1	CS51.2.		1	CS42		1	CS43			1	CS43.5.		1	CS41.1.	
39	2	CS21.7.		2	CS43.5.		2	CS21.7.		2	CS23.1.			2	CS21.7.		2	CS23.4.	
40	1	CS51.4.		2	CS51.2.		2	CS21.7.		2	CS51.4.			1	CS51.4.		1	CS51.4.	
41	2	CS51.4.		2	CS51.2.		2	CS52.3.		2	CS42			2	CS52.3.		2	CS52.3.	
42	1	CS51.4.		3	CS42.2.		2	CS51.4.		3	CS51.3.			2	CS43.3.		2	CS43.3.	
43	2	CS52.2.		1	CS2.1.		1	CS2.1.		1	CS2.1.			1	CS51.4.		1	CS51.4.	
44	1	CS2.3.		2	CS51.4.		1	CS2.6.		2	CS52.4.			2	CS2.3.		1	CS2.3.	
45	2	CS22.1.		2	CS2.2.		2	CS2.1.		2	CS2.2.			1	CS22.5.		1	CS51.4.	
46	2	CS23.2.		2	CS23.2.		2	CS23.6.		2	CS23.5.			2	CS23.6.		2	CS23.2.	
47	2	CS21		1	CS21.7.		2	CS21.7.		2	CS21.7.	CS23.5.		1	CS51.4.		2	CS21.1.	
48	3	CS23.6.		2	CS23.2.		3	CS23.6.		2	CS21.2.			2	CS43.5.		3	CS23.2.	
49	1	CS21.6.		1	CS2.1.		1	CS21.7.		1	CS21.6.			1	CS21.6.		1	CS21.6.	
50	3	CS1.2.	CS32.2.	2	CS31.4.		2	CS32.1.	CS32.2.	2	CS31.4.			2	CS22.3.		2	CS32.3.	
51	2	CS51.4.		2	CS43.5.		2	CS41.4.		2	CS43			2	CS52.3.		1	CS51.2.	
52	2	CS23.2.		2	CS23.2.		2	CS21.7.		2	CS23.2.			2	CS21.7.		2	CS23.5.	
53	2	CS21.2.		2	CS23.5.		1	CS21.2.		2	CS23.5.			2	CS21.7.		1	CS21.2.	
54	2	CS51.3.		2	CS41.4.		2	CS41.4.		3	CS52.2.			2	CS51.3.		2	CS41.4.	
55	2	CS23.5.		2	CS23.5.		2	CS23.5.		1	CS2.5.			3	CS23.5.		2	CS23.5.	
56	2	CS52.3.		2	CS51.3.		2	CS51.4.		2	CS51.3.			2	CS43.3.		1	CS43.3.	
57	2	CS23.5.		2	CS23.5.		2	CS23.5.		3	CS2.5.			3	CS23.5.	CS43.5.	2	CS23.5.	
58	2	CS2.3.		2	CS2.6.		1	CS51.4.		2	CS2.3.			2	CS2.3.		1	CS1.3.	
59	1	CS23.5.		1	CS23.5.		2	CS23.5.		2	CS2.5.			1	CS23.5.		1	CS2.5.	
60	2	CS43	CS2.1.	3	CS32.3.		2	CS1.2.		2	CS2.1.			3	CS1.3.		3	CS32.3.	
61	2	CS43.1.	CS32.1.	2	CS31.4.		2	CS32.3.		2	CS32.1.			2	CS32.3.		2	CS32.3.	
62	1	CS32.1.		1	CS32.3.		2	CS32.3.		1	CS32.1.			1	CS32.3.		2	CS32.3.	
63	1	CS32.1.		1	CS32.3.		2	CS32.3.		1	CS32.1.			1	CS32.3.		2	CS32.3.	
64	2	CS32.1.		2	CS31.4.		2	CS32.3.		1	CS32.1.			1	CS51.2.		2	CS32.3.	
65	1	CS32.1.		1	CS32.3.		2	CS32.3.		2	CS32.3.			1	CS32.3.		2	CS32.3.	
66	2	CS32.1.		2	CS32.3.		1	CS32.3.		1	CS32.3.			1	CS32.3.		1	CS33.4.	
67	2	CS32.1.	CS42.4.	2	CS32.3.		3	CS33.4.		3	CS32.3.			1	CS32.3.		3	CS33.4.	
68	1	CS32.1.		1	CS32.3.		3	CS33.4.		1	CS32.1.			1	CS32.3.		3	CS33.4.	
69	2	CS32.1.		3	CS31.4.		3	CS33.4.		3	CS32.1.			2	CS33.4.		3	CS33.4.	
70	1	CS32.1.		3	CS31.4.		3	CS33.4.		3	CS32.3.			2	CS33.4.		3	CS33.4.	

Table 12.8
DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	S1Obj3	S2Obj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5
71	2	CS32.1.		1	CS32.3.		2	CS32.1.		1	CS32.3.			1	CS32.3.		2	CS32.3.	
72	1	CS32.1.		1	CS32.3.		1	CS32.1.		1	CS32.3.			1	CS32.3.		1	CS32.3.	
73	2	CS32.1.		2	CS31.4.		3	CS33.4.		1	CS32.3.			1	CS32.3.		1	CS32.3.	
74	1	CS32.1.		2	CS31.4.		2	CS32.3.		2	CS32.3.			2	CS33.4.		1	CS32.3.	
75	2	CS32.1.		2	CS31.4.		2	CS32.3.		2	CS32.3.			1	CS31.2.		2	CS32.3.	
76	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
77	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
78	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
79	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
80	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
81	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
82	2	CS32.2.		1	CS51.2.		1	CS51.4.		1	CS51.2.			1	CS51.4.		1	CS51.4.	
83	2	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
84	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
85	1	CS51.4.		1	CS51.2.		1	CS51.4.		1	CS51.2.			1	CS51.4.		1	CS51.4.	
86	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.2.			1	CS51.4.		1	CS51.4.	
87	2	CS32.1.	CS32.2.	1	CS31.4.		1	CS51.4.	CS32.4.	1	CS51.2.	CS31.4.		1	CS32.3.		2	CS32.3.	
88	2	CS51.4.		1	CS51.4.		2	CS1.5.		1	CS51.2.			1	CS51.4.		1	CS51.4.	
89	2	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		2	CS51.4.	
90	2	CS51.4.	CS32.1.	1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
91	1	CS51.4.		1	CS51.4.		1	CS51.4.		1	CS51.4.			1	CS51.4.		1	CS51.4.	
92	2	CS51.4.		1	CS51.4.		2	CS51.4.		1	CS51.4.			2	CS51.4.		1	CS51.4.	
93	1	CS51.4.		1	CS51.4.		2	CS51.4.		1	CS51.4.			1	CS51.4.		2	CS51.4.	
94	2	CS51.4.		1	CS51.4.		1	CS23.6.		1	CS51.4.			2	CS51.4.		2	CS23.6.	
95	2	CS51.4.		2	CS51.2.		2	CS51.4.		1	CS51.4.			2	CS51.4.		2	CS51.4.	
96	2	CS51.4.		2	CS51.4.		2	CS51.4.		2	CS51.4.			2	CS51.4.		2	CS51.4.	
97	2	CS23.2.		2	CS23.2.		2	CS51.4.		2	CS51.4.			2	CS51.4.		2	CS23.2.	
98	2	CS51.4.		2	CS51.4.		1	CS51.4.		2	CS51.4.			2	CS51.4.		2	CS51.4.	
99	2	CS51.4.		2	CS23.2.		2	CS51.4.		2	CS51.4.			2	CS51.4.		2	CS23.2.	CS51.4.
100	1	CS51.4.		2	CS51.4.		1	CS51.4.		2	CS23.2.			2	CS51.4.		1	CS51.4.	
101	2	CS51.4.		2	CS51.4.		2	CS51.4.		1	CS51.4.			2	CS51.4.		1	CS51.4.	
102	2	CS51.4.		2	CS51.4.		2	CS51.4.		2	CS51.4.			2	CS51.4.		2	CS51.4.	
103	2	CS23.2.	CS51.4.	2	CS23.2.		2	CS21.7.		2	CS23.1.			2	CS51.4.		2	CS23.2.	CS51.4.
104	2	CS51.4.		2	CS23.2.		2	CS51.4.		2	CS23.1.			2	CS51.4.		2	CS23.2.	
105	1	CS23.2.		2	CS23.2.		2	CS51.4.		2	CS23.2.			2	CS51.4.		1	CS23.2.	

Table 12.8
DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics to 2004 Standards Study 2006

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	S1Obj3	S2Obj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5
106	1	CS32.1.		1	CS32.3.		3	CS1.5.		1	CS32.3.			1	CS1.2.		1	CS32.1.	
107	2			2	CS62		2	CS62		2	CS62			1	CS62.2.		2	CS62	
108	1	CS61.2.		1	CS61.1.		1	CS61.2.		1	CS61.1.			1	CS61.1.		1	CS61.2.	
109	1	CS52.2.		2	CS1.4.		1	CS1.4.		1	CS1.4.			1	CS1.2.		1	CS2.1.	
110	2	CS2.1.		1	CS2.1.		1	I	CS2.1.	1	CS2.1.			1	CS2.1.		1	CS2.1.	
111	2	CS1.1.	CS51.4.	2	CS2.2.		1	CS51.4.		2	CS2.2.			1	CS1.5.		2	CS51.4.	
112	2	CS51.4.	CS61	1	CS61.1.		2	CS61.2.		1	CS61.1.			1	CS61.1.		1	CS61.2.	
113	2	CS2.4.		2	CS2.6.		2	CS2.3.		2	CS2.6.			3	CS2.3.		2	CS2.3.	
114	2	CS2.3.		2	CS2.3.		3	CS2.6.		2	CS2.3.			3	CS2.3.		2	CS2.3.	
115	2	CS52.1.		2	CS52.1.		1	CS52.1.		1	CS52.1.			2	CS52.2.		2	CS52.2.	
116	2	CS62.2.		2	CS62.2.		2	CS62.2.		2	CS62.2.			2	CS62.2.		2	CS62.2.	
117	1	CS62.2.		2	CS62.2.		1	CS62.2.		2	CS62.2.			1	CS62.2.		1	CS62.2.	

Objective Pairwise Comparison: 0.4038
Standard Pairwise Comparison: 0.736

Table 12.9
Objectives Coded to Each Item by Reviewers
Michigan Mathematics to 2004 Standards Study 2006

Low		Medium		High
5		6.282051		9

1	CS41.1.	CS41.4.	CS41.4.	CS41.4.	CS51.1.	CS51.2.		
2	CS2.2.	CS32.2.	CS43.5.	CS52	CS52.2.	CS52.2.	CS52.2.	
3	CS21.6.	CS21.7.	CS23.5.	CS23.5.	CS23.5.	CS51.4.		
4	CS51.2.	CS51.2.	CS51.2.	CS51.4.	CS51.4.	CS51.4.		
5	CS2.6.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	
6	CS21.6.	CS23.2.	CS23.2.	CS23.6.	CS23.6.	CS33.3.	CS51.4.	
7	CS51.2.	CS51.3.	CS51.4.	CS51.4.	CS52.1.	CS52.2.	CS52.3.	
8	CS23.6.	CS32.1.	CS32.3.	CS32.3.	CS33.4.	CS41.4.	CS41.4.	CS51.2.
9	CS41.4.	CS51.1.	CS51.2.	CS51.4.	CS51.4.	CS52.3.		
10	CS1	CS1	CS1.4.	CS1.5.	CS1.5.	CS51.2.	CS51.2.	CS51.4.
11	CS52.1.	CS52.1.	CS52.1.	CS52.1.	CS52.1.	CS52.1.		
12	CS21.6.	CS21.6.	CS21.6.	CS21.6.	CS21.7.	CS21.7.		
13	CS21.7.	CS23.1.	CS23.2.	CS23.2.	CS51.4.	CS51.4.		
14	CS43.4.	CS51.2.	CS51.2.	CS51.4.	CS51.4.	CS51.4.	CS52.1.	
15	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
16	CS1.4.	CS2.1.	CS2.1.	CS2.4.	CS52.2.	CS52.2.	CS52.2.	
17	CS2.1.	CS22	CS22.1.	CS51.2.	CS51.4.	CS52.4.		
18	CS21.6.	CS21.6.	CS23.5.	CS23.5.	CS23.5.	CS23.5.		
19	CS42.2.	CS42.2.	CS43.1.	CS43.1.	CS43.4.	CS51.2.		
20	CS51.1.	CS52.1.	CS52.1.	CS52.1.	CS52.2.	CS52.2.		
21	CS2.1.	CS2.1.	CS2.1.	CS2.1.	CS2.1.	CS32.1.	CS32.3.	
22	CS2.2.	CS2.6.	CS51.2.	CS51.4.	CS51.4.	CS52.3.		
23	CS42.2.	CS43.3.	CS43.3.	CS51.4.	CS51.4.	CS51.4.		
24	CS2.1.	CS23.1.	CS23.6.	CS51.2.	CS51.4.	CS52.3.		
25	CS23.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.		
26	CS23.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.		
27	CS2	CS2.6.	CS23.4.	CS43.2.	CS52	CS52.4.		
28	CS51.4.	CS51.4.	CS51.4.	CS52	CS52.3.	CS52.3.		
29	CS32.3.	CS61	CS61.1.	CS61.2.	CS61.2.	CS61.3.		
30	CS52.1.	CS52.1.	CS52.1.	CS52.1.	CS52.2.	CS52.4.		
31	CS22.1.	CS32.3.	CS52.2.	CS52.3.	CS52.3.	CS52.4.		
32	CS31.4.	CS31.4.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS51.2.	CS51.2.
33	CS31.4.	CS32	CS32.3.	CS32.3.	CS43.5.	CS51.2.	CS51.2.	CS51.4.
34	CS32.1.	CS32.2.	CS32.3.	CS32.3.	CS32.3.	CS33.4.	CS52.2.	
35	CS21.6.	CS21.6.	CS21.7.	CS23.4.	CS52.1.	CS52.2.		
36	CS52.2.	CS52.3.	CS52.3.	CS52.3.	CS52.3.	CS52.3.		
37	CS21.2.	CS21.7.	CS23.2.	CS23.2.	CS23.3.	CS23.6.	CS51.4.	
38	CS41.1.	CS42	CS42.1.	CS43	CS43.5.	CS51.2.		
39	CS21.7.	CS21.7.	CS21.7.	CS23.1.	CS23.4.	CS43.5.		
40	CS21.7.	CS51.2.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
41	CS42	CS51.2.	CS51.4.	CS52.3.	CS52.3.	CS52.3.		
42	CS42.2.	CS43.3.	CS43.3.	CS51.3.	CS51.4.	CS51.4.		
43	CS2.1.	CS2.1.	CS2.1.	CS51.4.	CS51.4.	CS52.2.		
44	CS2.3.	CS2.3.	CS2.3.	CS2.6.	CS51.4.	CS52.4.		
45	CS2.1.	CS2.2.	CS2.2.	CS22.1.	CS22.5.	CS51.4.		

Table 12.9
Objectives Coded to Each Item by Reviewers
Michigan Mathematics to 2004 Standards Study 2006

46	CS23.2.	CS23.2.	CS23.2.	CS23.5.	CS23.6.	CS23.6.			
47	CS21	CS21.1.	CS21.7.	CS21.7.	CS21.7.	CS23.5.	CS51.4.		
48	CS21.2.	CS23.2.	CS23.2.	CS23.6.	CS23.6.	CS43.5.			
49	CS2.1.	CS21.6.	CS21.6.	CS21.6.	CS21.6.	CS21.7.			
50	CS1.2.	CS22.3.	CS31.4.	CS31.4.	CS32.1.	CS32.2.	CS32.2.	CS32.3.	
51	CS41.4.	CS43	CS43.5.	CS51.2.	CS51.4.	CS52.3.			
52	CS21.7.	CS21.7.	CS23.2.	CS23.2.	CS23.2.	CS23.5.			
53	CS21.2.	CS21.2.	CS21.2.	CS21.7.	CS23.5.	CS23.5.			
54	CS41.4.	CS41.4.	CS41.4.	CS51.3.	CS51.3.	CS52.2.			
55	CS2.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.			
56	CS43.3.	CS43.3.	CS51.3.	CS51.3.	CS51.4.	CS52.3.			
57	CS2.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.	CS43.5.		
58	CS1.3.	CS2.3.	CS2.3.	CS2.3.	CS2.6.	CS51.4.			
59	CS2.5.	CS2.5.	CS23.5.	CS23.5.	CS23.5.	CS23.5.			
60	CS1.2.	CS1.3.	CS2.1.	CS2.1.	CS32.3.	CS32.3.	CS43		
61	CS31.4.	CS32.1.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS43.1.		
62	CS32.1.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS32.3.			
63	CS32.1.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS32.3.			
64	CS31.4.	CS32.1.	CS32.1.	CS32.3.	CS32.3.	CS51.2.			
65	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS32.3.	CS32.3.			
66	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS32.3.	CS33.4.			
67	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS33.4.	CS33.4.	CS42.4.		
68	CS32.1.	CS32.1.	CS32.3.	CS32.3.	CS33.4.	CS33.4.			
69	CS31.4.	CS32.1.	CS32.1.	CS33.4.	CS33.4.	CS33.4.			
70	CS31.4.	CS32.1.	CS32.3.	CS33.4.	CS33.4.	CS33.4.			
71	CS32.1.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS32.3.			
72	CS32.1.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS32.3.			
73	CS31.4.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS33.4.			
74	CS31.4.	CS32.1.	CS32.3.	CS32.3.	CS32.3.	CS33.4.			
75	CS31.2.	CS31.4.	CS32.1.	CS32.3.	CS32.3.	CS32.3.			
76	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
77	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
78	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
79	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
80	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
81	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
82	CS32.2.	CS51.2.	CS51.2.	CS51.4.	CS51.4.	CS51.4.			
83	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
84	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
85	CS51.2.	CS51.2.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
86	CS51.2.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
87	CS31.4.	CS31.4.	CS32.1.	CS32.2.	CS32.3.	CS32.3.	CS32.4.	CS51.2.	CS51.4.
88	CS1.5.	CS51.2.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
89	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
90	CS32.1.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
91	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
92	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
93	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
94	CS23.6.	CS23.6.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			
95	CS51.2.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.			

Table 12.9
Objectives Coded to Each Item by Reviewers
Michigan Mathematics to 2004 Standards Study 2006

96	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
97	CS23.2.	CS23.2.	CS23.2.	CS51.4.	CS51.4.	CS51.4.		
98	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
99	CS23.2.	CS23.2.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	
100	CS23.2.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
101	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
102	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.	CS51.4.		
103	CS21.7.	CS23.1.	CS23.2.	CS23.2.	CS23.2.	CS51.4.	CS51.4.	CS51.4.
104	CS23.1.	CS23.2.	CS23.2.	CS51.4.	CS51.4.	CS51.4.		
105	CS23.2.	CS23.2.	CS23.2.	CS23.2.	CS51.4.	CS51.4.		
106	CS1.2.	CS1.5.	CS32.1.	CS32.1.	CS32.3.	CS32.3.		
107	CS62	CS62	CS62	CS62	CS62.2.			
108	CS61.1.	CS61.1.	CS61.1.	CS61.2.	CS61.2.	CS61.2.		
109	CS1.2.	CS1.4.	CS1.4.	CS1.4.	CS2.1.	CS52.2.		
110	I	CS2.1.	CS2.1.	CS2.1.	CS2.1.	CS2.1.	CS2.1.	
111	CS1.1.	CS1.5.	CS2.2.	CS2.2.	CS51.4.	CS51.4.	CS51.4.	
112	CS51.4.	CS61	CS61.1.	CS61.1.	CS61.1.	CS61.2.	CS61.2.	
113	CS2.3.	CS2.3.	CS2.3.	CS2.4.	CS2.6.	CS2.6.		
114	CS2.3.	CS2.3.	CS2.3.	CS2.3.	CS2.3.	CS2.6.		
115	CS52.1.	CS52.1.	CS52.1.	CS52.1.	CS52.2.	CS52.2.		
116	CS62.2.	CS62.2.	CS62.2.	CS62.2.	CS62.2.	CS62.2.		
117	CS62.2.	CS62.2.	CS62.2.	CS62.2.	CS62.2.	CS62.2.		

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics to 2004 Standards Study 2006

Low		Medium		High
0		7.424242		207

I	110																			
1	10	10																		
1.1.	111																			
1.2.	50	60	106	109																
1.3.	58	60																		
1.4.	10	16	109	109	109															
1.5.	10	10	88	106	111															
2	27																			
2.1.	16	16	17	21	21	21	21	21	24	43	43	43	45	49	60	60	109	110	110	110
	110	110	110																	
2.2.	2	22	45	45	111	111														
2.3.	44	44	44	58	58	58	113	113	113	114	114	114	114	114						
2.4.	16	113																		
2.5.	55	57	59	59																
2.6.	5	22	27	44	58	113	113	114												
II																				
21	47																			
21.1.	47																			
21.2.	37	48	53	53	53															
D21.3.																				
21.4.																				
21.5.																				
21.6.	3	6	12	12	12	12	18	18	35	35	49	49	49	49						
21.7.	3	12	12	13	35	37	39	39	39	40	47	47	47	49	52	52	53	103		
22	17																			
22.1.	17	31	45																	
22.2.																				
22.3.	50																			
22.4.																				
22.5.	45																			
23																				
23.1.	13	24	39	103	104															
23.2.	6	6	13	13	37	37	46	46	46	48	48	52	52	52	97	97	97	99	99	100
	103	103	103	104	104	105	105	105	105											
23.3.	37																			
23.4.	27	35	39																	
23.5.	3	3	3	18	18	18	18	25	25	25	25	25	25	26	26	26	26	26	26	46
	47	52	53	53	55	55	55	55	55	57	57	57	57	57	59	59	59	59		
23.6.	6	6	8	24	37	46	46	48	48	94	94									
III																				
31																				
31.1.																				
31.2.	75																			
31.3.																				
31.4.	32	32	33	50	50	61	64	69	70	73	74	75	87	87						
32	33																			
32.1.	8	21	32	34	50	61	61	62	62	63	63	64	64	65	66	67	68	68	69	69
	70	71	71	72	72	73	74	75	87	90	106	106								
32.2.	2	34	50	50	82	87														
32.3.	8	8	21	29	31	32	32	32	33	33	34	34	34	50	60	60	61	61	61	62

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics to 2004 Standards Study 2006

	62	62	62	63	63	63	63	64	64	65	65	65	65	65	66	66	66	66	67
	67	67	68	68	70	71	71	71	71	72	72	72	72	73	73	73	74	74	74
	75	75	75	87	87	106	106												
32.4.	87																		
32.5.																			
33																			
33.1.																			
33.2.																			
33.3.	6																		
33.4.	8	34	66	67	67	68	68	69	69	69	70	70	70	73	74				
33.5.																			
IV																			
41																			
41.1.	1	38																	
41.2.																			
41.3.																			
41.4.	1	1	1	8	8	9	51	54	54	54									
42	38	41																	
42.1.	38																		
42.2.	19	19	23	42															
42.3.																			
42.4.	67																		
42.5.																			
43	38	51	60																
43.1.	19	19	61																
43.2.	27																		
43.3.	23	23	42	42	56	56													
43.4.	14	19																	
43.5.	2	33	38	39	48	51	57												
V																			
51																			
51.1.	1	9	20																
51.2.	1	4	4	4	7	8	9	10	10	14	14	17	19	22	24	32	32	33	33	38
	40	41	51	64	82	82	85	85	86	87	88	95							
51.3.	7	42	54	54	56	56													

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics to 2004 Standards Study 2006

51.4.	3	4	4	4	5	5	5	5	5	5	6	7	7	9	9	10	13	13	14	14
	14	15	15	15	15	15	15	17	22	22	23	23	23	24	28	28	28	33	37	
	40	40	40	40	41	42	42	43	43	44	45	47	51	56	58	76	76	76	76	
	76	76	77	77	77	77	77	77	78	78	78	78	78	78	79	79	79	79	79	
	79	80	80	80	80	80	80	81	81	81	81	81	81	82	82	82	83	83	83	
	83	83	83	84	84	84	84	84	84	85	85	85	85	86	86	86	86	86	87	
	88	88	88	88	89	89	89	89	89	89	90	90	90	90	90	90	91	91	91	
	91	91	91	92	92	92	92	92	92	93	93	93	93	93	93	94	94	94	94	
	95	95	95	95	95	96	96	96	96	96	96	97	97	97	98	98	98	98	98	
	98	99	99	99	99	99	100	100	100	100	100	101	101	101	101	101	101	102	102	
	102	102	102	102	103	103	103	104	104	104	105	105	111	111	111	112				
52	2	27	28																	
52.1.	7	11	11	11	11	11	11	14	20	20	20	30	30	30	30	35	115	115	115	115
52.2.	2	2	2	7	16	16	16	20	20	30	31	34	35	36	43	54	109	115	115	
52.3.	7	9	22	24	28	28	31	31	36	36	36	36	36	41	41	41	51	56		
52.4.	17	27	30	31	44															
52.5.																				
VI																				
61	29	112																		
61.1.	29	108	108	108	112	112	112													
61.2.	29	29	108	108	108	112	112													
61.3.	29																			
61.4.																				
61.5.																				
62	107	107	107	107																
62.1.																				
62.2.	107	116	116	116	116	116	116	117	117	117	117	117	117							
62.3.																				
62.4.																				
62.5.																				
62.6.																				

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

Michigan Mathematics to 2004 Standards Study 2006

Low		Medium		High
1		3		7

I	110:1											
CS1	10:2											
CS1.1.	111:1											
CS1.2.	50:1	60:1	106:1	109:1								
CS1.3.	58:1	60:1										
CS1.4.	10:1	16:1	109:3									
CS1.5.	10:2	88:1	106:1	111:1								
CS2	27:1											
CS2.1.	16:2	17:1	21:5	24:1	43:3	45:1	49:1	60:2	109:1	110:6		
CS2.2.	2:1	22:1	45:2	111:2								
CS2.3.	44:3	58:3	113:3	114:5								
CS2.4.	16:1	113:1										
CS2.5.	55:1	57:1	59:2									
CS2.6.	5:1	22:1	27:1	44:1	58:1	113:2	114:1					
II												
CS21	47:1											
CS21.1.	47:1											
CS21.2.	37:1	48:1	53:3									
CSD21.3.												
CS21.4.												
CS21.5.												
CS21.6.	3:1	6:1	12:4	18:2	35:2	49:4						
CS21.7.	3:1	12:2	13:1	35:1	37:1	39:3	40:1	47:3	49:1	52:2	53:1	103:1
CS22	17:1											
CS22.1.	17:1	31:1	45:1									
CS22.2.												
CS22.3.	50:1											
CS22.4.												
CS22.5.	45:1											
CS23												
CS23.1.	13:1	24:1	39:1	103:1	104:1							
CS23.2.	6:2	13:2	37:2	46:3	48:2	52:3	97:3	99:2	100:1	103:3	104:2	105:4
CS23.3.	37:1											
CS23.4.	27:1	35:1	39:1									
CS23.5.	3:3	18:4	25:6	26:6	46:1	47:1	52:1	53:2	55:5	57:5	59:4	
CS23.6.	6:2	8:1	24:1	37:1	46:2	48:2	94:2					
III												
CS31												
CS31.1.												
CS31.2.	75:1											
CS31.3.												
CS31.4.	32:2	33:1	50:2	61:1	64:1	69:1	70:1	73:1	74:1	75:1	87:2	
CS32	33:1											
CS32.1.	8:1	21:1	32:1	34:1	50:1	61:2	62:2	63:2	64:2	65:1	66:1	67:1	68:2
	69:2	70:1	71:2	72:2	73:1	74:1	75:1	87:1	90:1	106:2			

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

Michigan Mathematics to 2004 Standards Study 2006

CS32.2.	2:1	34:1	50:2	82:1	87:1								
CS32.3.	8:2	21:1	29:1	31:1	32:3	33:2	34:3	50:1	60:2	61:3	62:4	63:4	64:2
	65:5	66:4	67:3	68:2	70:1	71:4	72:4	73:3	74:3	75:3	87:2	106:2	
CS32.4.	87:1												
CS32.5.													
CS33													
CS33.1.													
CS33.2.													
CS33.3.	6:1												
CS33.4.	8:1	34:1	66:1	67:2	68:2	69:3	70:3	73:1	74:1				
CS33.5.													
IV													
CS41													
CS41.1.	1:1	38:1											
CS41.2.													
CS41.3.													
CS41.4.	1:3	8:2	9:1	51:1	54:3								
CS42	38:1	41:1											
CS42.1.	38:1												
CS42.2.	19:2	23:1	42:1										
CS42.3.													
CS42.4.	67:1												
CS42.5.													
CS43	38:1	51:1	60:1										
CS43.1.	19:2	61:1											
CS43.2.	27:1												
CS43.3.	23:2	42:2	56:2										
CS43.4.	14:1	19:1											
CS43.5.	2:1	33:1	38:1	39:1	48:1	51:1	57:1						
V													
CS51													
CS51.1.	1:1	9:1	20:1										
CS51.2.	1:1	4:3	7:1	8:1	9:1	10:2	14:2	17:1	19:1	22:1	24:1	32:2	33:2
	38:1	40:1	41:1	51:1	64:1	82:2	85:2	86:1	87:1	88:1	95:1		
CS51.3.	7:1	42:1	54:2	56:2									
CS51.4.	3:1	4:3	5:6	6:1	7:2	9:2	10:1	13:2	14:3	15:6	17:1	22:2	23:3
	24:1	28:3	33:1	37:1	40:4	41:1	42:2	43:2	44:1	45:1	47:1	51:1	56:1
	58:1	76:6	77:6	78:6	79:6	80:6	81:6	82:3	83:6	84:6	85:4	86:5	87:1
	88:4	89:6	90:6	91:6	92:6	93:6	94:4	95:5	96:6	97:3	98:6	99:5	100:5
	101:6	102:6	103:3	104:3	105:2	111:3	112:1						
CS52	2:1	27:1	28:1										
CS52.1.	7:1	11:6	14:1	20:3	30:4	35:1	115:4						
CS52.2.	2:3	7:1	16:3	20:2	30:1	31:1	34:1	35:1	36:1	43:1	54:1	109:1	115:2
CS52.3.	7:1	9:1	22:1	24:1	28:2	31:2	36:5	41:3	51:1	56:1			
CS52.4.	17:1	27:1	30:1	31:1	44:1								
CS52.5.													
VI													
CS61	29:1	112:1											
CS61.1.	29:1	108:3	112:3										
CS61.2.	29:2	108:3	112:2										

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

Michigan Mathematics to 2004 Standards Study 2006

CS61.3.	29:1		
CS61.4.			
CS61.5.			
CS62	107:4		
CS62.1.			
CS62.2.	107:1	116:6	117:6
CS62.3.			
CS62.4.			
CS62.5.			
CS62.6.			

Table 12.12

Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)

Michigan Mathematics to 2004 Standards Study 2006

Low		Medium		High
1		3		7

1	CS41.1.:1	CS41.4.:3	CS51.1.:1	CS51.2.:1		
2	CS2.2.:1	CS32.2.:1	CS43.5.:1	CS52:1	CS52.2.:3	
3	CS21.6.:1	CS21.7.:1	CS23.5.:3	CS51.4.:1		
4	CS51.2.:3	CS51.4.:3				
5	CS2.6.:1	CS51.4.:6				
6	CS21.6.:1	CS23.2.:2	CS23.6.:2	CS33.3.:1	CS51.4.:1	
7	CS51.2.:1	CS51.3.:1	CS51.4.:2	CS52.1.:1	CS52.2.:1	CS52.3.:1
8	CS23.6.:1	CS32.1.:1	CS32.3.:2	CS33.4.:1	CS41.4.:2	CS51.2.:1
9	CS41.4.:1	CS51.1.:1	CS51.2.:1	CS51.4.:2	CS52.3.:1	
10	CS1:2	CS1.4.:1	CS1.5.:2	CS51.2.:2	CS51.4.:1	
11	CS52.1.:6					
12	CS21.6.:4	CS21.7.:2				
13	CS21.7.:1	CS23.1.:1	CS23.2.:2	CS51.4.:2		
14	CS43.4.:1	CS51.2.:2	CS51.4.:3	CS52.1.:1		
15	CS51.4.:6					
16	CS1.4.:1	CS2.1.:2	CS2.4.:1	CS52.2.:3		
17	CS2.1.:1	CS22:1	CS22.1.:1	CS51.2.:1	CS51.4.:1	CS52.4.:1
18	CS21.6.:2	CS23.5.:4				
19	CS42.2.:2	CS43.1.:2	CS43.4.:1	CS51.2.:1		
20	CS51.1.:1	CS52.1.:3	CS52.2.:2			
21	CS2.1.:5	CS32.1.:1	CS32.3.:1			
22	CS2.2.:1	CS2.6.:1	CS51.2.:1	CS51.4.:2	CS52.3.:1	
23	CS42.2.:1	CS43.3.:2	CS51.4.:3			
24	CS2.1.:1	CS23.1.:1	CS23.6.:1	CS51.2.:1	CS51.4.:1	CS52.3.:1
25	CS23.5.:6					
26	CS23.5.:6					
27	CS2:1	CS2.6.:1	CS23.4.:1	CS43.2.:1	CS52:1	CS52.4.:1
28	CS51.4.:3	CS52:1	CS52.3.:2			
29	CS32.3.:1	CS61:1	CS61.1.:1	CS61.2.:2	CS61.3.:1	
30	CS52.1.:4	CS52.2.:1	CS52.4.:1			
31	CS22.1.:1	CS32.3.:1	CS52.2.:1	CS52.3.:2	CS52.4.:1	
32	CS31.4.:2	CS32.1.:1	CS32.3.:3	CS51.2.:2		
33	CS31.4.:1	CS32:1	CS32.3.:2	CS43.5.:1	CS51.2.:2	CS51.4.:1
34	CS32.1.:1	CS32.2.:1	CS32.3.:3	CS33.4.:1	CS52.2.:1	
35	CS21.6.:2	CS21.7.:1	CS23.4.:1	CS52.1.:1	CS52.2.:1	
36	CS52.2.:1	CS52.3.:5				
37	CS21.2.:1	CS21.7.:1	CS23.2.:2	CS23.3.:1	CS23.6.:1	CS51.4.:1
38	CS41.1.:1	CS42:1	CS42.1.:1	CS43:1	CS43.5.:1	CS51.2.:1
39	CS21.7.:3	CS23.1.:1	CS23.4.:1	CS43.5.:1		
40	CS21.7.:1	CS51.2.:1	CS51.4.:4			
41	CS42:1	CS51.2.:1	CS51.4.:1	CS52.3.:3		
42	CS42.2.:1	CS43.3.:2	CS51.3.:1	CS51.4.:2		
43	CS2.1.:3	CS51.4.:2	CS52.2.:1			
44	CS2.3.:3	CS2.6.:1	CS51.4.:1	CS52.4.:1		
45	CS2.1.:1	CS2.2.:2	CS22.1.:1	CS22.5.:1	CS51.4.:1	

Table 12.12

Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)

Michigan Mathematics to 2004 Standards Study 2006

46	CS23.2.:3	CS23.5.:1	CS23.6.:2				
47	CS21:1	CS21.1.:1	CS21.7.:3	CS23.5.:1	CS51.4.:1		
48	CS21.2.:1	CS23.2.:2	CS23.6.:2	CS43.5.:1			
49	CS2.1.:1	CS21.6.:4	CS21.7.:1				
50	CS1.2.:1	CS22.3.:1	CS31.4.:2	CS32.1.:1	CS32.2.:2	CS32.3.:1	
51	CS41.4.:1	CS43:1	CS43.5.:1	CS51.2.:1	CS51.4.:1	CS52.3.:1	
52	CS21.7.:2	CS23.2.:3	CS23.5.:1				
53	CS21.2.:3	CS21.7.:1	CS23.5.:2				
54	CS41.4.:3	CS51.3.:2	CS52.2.:1				
55	CS2.5.:1	CS23.5.:5					
56	CS43.3.:2	CS51.3.:2	CS51.4.:1	CS52.3.:1			
57	CS2.5.:1	CS23.5.:5	CS43.5.:1				
58	CS1.3.:1	CS2.3.:3	CS2.6.:1	CS51.4.:1			
59	CS2.5.:2	CS23.5.:4					
60	CS1.2.:1	CS1.3.:1	CS2.1.:2	CS32.3.:2	CS43:1		
61	CS31.4.:1	CS32.1.:2	CS32.3.:3	CS43.1.:1			
62	CS32.1.:2	CS32.3.:4					
63	CS32.1.:2	CS32.3.:4					
64	CS31.4.:1	CS32.1.:2	CS32.3.:2	CS51.2.:1			
65	CS32.1.:1	CS32.3.:5					
66	CS32.1.:1	CS32.3.:4	CS33.4.:1				
67	CS32.1.:1	CS32.3.:3	CS33.4.:2	CS42.4.:1			
68	CS32.1.:2	CS32.3.:2	CS33.4.:2				
69	CS31.4.:1	CS32.1.:2	CS33.4.:3				
70	CS31.4.:1	CS32.1.:1	CS32.3.:1	CS33.4.:3			
71	CS32.1.:2	CS32.3.:4					
72	CS32.1.:2	CS32.3.:4					
73	CS31.4.:1	CS32.1.:1	CS32.3.:3	CS33.4.:1			
74	CS31.4.:1	CS32.1.:1	CS32.3.:3	CS33.4.:1			
75	CS31.2.:1	CS31.4.:1	CS32.1.:1	CS32.3.:3			
76	CS51.4.:6						
77	CS51.4.:6						
78	CS51.4.:6						
79	CS51.4.:6						
80	CS51.4.:6						
81	CS51.4.:6						
82	CS32.2.:1	CS51.2.:2	CS51.4.:3				
83	CS51.4.:6						
84	CS51.4.:6						
85	CS51.2.:2	CS51.4.:4					
86	CS51.2.:1	CS51.4.:5					
87	CS31.4.:2	CS32.1.:1	CS32.2.:1	CS32.3.:2	CS32.4.:1	CS51.2.:1	CS51.4.:1
88	CS1.5.:1	CS51.2.:1	CS51.4.:4				
89	CS51.4.:6						
90	CS32.1.:1	CS51.4.:6					
91	CS51.4.:6						
92	CS51.4.:6						
93	CS51.4.:6						
94	CS23.6.:2	CS51.4.:4					
95	CS51.2.:1	CS51.4.:5					

Table 12.12

Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
Michigan Mathematics to 2004 Standards Study 2006

96	CS51.4.:6			
97	CS23.2.:3	CS51.4.:3		
98	CS51.4.:6			
99	CS23.2.:2	CS51.4.:5		
100	CS23.2.:1	CS51.4.:5		
101	CS51.4.:6			
102	CS51.4.:6			
103	CS21.7.:1	CS23.1.:1	CS23.2.:3	CS51.4.:3
104	CS23.1.:1	CS23.2.:2	CS51.4.:3	
105	CS23.2.:4	CS51.4.:2		
106	CS1.2.:1	CS1.5.:1	CS32.1.:2	CS32.3.:2
107	CS62:4	CS62.2.:1		
108	CS61.1.:3	CS61.2.:3		
109	CS1.2.:1	CS1.4.:3	CS2.1.:1	CS52.2.:1
110	I:1	CS2.1.:6		
111	CS1.1.:1	CS1.5.:1	CS2.2.:2	CS51.4.:3
112	CS51.4.:1	CS61:1	CS61.1.:3	CS61.2.:2
113	CS2.3.:3	CS2.4.:1	CS2.6.:2	
114	CS2.3.:5	CS2.6.:1		
115	CS52.1.:4	CS52.2.:2		
116	CS62.2.:6			
117	CS62.2.:6			

Table 12.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
Michigan Mathematics to 2004 Standards Study 2006

Low DOK		Matched DOK		High DOK
1		3		7

I [3]:	110:1 [1]									
CS1 3]:	10:2 [1]									
CS1.1. [3]:	111:1 [2]									
CS1.2. [3]:	50:1 [3]	60:1 [2]	106:1 [1]	109:1 [1]						
CS1.3. [3]:	58:1 [1]	60:1 [3]								
CS1.4. [2]:	10:1 [1]	16:1 [1]	109:3 [1.33]							
CS1.5. [3]:	10:2 [1]	88:1 [2]	106:1 [3]	111:1 [1]						
CS2 [2]:	27:1 [2]									
CS2.1. [2]:	16:2 [2]	17:1 [1]	21:5 [1.6]	24:1 [1]	43:3 [1]	45:1 [2]	49:1 [1]	60:2 [2]	109:1 [1]	110:6 [1.17]
CS2.2. [2]:	2:1 [2]	22:1 [1]	45:2 [2]	111:2 [2]						
CS2.3. [2]:	44:3 [1.33]	58:3 [2]	113:3 [2.33]	114:5 [2.2]						
CS2.4. [2]:	16:1 [2]	113:1 [2]								
CS2.5. [3]:	55:1 [1]	57:1 [3]	59:2 [1.5]							
CS2.6. [3]:	5:1 [1]	22:1 [1]	27:1 [2]	44:1 [1]	58:1 [2]	113:2 [2]	114:1 [3]			
II [2]:										
CS21 [2]:	47:1 [2]									
CS21.1. [1]:	47:1 [2]									
CS21.2. [2]:	37:1 [2]	48:1 [2]	53:3 [1.33]							
CSD21.3. [3]:										
CS21.4. [3]:										
CS21.5. [2]:										
CS21.6. [3]:	3:1 [2]	6:1 [2]	12:4 [1.5]	18:2 [2.5]	35:2 [2]	49:4 [1]				
CS21.7. [2]:	3:1 [2]	12:2 [2]	13:1 [2]	35:1 [2]	37:1 [2]	39:3 [2]	40:1 [2]	47:3 [1.67]	49:1 [1]	52:2 [2]	53:1 [2]	103:1 [2]

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics to 2004 Standards Study 2006

CS22 [2]:	17:1 [1]											
CS22.1. [1]:	17:1 [1]	31:1 [1]	45:1 [2]									
CS22.2. [2]:												
CS22.3. [2]:	50:1 [2]											
CS22.4. [2]:												
CS22.5. [2]:	45:1 [1]											
CS23 [2]:												
CS23.1. [1]:	13:1 [1]	24:1 [1]	39:1 [2]	103:1 [2]	104:1 [2]							
CS23.2. [1]:	6:2 [2]	13:2 [1]	37:2 [2]	46:3 [2]	48:2 [2.5]	52:3 [2]	97:3 [2]	99:2 [2]	100:1 [2]	103:3 [2]	104:2 [2]	105:4 [1.5]
CS23.3. [2]:	37:1 [2]											
CS23.4. [2]:	27:1 [3]	35:1 [2]	39:1 [2]									
CS23.5. [2]:	3:3 [1.67]	18:4 [1.75]	25:6 [2.83]	26:6 [1.83]	46:1 [2]	47:1 [2]	52:1 [2]	53:2 [2]	55:5 [2.2]	57:5 [2.2]	59:4 [1.25]	
CS23.6. [2]:	6:2 [2]	8:1 [3]	24:1 [1]	37:1 [1]	46:2 [2]	48:2 [3]	94:2 [1.5]					
III [3]:												
CS31 [3]:												
CS31.1. [2]:												
CS31.2. [2]:	75:1 [1]											
CS31.3. [3]:												
CS31.4. [4]:	32:2 [2]	33:1 [2]	50:2 [2]	61:1 [2]	64:1 [2]	69:1 [3]	70:1 [3]	73:1 [2]	74:1 [2]	75:1 [2]	87:2 [1]	
CS32 [3]:	33:1 [2]											
CS32.1. [3]:	8:1 [2]	21:1 [2]	32:1 [1]	34:1 [2]	50:1 [2]	61:2 [2]	62:2 [1]	63:2 [1]	64:2 [1.5]	65:1 [1]	66:1 [2]	67:1 [2]	68:2 [1]
	69:2 [2.5]	70:1 [1]	71:2 [2]	72:2 [1]	73:1 [2]	74:1 [1]	75:1 [2]	87:1 [2]	90:1 [2]	106:2 [1]		
CS32.2. [2]:	2:1 [1]	34:1 [3]	50:2 [2.5]	82:1 [2]	87:1 [2]							
CS32.3. [3]:	8:2 [2]	21:1 [1]	29:1 [2]	31:1 [2]	32:3 [1]	33:2 [2]	34:3 [2.67]	50:1 [2]	60:2 [3]	61:3 [2]	62:4 [1.5]	63:4 [1.5]	64:2 [2]
	65:5 [1.6]	66:4 [1.25]	67:3 [2]	68:2 [1]	70:1 [3]	71:4 [1.25]	72:4 [1]	73:3 [1]	74:3 [1.67]	75:3 [2]	87:2 [1.5]	106:2 [1]	

Table 12.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
Michigan Mathematics to 2004 Standards Study 2006

CS32.4. [3]:	87:1 [1]								
CS32.5. [4]:									
CS33 [3]:									
CS33.1. [3]:									
CS33.2. [3]:									
CS33.3. [3]:	6:1 [2]								
CS33.4. [3]:	8:1 [1]	34:1 [3]	66:1 [1]	67:2 [3]	68:2 [3]	69:3 [2.67]	70:3 [2.67]	73:1 [3]	74:1 [2]
CS33.5. [4]:									
IV [2]:									
CS41 [2]:									
CS41.1. [2]:	1:1 [1]	38:1 [1]							
CS41.2. [1]:									
CS41.3. [2]:									
CS41.4. [2]:	1:3 [1.33]	8:2 [2.5]	9:1 [2]	51:1 [2]	54:3 [2]				
CS42 [2]:	38:1 [1]	41:1 [2]							
CS42.1. [1]:	38:1 [1]								
CS42.2. [2]:	19:2 [1]	23:1 [1]	42:1 [3]						
CS42.3. [2]:									
CS42.4. [2]:	67:1 [2]								
CS42.5. [2]:									
CS43 [1]:	38:1 [1]	51:1 [2]	60:1 [2]						
CS43.1. [1]:	19:2 [1.5]	61:1 [2]							
CS43.2. [1]:	27:1 [2]								
CS43.3. [2]:	23:2 [1.5]	42:2 [2]	56:2 [1.5]						
CS43.4. [1]:	14:1 [1]	19:1 [1]							

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics to 2004 Standards Study 2006

CS43.5. [2]:	2:1 [1]	33:1 [1]	38:1 [1]	39:1 [2]	48:1 [2]	51:1 [2]	57:1 [3]						
V [2]:													
CS51 [2]:													
CS51.1. [2]:	1:1 [1]	9:1 [1]	20:1 [1]										
CS51.2. [1]:	1:1 [1]	4:3 [1.33]	7:1 [1]	8:1 [2]	9:1 [2]	10:2 [1]	14:2 [1]	17:1 [1]	19:1 [1]	22:1 [1]	24:1 [1]	32:2 [1]	33:2 [1.5]
	38:1 [1]	40:1 [2]	41:1 [2]	51:1 [1]	64:1 [1]	82:2 [1]	85:2 [1]	86:1 [1]	87:1 [1]	88:1 [1]	95:1 [2]		
CS51.3. [3]:	7:1 [2]	42:1 [3]	54:2 [2]	56:2 [2]									
CS51.4. [2]:	3:1 [2]	4:3 [1.33]	5:6 [1.5]	6:1 [2]	7:2 [2]	9:2 [1.5]	10:1 [1]	13:2 [1]	14:3 [1]	15:6 [1]	17:1 [2]	22:2 [1]	23:3 [1.33]
	24:1 [1]	28:3 [1]	33:1 [2]	37:1 [1]	40:4 [1.25]	41:1 [2]	42:2 [1.5]	43:2 [1]	44:1 [2]	45:1 [1]	47:1 [1]	51:1 [2]	56:1 [2]
	58:1 [1]	76:6 [1]	77:6 [1]	78:6 [1]	79:6 [1]	80:6 [1]	81:6 [1]	82:3 [1]	83:6 [1.17]	84:6 [1]	85:4 [1]	86:5 [1]	87:1 [1]
	88:4 [1.25]	89:6 [1.33]	90:6 [1.17]	91:6 [1]	92:6 [1.5]	93:6 [1.33]	94:4 [1.5]	95:5 [1.8]	96:6 [2]	97:3 [2]	98:6 [1.83]	99:5 [2]	100:5 [1.4]
	101:6 [1.67]	102:6 [2]	103:3 [2]	104:3 [2]	105:2 [2]	111:3 [1.67]	112:1 [2]						
CS52 [2]:	2:1 [2]	27:1 [3]	28:1 [1]										
CS52.1. [2]:	7:1 [2]	11:6 [1.67]	14:1 [1]	20:3 [1]	30:4 [1.25]	35:1 [2]	115:4 [1.5]						
CS52.2. [2]:	2:3 [1.67]	7:1 [2]	16:3 [1.67]	20:2 [1.5]	30:1 [2]	31:1 [1]	34:1 [2]	35:1 [1]	36:1 [2]	43:1 [2]	54:1 [3]	109:1 [1]	115:2 [2]
CS52.3. [2]:	7:1 [2]	9:1 [3]	22:1 [1]	24:1 [1]	28:2 [1]	31:2 [1]	36:5 [1.6]	41:3 [2]	51:1 [2]	56:1 [2]			
CS52.4. [3]:	17:1 [2]	27:1 [3]	30:1 [2]	31:1 [3]	44:1 [2]								
CS52.5. [3]:													
VI [2]:													
CS61 [2]:	29:1 [1]	112:1 [2]											
CS61.1. [2]:	29:1 [1]	108:3 [1]	112:3 [1]										
CS61.2. [2]:	29:2 [2]	108:3 [1]	112:2 [1.5]										
CS61.3. [2]:	29:1 [2]												
CS61.4. [2]:													
CS61.5. [3]:													

Table 12.13
Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])
Michigan Mathematics to 2004 Standards Study 2006

CS62 [3]:	107:4 [2]		
CS62.1. [2]:			
CS62.2. [2]:	107:1 [1]	116:6 [2]	117:6 [1.33]
CS62.3. [2]:			
CS62.4. [3]:			
CS62.5. [3]:			
CS62.6. [3]:			

Table 12.1
Categorical Concurrence Between Standards and Assessment as Rated by Seven Reviewers
Michigan Mathematics Study 2006 (modified)
Number of Assessment Items - 117

Standards			Level by Objective			Hits		Cat. Concurr.
Title	Goals #	Objs #	Level	# of objs by Level	% w/in std by Level	Mean	S.D.	
STANDARD L1: Reasoning about numbers, systems, and quantitative situations	3	13.29	1 2 3	1 9 3	7 69 23	13.14	6.42	YES
STANDARD L2: Calculation, algorithms, and estimation	2	10.29	1 2 3	2 6 1	22 66 11	35.86	1.25	YES
STANDARD L3: Measurement and precision	2	5.14	2 3	3 2	60 40	1.86	2.37	NO
STANDARD L4: Mathematical reasoning, logic, and proof	3	11	1 2 3	3 5 2	30 50 20	2.71	0.88	NO
STANDARD A1: Expressions, equations, and inequalities	2	16.14	1 2 3	1 10 5	6 62 31	23	8.59	YES
STANDARD A2: Function	10	41.29	1 2 3	6 33 1	15 82 2	9.71	2.12	YES
STANDARD A3: Mathematical modeling	1	3.14	2	3	100	0.86	1.08	NO
STANDARD G1: Figures and their properties	8	30.14	1 2 3	2 12 15	6 41 51	19.86	2.36	YES
STANDARD G2: Relationships between figures	3	10.43	2 3	7 3	70 30	1.86	1.11	NO
STANDARD G3: Transformations of figures in the plane	2	5	1 2	3 2	60 40	0.14	0.86	NO
STANDARD S1: Univariate data – examining distributions	3	9.14	2	9	100	4.57	4.03	NO
STANDARD S2: Bivariate data – examining relationships	2	6	2 3	5 1	83 16	0.14	0.86	NO
STANDARD S3: Samples, surveys, and experiments	1	3.43	2 3	1 2	33 66	4.14	6.43	NO
STANDARD S4: Probability models and probability calculation	2	4.14	2 3	3 1	75 25	3.57	1.50	NO
Total	44	168.57	1 2 3	18 108 36	11 66 22	121.43	9.93	

Table 12.2
Depth-of-Knowledge Consistency Between Standards and Assessment as Rated by Seven Reviewers
Michigan Mathematics Study 2006 (modified)
Number of Assessment Items - 117

Standards			Hits		Level of Item w.r.t. Standard						DOK Consistency
					% Under		% At		% Above		
Title	Goals #	Objs #	M	S.D.	M	S.D.	M	S.D.	M	S.D.	
STANDARD L1: Reasoning about numbers, systems, and quantitative situations	3	13.29	13.14	6.42	37	41	38	38	25	37	YES
STANDARD L2: Calculation, algorithms, and estimation	2	10.29	35.86	1.25	44	39	50	41	6	22	YES
STANDARD L3: Measurement and precision	2	5.14	1.86	2.37	45	46	55	46	0	0	YES
STANDARD L4: Mathematical reasoning, logic, and proof	3	11	2.71	0.88	42	40	58	40	0	0	YES
STANDARD A1: Expressions, equations, and inequalities	2	16.14	23	8.59	59	35	39	35	2	8	WEAK
STANDARD A2: Function	10	41.29	9.71	2.12	48	48	32	45	20	40	YES
STANDARD A3: Mathematical modeling	1	3.14	0.86	1.08	20	40	40	49	40	49	YES
STANDARD G1: Figures and their properties	8	30.14	19.86	2.36	62	47	33	44	5	18	NO
STANDARD G2: Relationships between figures	3	10.43	1.86	1.11	18	32	59	47	23	39	YES
STANDARD G3: Transformations of figures in the plane	2	5	0.14	0.86	0	0	100	0	0	0	YES
STANDARD S1: Univariate data – examining distributions	3	9.14	4.57	4.03	19	30	68	42	12	28	YES
STANDARD S2: Bivariate data – examining relationships	2	6	0.14	0.86	0	0	100	0	0	0	YES
STANDARD S3: Samples, surveys, and experiments	1	3.43	4.14	6.43	70	23	30	23	0	0	NO
STANDARD S4: Probability models and probability calculation	2	4.14	3.57	1.50	79	31	21	31	0	0	NO
Total	44	168.57	121.43	9.93	51	44	40	43	10	27	

Table 12.3

Range-of-Knowledge Correspondence and Balance of Representation Between Standards and Assessment as Rated by Seven Reviewers, Michigan Mathematics Study 2006 (modified)

Number of Assessment Items – 117

Standards			Hits		Range of Objectives				Rng. of Know.	Balance Index				Bal. of Represent.
					# Objs Hit		% of Total			% Hits in Std/Ttl Hits		Index		
Title	Goals #	Objs #	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
STANDARD L1: Reasoning about numbers, systems, and quantitative situations	3	13.29	13.14	6.42	2.57	1.05	19	8	NO	11	5	0.66	0.23	WEAK
STANDARD L2: Calculation, algorithms, and estimation	2	10.29	35.86	1.25	3.43	0.73	33	7	NO	30	2	0.41	0.06	NO
STANDARD L3: Measurement and precision	2	5.14	1.86	2.37	0.71	0.69	13	12	NO	1	2	0.52	0.42	NO
STANDARD L4: Mathematical reasoning, logic, and proof	3	11	2.71	0.88	1.14	0.35	10	3	NO	2	1	0.96	0.09	YES
STANDARD A1: Expressions, equations, and inequalities	2	16.14	23	8.59	7.71	0.45	48	3	WEAK	19	5	0.75	0.06	YES
STANDARD A2: Function	10	41.29	9.71	2.12	7.86	1.64	19	4	NO	8	2	0.85	0.05	YES
STANDARD A3: Mathematical modeling	1	3.14	0.86	1.08	0.71	0.69	21	18	NO	1	1	0.55	0.42	NO
STANDARD G1: Figures and their properties	8	30.14	19.86	2.36	11	1.20	36	4	NO	16	2	0.72	0.06	YES
STANDARD G2: Relationships between figures	3	10.43	1.86	1.11	1.57	0.74	15	7	NO	2	1	0.86	0.14	YES
STANDARD G3: Transformations of figures in the plane	2	5	0.14	0.86	0.14	0.86	3	17	NO	0	1	0.14	0.86	NO
STANDARD S1: Univariate data – examining distributions	3	9.14	4.57	4.03	2	1.07	22	11	NO	4	3	0.86	0.17	YES
STANDARD S2: Bivariate data – examining relationships	2	6	0.14	0.86	0.14	0.86	2	14	NO	0	1	0.14	0.86	NO
STANDARD S3: Samples, surveys, and experiments	1	3.43	4.14	6.43	0.43	0.57	11	14	NO	3	5	0.43	0.57	NO
STANDARD S4: Probability models and probability calculation	2	4.14	3.57	1.50	1.86	0.83	44	18	WEAK	3	1	0.87	0.13	YES
Total	44	168.57	121.43	9.93	2.95	3.40	21	14		7	9	0.62	0.20	

Table 12.4
Summary of Attainment of Acceptable Alignment Level on Four Content Focus Criteria as Rated by Seven Reviewers
Michigan Mathematics Study 2006 (modified)
Number of Assessment Items - 117

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range of Knowledge	Balance of Representation
STANDARD L1: Reasoning about numbers, systems, and quantitative situations	YES	YES	NO	WEAK
STANDARD L2: Calculation, algorithms, and estimation	YES	YES	NO	NO
STANDARD L3: Measurement and precision	NO	YES	NO	NO
STANDARD L4: Mathematical reasoning, logic, and proof	NO	YES	NO	YES
STANDARD A1: Expressions, equations, and inequalities	YES	WEAK	WEAK	YES
STANDARD A2: Function	YES	YES	NO	YES
STANDARD A3: Mathematical modeling	NO	YES	NO	NO
STANDARD G1: Figures and their properties	YES	NO	NO	YES
STANDARD G2: Relationships between figures	NO	YES	NO	YES
STANDARD G3: Transformations of figures in the plane	NO	YES	NO	NO
STANDARD S1: Univariate data – examining distributions	NO	YES	NO	YES
STANDARD S2: Bivariate data – examining relationships	NO	YES	NO	NO
STANDARD S3: Samples, surveys, and experiments	NO	NO	NO	NO
STANDARD S4: Probability models and probability calculation	NO	NO	WEAK	YES

Table 12.5
Source-of-Challenge Issues by Reviewer
Michigan Mathematics Study 2006 (modified)

Item Number	Comments by Reviewer
8	Knowing time and being able to visualize it either on paper or in your mind.
38	Not applicable to any more specific standard.
86	Again, not specific, but as close as I could get.

Table 12.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
Michigan Mathematics Study 2006 (modified)

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
1	1	1	1	2	1	1	1
2	1	2	2	2	2	2	1
3	2	2	2	2	2	2	2
4	2	1	1	2	2	1	1
5	1	2	2	1	1	1	1
6	2	2	2	2	2	2	2
7	2	2	2	2	1	2	2
8	2	2	3	2	1	2	1
9	2	2	2	2	2	1	2
10	1	1	1	1	1	1	1
11	1	2	2	2	1	2	1
12	2	1	2	1	2	2	2
13	1	1	2	1	1	1	1
14	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1
16	1	2	2	2	1	2	1
17	2	1	1	2	1	1	1
18	2	2	1	2	1	2	2
19	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1
21	1	1	3	1	1	2	1
22	1	1	1	1	1	1	1
23	1	1	2	1	2	2	1
24	1	1	1	1	1	1	1
25	3	3	3	3	3	2	3
26	1	2	2	2	2	2	1
27	2	3	3	3	2	2	1
28	1	1	1	1	1	1	2
29	1	2	2	2	1	2	1
30	1	1	2	2	1	2	1
31	1	2	1	3	1	1	1
32	1	1	2	2	1	1	2
33	1	2	2	2	1	2	2
34	2	3	3	3	2	2	1
35	1	2	2	2	2	2	1
36	2	2	2	1	1	2	2
37	2	2	1	2	1	2	2
38	1	1	1	1	1	1	1
39	2	2	2	2	2	2	1
40	1	2	2	2	1	1	1

Table 12.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
Michigan Mathematics Study 2006 (modified)

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
41	2	2	2	2	2	2	2
42	1	3	2	3	2	2	2
43	2	1	1	1	1	1	1
44	1	2	1	2	2	1	2
45	2	2	2	2	1	1	1
46	2	2	2	2	2	2	2
47	2	1	2	2	2	2	1
48	3	2	3	2	2	3	2
49	1	1	1	1	1	1	1
50	3	2	2	2	2	2	2
51	2	2	2	2	2	1	2
52	2	2	2	2	2	2	2
53	2	2	1	2	2	1	2
54	2	2	2	3	2	2	1
55	2	2	2	1	2	2	2
56	2	2	2	2	2	1	2
57	2	2	2	3	2	2	2
58	2	2	1	2	2	1	1
59	1	1	2	2	1	1	1
60	1	3	2	2	3	2	1
61	1	2	2	2	2	2	2
62	1	1	2	1	1	2	2
63	1	1	2	1	1	2	2
64	2	2	2	1	1	2	2
65	1	1	2	2	1	2	2
66	2	1	1	1	1	3	2
67	2	2	3	3	2	3	2
68	1	1	3	1	1	3	2
69	2	3	3	3	2	3	2
70	1	3	3	3	2	3	2
71	2	1	2	1	1	2	2
72	1	1	1	1	1	1	2
73	2	2	3	1	1	1	2
74	1	2	2	2	2	1	2
75	2	2	2	2	2	2	2
76	1	1	3	1	1	1	2
77	2	2	2	2	1	2	2
78	1	1	1	1	1	1	2
79	1	2	1	1	1	1	2
80	2	1	1	1	1	1	1

Table 12.6
Depth-of-Knowledge Levels by Item and Reviewers
Intraclass Correlation
Michigan Mathematics Study 2006 (modified)

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Rater 7
81	2	2	1	2	1	2	2
82	2	1	1	1	1	1	2
83	2	2	2	2	3	2	1
84	2	2	3	2	3	2	1
85	2	2	1	1	2	2	2
86	2	2	2	2	2	2	1
87	1	2	1	2	1	1	1
88	1	1	1	1	1	1	2
89	1	1	1	1	1	1	2
90	1	1	1	1	1	1	2
91	1	1	1	1	1	1	2
92	1	1	1	1	1	1	2
93	1	1	1	1	1	1	2
94	2	1	1	1	1	1	2
95	2	1	1	1	1	1	2
96	1	1	1	1	1	1	2
97	1	1	1	1	1	1	2
98	1	1	1	1	1	1	2
99	1	1	1	1	1	2	2
100	2	1	2	1	1	1	2
101	2	1	1	1	1	2	2
102	2	1	1	1	1	1	2
103	1	1	1	1	1	1	1
104	2	1	2	1	2	1	2
105	1	1	2	1	1	2	2
106	2	1	1	1	1	2	2
107	2	2	2	2	2	2	2
108	2	2	2	2	1	2	2
109	2	2	2	2	2	2	2
110	2	2	1	2	2	2	2
111	2	2	2	2	2	2	2
112	1	2	1	2	2	1	2
113	2	2	2	1	2	1	2
114	2	2	2	2	2	2	2
115	1	2	2	2	2	2	2
116	2	2	2	2	2	2	2
117	1	2	2	2	2	1	2

Intraclass Correlation: 0.8044
Pairwise Comparison: 0.6199

Table 12.7
Notes by Reviewer
Michigan Mathematics Study 2006 (modified)

Item Number	Comments by Reviewer
1	There was no standard more specific to accomodate numerical computations.
2	This problem is NOT a statistics problem - it is an algebra problem. Stats is just the context.
3	Uses the Pythagorean Theorem, but no proof. Therefore only partially covers expectation.
5	Does not fit exactly. The item asks for compute percent increase over two years.
5	middle school level problem; no real match to HSCE
5	Again, no standard specific enough.
6	Asks to reason about area of compound rectangles. No exact fit.
6	topic is really being able to recognize having insufficient information to solve the problem; area is just the context; G2.1 not a good fit, but as close as we can get
7	Word problem requiring calculation with fractions. Did not see a match.
7	middle school level problem; no real match to HSCE
8	Also, read a schedule but no appropriate standard.
8	Not HS, more of MS expectation
8	middle school level problem; no real match to HSCE
9	Repeated multiplication by fraction. Best fit, series, but does not really represent the item.
9	middle school level problem; no real match to HSCE
10	L2.2.1 sorta fits...
12	also hits props of isosceles triangles, linear pairs of angles...
13	middle school level problem; no real match to HSCE; G2.1 was as close as I could get
16	also done in middle school...7th grade
17	done in middle school...
18	MS expectation?
18	Middle School standard
19	this was not a good fit, MS?
19	Middle School Standard
21	Asks to interpret slope, not compute slope. Therefore does not match A1.2.9.
24	Requires using d=rt.
24	elemenatry school level problem; no real match to HSCE
27	Asks what is the result of doubling the denominator to the value of an expression. Did not fine any benchmark that matched.
27	L1.1.4 is vaguely related to this question; we did originally have an expectation that nailed this exactly.
29	middle school level problem
31	Gives the intersection of two lines as the solution. Does not require students to compute a solution.
32	MS?

Table 12.7
Notes by Reviewer
Michigan Mathematics Study 2006 (modified)

Item Number	Comments by Reviewer
32	Middle School Standard
33	Compute percent. Not in standards.
33	MS?
33	Middle School Standard
34	MS?
34	Middle School Standard
38	Middle School Standard
38	elementary school item
44	Composite function. I could not find this in the benchmarks.
45	doesn't really fit G1.1 since this question is a middle school level question (or even elementary,since it's first quadrant).
46	Item 46 asks to compute a volume. This does not match any benchmarks that call for considering relationships.
53	done in 6th grade GLCE
54	Not a precise fit.
55	The item gives cosine and asks for side of triangle. Where is the benchmark?
57	Not a precise fit. Item requires students to know a trig identity. There is not a benchmark on this.
61	Asks for comparison of two numbers. No benchmark.
61	There is no standard that directly relates to reading and analyzing data from a chart.
65	The standards do not have a good match with #61-70
66	There is no standard specific enough for these.
68	There is no standard that matches well.
71	There isn't a good match
77	A simple logic item that does not require any of what is in the benchmarks.
78	middle school level problem - grade 6
81	Middle School Standard
82	a 6th grade GLCE
84	Close, but there is not a standard specific enough for this one.
86	This is venn diagrams and is logic, but does not match the bencmark adequately.
87	Requires students to read a Venn diagram.
88	This is a word problem that requires computation of real numbers. There is no benchmark for this. This applies to most items numbe 76 through 102.
88	Not an appropriate question to assess the HSCE
89	Not an appropriate question to assess the HSCE
90	Not an appropriate question to assess the HSCE
91	Not an appropriate question to assess the HSCE
92	Not an appropriate question to assess the HSCE
93	Not an appropriate question to assess the HSCE

Table 12.7
Notes by Reviewer
Michigan Mathematics Study 2006 (modified)

Item Number	Comments by Reviewer
94	question is at a 5th grade level
95	Not an appropriate question to assess the HSCE
96	Not an appropriate question to assess the HSCE
97	Not an appropriate question to assess the HSCE
98	Not an appropriate question to assess the HSCE
99	Grade 5/6 appropriate question.
101	Not an appropriate question to assess the HSCE
102	Not an appropriate question to assess the HSCE
103	Not an appropriate question to assess the HSCE
104	Not an appropriate question to assess the HSCE
108	Not an appropriate question to assess the HSCE

Table 12.8
DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics Study 2006 (modified)

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5	DOK6	PObj6	S1Obj6	S2Obj6
1	1	L2.1		1	L2.1		1	L1.1		2	L2.1	1	L2.1		1	L2.1		1	L3.1.1		
2	1	A1.2.1	S1.2.1	2	A1.2.1		2	L1.2.1		2	S1.2.1	2	A1.2.1		2	S1.2.1		1	A1.1.1		
3	2	G1.2.3		2	G1.6.3		2	G1.6.3	G1.6.4	2	G1.6.4	2	G1.2.3		2	G1.6.2		2	G1.2.3	G1.2.2	
4	2	A1.2.3		1	A1.2.3		1	L2.1.2		2	A1.2.6	2	A1.2.3		1	A1.2.3		1	L2.1.2		
5	1	L1.2.2		2	L2.2		2	L2.1		1	L2.1	1	L2.1		1	L2.1		1	L2.1.2		
6	2	G1.4		2	G1.4.1		2	G1.5.1		2	L2.1	2	G2.1		2	G1.4.1		2	G1.5.1		
7	2	L2.1		2	L2.1		2	L2.1		2	L2.1	1	L2.1		2	L2.1		2	A1.2.3		
8	2	L1.2.1		2	L2.1		3	L2.1		2	L2.1	1	L2.1		2	L2.1		1	L4.1.1		
9	2	L2.2.1		2	L2.1		2	L2.1		2	L2.1	2	L2.1		1	L2.2.3		2	L2.2.1	L2.2.2	
10	1	A1.1.1		1	L2.2		1	L2.2.1		1	L2.2.1	1	L2.2.1		1	L2.2.1		1	L2.2.1		
11	1	A1.1.1		2	A1.2.1		2	A1.1.1		2	A1.1.1	1	A1.1.1		2	A1.2.1		1	A1.1.1		
12	2	G1.2.2		1	G1.1.2		2	G1.2.2		1	G1.1.2	2	G1.1.2		2	G1.1.2		2	G1.2.1	G1.2.2	G1.1.2
13	1	G1.2.2		1	G1.2.2		2	G2.1.1		1	G1.2.2	1	G2.1		1	G1.2.2		1	G1.2.2		
14	1	A1.1.4		1	A1.1.4		1	A1.1.4		1	A1.1.4	1	A1.1.4		1	A1.1.4		1	A1.1.4		
15	1	A1.1.4		1	A1.2.3		1	A1.2.1		1	G1.6.1	1	A1.2.8		1	A1.2.8		1	A1.2.8		
16	1	A1.1.1		2	A1.2.1		2	A2.4.1		2	A2.4.1	1	A2.4.1		2	A1.2.1		1	A1.2.9	A2.4.1	
17	2	G.1.1.5		1	G.1.1.5		1	G.1.1.5		2	L1.1.5	1	A1.2.9		1	G.1.1.5		1	G.1.1.5		
18	2	G1.1.2		2			1	G1.2.2		2		1	G2.3.4		2	G1.2.2		2	G2.3.4		
19	1	L2.1.2		1	L1.1		1	L2.1.2		1		1	L2.1.2		1	L2.1.2		1	L2.1.2		
20	1	A1.2.1		1	A1.2.1		1	A1.1.1		1	A1.2.1	1	A1.1.1		1	A1.2.1		1	A1.2.1		
21	1	A1.2.7		1	A1.2.9		3	A1.2.9		1	A1.2.9	1	A2.1.7		2	A1.2.9		1	A1.2.9		
22	1	A2.1.2		1	A2.1.2		1	L2.1.2		1	A2.1.2	1	A2.1.2		1	A2.1.2		1	A2.1.2		
23	1	A1.1.3		1	A1.1.3		2	A1.1.4		1	A1.1.3	2	A1.1.3		2	A1.1.3		1	A1.1.3		
24	1	L2.1		1	L2.1		1	L2.1		1	G1.3	1	L2.1		1	L2.1		1	A2.5.1		
25	3	G1.2.2		3	G1.3		3	G2.3.4		3	G1.3	3	G2.3.4	G1.2.3	2	G2.3.4		3	G1.3.1	G1.2.3	
26	1	G1.3.1		2	G1.3.1		2	G1.3.1		2	G1.3.1	2	G1.3.1		2	L1.3.1		1	G1.3.1		
27	2	L2.1		3	A3.1.3		3	G2.3.5		3	A3.1.3	2	L1.1.4		2	A1.2.8		1	L2.1		
28	1	A1.2.1		1	A1.2.3		1	A1.2.1		1	A1.2.3	1	A1.2.4		1	A1.2.3		2	A1.2.3		
29	1	S4.2.1		2	S4.2.1		2	S4.1.2		2	S4.1.1	1	S4.1.2	S4.2.2	2	S4.2.1		1	S4.1.1	S4.1	
30	1	A1.2.1		1	G1.4.1		2	A1.2.1		2	A1.2.1	1	A1.2.1		2	A1.2.3	G1.4.1	1	A1.2.1		
31	1	A1.2.3		2	A2.1.7		1	A1.2.3		3	A1.2.3	1	A1.2.3		1	A1.2.3		1	L2.1		
32	1	L1.2.4		1			2	A3.1		2		1	L2.1		1	S1.1.1		2	L2.1		
33	1	L2.1		2			2	A3.1	L2.1	2		1	L2.1		2	S1.1.1		2	L2.1		
34	2	L1.2.4		3			3	S1.1.1		3		2	S1.1.1		2	S1.1.1		1	G3.2.1		
35	1	A1.2.1		2	G1.1.1		2	G1.1.1		2	G1.1.1	2	G1.1.1		2	G1.1.1		1	G1.2.5		

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DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics Study 2006 (modified)

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5	DOK6	PObj6	S1Obj6	S2Obj6
36	2	A1.2.1		2	A1.2.3		2	A1.2.3		1	A1.2.3	1	A1.2.3		2	A1.2.3		2	A1.2.3		
37	2	G1.4.1		2	G1.4.1		1	G1.4.1		2	G1.4.1	1	L2.1		2	G1.4.1		2	L2.1		
38	1	L2.1		1	L2.1		1	L1.2.1		1		1	L2.1		1	L2.1		1	L2.1		
39	2	G1.2.2		2	G1.2		2	G1.2.2		2	G1.1.1	2	G1.1.2		2	G1.2.1		1	G1.2.1		
40	1	A1.2.1		2	L2.1		2	G1.2.2		2	G1.4.1	1	A1.2.9		1	A1.1.1		1	G1.2.2	G1.3.2	
41	2	A1.2.3		2	A1.2.3		2	A1.2.1		2	A1.2.3	2	A1.2.3		2	A1.2.3		2	A1.2.3		
42	1	A1.1.4		3	A1.1.3		2	A1.1.4	A1.1.5	3	A1.1.3	2	A1.1.4		2	A1.1.4		2	A1.1.3		
43	2	A1.2.9		1	A1.2.9		1	A1.2.9		1	A2.4.1	1	A1.2.9		1	A1.2.9		1	A1.2.9		
44	1	A2.1.2		2	A2.2		1	A2.2		2	A2.2.1	2	A2.2		1	A2.2		2	A2.1		
45	2	L1.2.4		2	A1.2.9		2	A1.2.9		2	A2.4.1	1	G1.1		1	A1.2.9		1	A1.2.9	L2.1	
46	2	G2.1		2	G1.8.1		2	G1.8.1		2	G1.4.1	2	G1.8.1		2	G1.8.1		2	G1.8.1		
47	2	G1.6.1		1	A1.2.9		2	G1.6		2	G1.6.2	2	G.1.7.1		2	G.1.7.1		1	G1.6		
48	3	G1.2.2		2	G1.4.1		3	G1.4.1		2	G2.1	2	G1.4.1		3	G1.4.1		2	A1.2.3		
49	1	A2.4.4		1	A2.4.4		1	A2.4.4		1	A2.4.4	1	A2.4.4		1	A2.4.4		1	G1.1		
50	3	L1.2.4	S1.2.1	2	S1.2.1		2	S1.2.1		2	S1.2.1	2	S1.2.2		2	S1.1.2		2	S1.2.1		
51	2	L1.2.2		2	A1.2.4		2	A1.2		2	A1.2.4	2	A2.1.6		1	A1.1.1		2	A1.2.4		
52	2	G1.5.1		2	G1.5.2		2	G1.5.1		2	G2.1.2	2	G1.5.2		2	G1.5.2		2	G1.4.1		
53	2	G1.2.2		2	G1.2	A1.1.1	1	G1.2.1		2	G1.3	2	G1.2.2		1	G1.2.2		2	G1.3.1	G1.2.5	
54	2	A1.1.1		2	A1.1.1		2	L1.1.1		3	A1.2.4	2	L1.2.1		2	A1.2.4		1	L2.1		
55	2	A2.10		2	G1.3.1		2	G1.3.1		1	G1.3.1	2	G1.3.1		2	G1.3.1		2	G1.3.1		
56	2	A1.1.3		2	A1.1.3		2	A1.1.3		2	A1.1.3	2	A1.1.3		1	A1.1.3		2	A1.1.3		
57	2	A2.10.1		2	G1.3.2		2	A2.1		3	G1.3.1	2	G1.3.1		2	G1.3.1		2	G1.3.1		
58	2	A2.1.2		2	A2.1		1	A2.1		2	A2.2.3	2	A2.2.2		1	A2.1.2		1	A2.2.2		
59	1	A2.10.3		1	A2.10.3		2	A2.10.1		2	G1.6.2	1	A2.10.1		1	G1.3.1		1	A2.10.1		
60	1	A2.4.2		3	S1.1.1		2	A3.1.3		2	S2.1.2	3	A2.7.2		2	S1.1.1		1	A2.4		
61	1	L2		2	L1.2.4		2	S3.1		2	L1.2.4	2	L1.2.4		2	S1.1.1		2	L1.2.4	L2.1	
62	1	L1.2.4		1	L1.2.4		2	S3.1		1	L1.2.4	1	L1.2.4		2	S1.1.1		2	L1.2.4	L2.1	
63	1	L1.2.4		1	L1.2.4		2	S3.1		1	L1.2.4	1	L1.2.4		2	S1.1.1		2	L1.2.4	L2.1	
64	2	L1.2.4		2	L1.2.4		2	S3.1		1	L1.2.4	1	L2.1		2	S1.1.1		2	L1.2.4	L2.1	
65	1	L1.2.4		1	L1.2.4		2	S3.1		2	L1.2.4	1	L1.2.4		2	S1.1.1		2	L1.2.4	L2.1	
66	2	L1.2.4		1	L1.2.4		1	S3.1		1	L1.2.4	1	L1.2.4		3	S3.1		2	L1.2.4	L2.1	
67	2	L1.2.4		2	L1.2.4		3	S3.1		3	L1.2.4	2	L1.2.4		3	S3.1		2	L1.2.4	L2.1	
68	1	L1.2.4		1	L1.2.4		3	S3.1		1	L1.2.4	1	L1.2.4		3	S3.1		2	L1.2.4	L2.1	
69	2	L1.2.4		3	L1.2.4		3	S3.1		3	L1.2.4	2	L1.2.4		3	S3.1		2	L1.2.4	L2.1	
70	1	L1.2.4		3	L1.2.4		3	S3.1		3	L1.2.4	2	S1.1		3	S3.1		2	L1.2.4	L2.1	

Table 12.8
DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics Study 2006 (modified)

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5	DOK6	PObj6	S1Obj6	S2Obj6
71	2	L1.2.4		1	S3.1		2	S3.1		1	L1.2.4	1	L1.2.4		2	S3.1		2	L1.2.4	L2.1	
72	1	L1.2.4		1	S3.1		1	S3.1		1	L1.2.4	1	L1.2.4		1	S3.1		2	L1.2.4	L2.1	
73	2	L1.2.4		2	S3.1		3	S3.1		1	L1.2.4	1	L1.2.4		1	S3.1		2	L1.2.4	L2.1	
74	1	L1.2.4		2	S3.1		2	S3.1		2	L1.2.4	2	L1.2.4		1	S3.1		2	L1.2.4	L2.1	
75	2	L1.2.4		2	S3.1		2	L1.2.4		2	L1.2.4	2	S1.1.1		2	S1.1.1		2	L1.2.4	L2.1	
76	1	L1.2.4		1	S3.1		3	L1.2.4		1	L1.2.4	1	L1.2.4		1	S1.1.1		2	L1.2.4	L2.1	
77	2	L4.1		2	L4.2		2	L4.2		2	L4.2	1	L4.2	L4.1	2	L4.2		2	S4.2.1		
78	1	S4.2.1		1	S4.2.1		1	S4.1.1		1	S4.1.1	1	S4.2.1		1	S4.2.1		2	S4.2.1		
79	1	A3.1.3		2	A2.1.3		1	A2.2.2		1	A2.1.1	1	A2.6.2		1	A2.1.7		2	A2.2.2		
80	2	A2.1.7		1	A1.2.9		1	A1.2.9		1	A2.4.2	1	A2.1.7		1	A2.1.7		1	A1.2.9		
81	2	L2.1		2	L2.2.2		1	L2.1		2		1	L2.1		2	L2.1		2	L2.2.2		
82	2	L2.1		1	S4.2.1		1	S4.1.1		1	S4.2.1	1	S4.2.1		1	S4.2.1		2	S4.2.1		
83	2	A2.1.4		2	A1.2.1		2	L2.1.4		2	A2.3.3	3	A2.1.4		2	A2.1.4		1	A1.1.1		
84	2	A2.2.1		2	A2.2		3	L2.2.1		2	A2.2.1	3	A2.2		2	A2.2.1		1	A2.2.1		
85	2	A1.2.1		2	A1.2.1		1	L2.1		1	A2.4.1	2	A1.1.1		2	A1.2.1		2	A1.1.1		
86	2	L4.1		2	L4.2		2	L4.2		2	L4.2	2	L4.2		2	L4.2		1	S4.2.1		
87	1	G1.4.3		2	L4.2		1	L4.2		2	L4.2	1	L4.2		1	L4.2		1	S4.2.1		
88	1	L2.1		1	L2.1		1	L2.1		1	L1.2.1	1	L2.1		1	L2.1		2	A1.2.1		
89	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	A1.2.1		
90	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	A1.2.1		
91	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	A1.2.1		
92	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	A1.2.1		
93	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	L2.1		
94	2	S1.2.1		1	L2.1		1	L2.1		1	L2.1	1	S1.2.1		1	L2.1		2	L2.1		
95	2	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	L2.1		
96	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	L2.1		
97	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	A1.2.1		
98	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	A1.2.1		
99	1	S1.2.1		1	S1.2.1		1	S1.1.1		1	L2.1	1	L2.1		2	S1.1.1		2	L2.1		
100	2	L2.1		1	L2.1		2	L2.1		1	L2.1	1	L2.1		1	L2.1		2	A1.1.1		
101	2	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		2	L2.1		2	A1.1.1		
102	2	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		2	L2.1		
103	1	L2.1		1	L2.1		1	L2.1		1	L2.1	1	L2.1		1	L2.1		1	L2.1		
104	2	L2.1		1	L2.1		2	L2.1		1	L2.1	2	L2.1		1	L2.1		2	A1.1.1		
105	1	L2.1		1	L2.1		2	L2.1		1	L2.1	1	L2.1		2	L2.1		2	A1.1.1		

Table 12.8
DOK Levels and Objectives Coded by Each Reviewer
Michigan Mathematics Study 2006 (modified)

Item	DOK0	PObj0	S1Obj0	DOK1	PObj1	S1Obj1	DOK2	PObj2	S1Obj2	DOK3	PObj3	DOK4	PObj4	S1Obj4	DOK5	PObj5	S1Obj5	DOK6	PObj6	S1Obj6	S2Obj6
106	2	L2.1		1	L2.1		1	L3.1.1		1	L2.1	1	L3.1		2	L3.1.1		2	L3.1.1		
107	2	L2.1		2	L2.1		2	L2.1		2	L2.1	2	L3.1.1		2	L2.1		2	L3.1.1	A1.1.1	
108	2	L2.1		2	L2.1		2	L2.1		2	L2.1	1	L2.1		2	L2.1		2	L3.1.1		
109	2	G1.4.1		2	G1.4.1		2	G1.4.1		2	L2.1	2	G1.4.1		2	G1.4.1	L3.1.1	2	A1.1.1		
110	2	L2.1		2	L1.2.1		1	L1.2.1		2	L2.1	2	L3.1.1		2	L2.1		2	A1.1.1		
111	2	L2.1		2	G1.4.1		2	L2.1		2	L2.1	2	L3.1.1		2	L2.1	G1.4.1	2	A1.2.1		
112	1	L2.1		2	L2.1		1	L2.1		2	L2.1	2	L3.1.1		1	L2.1		2	A1.2.1		
113	2	L2.1		2	L2.1		2	L2.1		1	L2.1	2	L2.1		1	L2.1		2	A1.2.1		
114	2	L2.1		2	L2.1		2	L2.1		2	L2.1	2	L2.1		2	L2.1		2	A1.2.1		
115	1	G1.2.2		2	L2.1	G1.4.1	2	G1.4.1		2	L2.1	2	L3.1.1	G1.4.1	2	G1.4.1	L2.1	2	A1.2.1		
116	2	L2.1		2	G1.4.1		2	L1.2.1		2	L2.1	2	L2.1		2	G1.4.1		2	A1.2.1		
117	1	G1.8.1		2	G1.4.1		2	G1.8.1		2	L2.1	2	G1.8.1		1	G2.1.3		2	A1.2.1		

Objective Pairwise Comparison: 0.4219
Standard Pairwise Comparison: 0.5957

Table 12.9
Objectives Coded to Each Item by Reviewers
Michigan Mathematics Study 2006 (modified)

Low		Medium		High
5		7.264957		10

1	L1.1	L2.1	L2.1	L2.1	L2.1	L2.1	L3.1.1		
2	L1.2.1	A1.1.1	A1.2.1	A1.2.1	A1.2.1	S1.2.1	S1.2.1	S1.2.1	
3	G1.2.2	G1.2.3	G1.2.3	G1.2.3	G1.6.2	G1.6.3	G1.6.3	G1.6.4	G1.6.4
4	L2.1.2	L2.1.2	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A1.2.6		
5	L1.2.2	L2.1	L2.1	L2.1	L2.1	L2.1.2	L2.2		
6	L2.1	G1.4	G1.4.1	G1.4.1	G1.5.1	G1.5.1	G2.1		
7	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.3		
8	L1.2.1	L2.1	L2.1	L2.1	L2.1	L2.1	L4.1.1		
9	L2.1	L2.1	L2.1	L2.1	L2.2.1	L2.2.1	L2.2.2	L2.2.3	
10	L2.2	L2.2.1	L2.2.1	L2.2.1	L2.2.1	L2.2.1	A1.1.1		
11	A1.1.1	A1.1.1	A1.1.1	A1.1.1	A1.1.1	A1.2.1	A1.2.1		
12	G1.1.2	G1.1.2	G1.1.2	G1.1.2	G1.1.2	G1.2.1	G1.2.2	G1.2.2	G1.2.2
13	G1.2.2	G1.2.2	G1.2.2	G1.2.2	G1.2.2	G2.1	G2.1.1		
14	A1.1.4	A1.1.4	A1.1.4	A1.1.4	A1.1.4	A1.1.4	A1.1.4		
15	A1.1.4	A1.2.1	A1.2.3	A1.2.8	A1.2.8	A1.2.8	G1.6.1		
16	A1.1.1	A1.2.1	A1.2.1	A1.2.9	A2.4.1	A2.4.1	A2.4.1	A2.4.1	
17	L1.1.5	A1.2.9	G.1.1.5	G.1.1.5	G.1.1.5	G.1.1.5	G.1.1.5		
18	G1.1.2	G1.2.2	G1.2.2	G2.3.4	G2.3.4				
19	L1.1	L2.1.2	L2.1.2	L2.1.2	L2.1.2	L2.1.2			
20	A1.1.1	A1.1.1	A1.2.1	A1.2.1	A1.2.1	A1.2.1	A1.2.1		
21	A1.2.7	A1.2.9	A1.2.9	A1.2.9	A1.2.9	A1.2.9	A2.1.7		
22	L2.1.2	A2.1.2	A2.1.2	A2.1.2	A2.1.2	A2.1.2	A2.1.2		
23	A1.1.3	A1.1.3	A1.1.3	A1.1.3	A1.1.3	A1.1.3	A1.1.4		
24	L2.1	L2.1	L2.1	L2.1	L2.1	A2.5.1	G1.3		
25	G1.2.2	G1.2.3	G1.2.3	G1.3	G1.3	G1.3.1	G2.3.4	G2.3.4	G2.3.4
26	L1.3.1	G1.3.1	G1.3.1	G1.3.1	G1.3.1	G1.3.1	G1.3.1		
27	L1.1.4	L2.1	L2.1	A1.2.8	A3.1.3	A3.1.3	G2.3.5		
28	A1.2.1	A1.2.1	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A1.2.4		
29	S4.1	S4.1.1	S4.1.1	S4.1.2	S4.1.2	S4.2.1	S4.2.1	S4.2.1	S4.2.2
30	A1.2.1	A1.2.1	A1.2.1	A1.2.1	A1.2.1	A1.2.3	G1.4.1	G1.4.1	
31	L2.1	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A2.1.7		
32	L1.2.4	L2.1	L2.1	A3.1	S1.1.1				
33	L2.1	L2.1	L2.1	L2.1	A3.1	S1.1.1			
34	L1.2.4	G3.2.1	S1.1.1	S1.1.1	S1.1.1				
35	A1.2.1	G1.1.1	G1.1.1	G1.1.1	G1.1.1	G1.1.1	G1.2.5		
36	A1.2.1	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A1.2.3		
37	L2.1	L2.1	G1.4.1	G1.4.1	G1.4.1	G1.4.1	G1.4.1		
38	L1.2.1	L2.1	L2.1	L2.1	L2.1	L2.1			
39	G1.1.1	G1.1.2	G1.2	G1.2.1	G1.2.1	G1.2.2	G1.2.2		
40	L2.1	A1.1.1	A1.2.1	A1.2.9	G1.2.2	G1.2.2	G1.3.2	G1.4.1	
41	A1.2.1	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A1.2.3	A1.2.3		
42	A1.1.3	A1.1.3	A1.1.3	A1.1.4	A1.1.4	A1.1.4	A1.1.4	A1.1.5	

Table 12.9
Objectives Coded to Each Item by Reviewers
Michigan Mathematics Study 2006 (modified)

43	A1.2.9	A1.2.9	A1.2.9	A1.2.9	A1.2.9	A1.2.9	A2.4.1		
44	A2.1	A2.1.2	A2.2	A2.2	A2.2	A2.2	A2.2.1		
45	L1.2.4	L2.1	A1.2.9	A1.2.9	A1.2.9	A1.2.9	A2.4.1	G1.1	
46	G1.4.1	G1.8.1	G1.8.1	G1.8.1	G1.8.1	G1.8.1	G2.1		
47	A1.2.9	G1.6	G1.6	G1.6.1	G1.6.2	G.1.7.1	G.1.7.1		
48	A1.2.3	G1.2.2	G1.4.1	G1.4.1	G1.4.1	G1.4.1	G2.1		
49	A2.4.4	A2.4.4	A2.4.4	A2.4.4	A2.4.4	A2.4.4	G1.1		
50	L1.2.4	S1.1.2	S1.2.1	S1.2.1	S1.2.1	S1.2.1	S1.2.1	S1.2.2	
51	L1.2.2	A1.1.1	A1.2	A1.2.4	A1.2.4	A1.2.4	A2.1.6		
52	G1.4.1	G1.5.1	G1.5.1	G1.5.2	G1.5.2	G1.5.2	G2.1.2		
53	A1.1.1	G1.2	G1.2.1	G1.2.2	G1.2.2	G1.2.2	G1.2.5	G1.3	G1.3.1
54	L1.1.1	L1.2.1	L2.1	A1.1.1	A1.1.1	A1.2.4	A1.2.4		
55	A2.10	G1.3.1	G1.3.1	G1.3.1	G1.3.1	G1.3.1	G1.3.1		
56	A1.1.3	A1.1.3	A1.1.3	A1.1.3	A1.1.3	A1.1.3	A1.1.3		
57	A2.1	A2.10.1	G1.3.1	G1.3.1	G1.3.1	G1.3.1	G1.3.2		
58	A2.1	A2.1	A2.1.2	A2.1.2	A2.2.2	A2.2.2	A2.2.3		
59	A2.10.1	A2.10.1	A2.10.1	A2.10.3	A2.10.3	G1.3.1	G1.6.2		
60	A2.4	A2.4.2	A2.7.2	A3.1.3	S1.1.1	S1.1.1	S2.1.2		
61	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2	L2.1	S1.1.1	S3.1	
62	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S1.1.1	S3.1	
63	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S1.1.1	S3.1	
64	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	L2.1	S1.1.1	S3.1	
65	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S1.1.1	S3.1	
66	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	
67	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	
68	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	
69	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	
70	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S1.1	S3.1	S3.1	
71	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	S3.1	
72	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	S3.1	
73	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	S3.1	
74	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S3.1	S3.1	S3.1	
75	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S1.1.1	S1.1.1	S3.1	
76	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L1.2.4	L2.1	S1.1.1	S3.1	
77	L4.1	L4.1	L4.2	L4.2	L4.2	L4.2	L4.2	S4.2.1	
78	S4.1.1	S4.1.1	S4.2.1	S4.2.1	S4.2.1	S4.2.1	S4.2.1		
79	A2.1.1	A2.1.3	A2.1.7	A2.2.2	A2.2.2	A2.6.2	A3.1.3		
80	A1.2.9	A1.2.9	A1.2.9	A2.1.7	A2.1.7	A2.1.7	A2.4.2		
81	L2.1	L2.1	L2.1	L2.1	L2.2.2	L2.2.2			
82	L2.1	S4.1.1	S4.2.1	S4.2.1	S4.2.1	S4.2.1	S4.2.1		
83	L2.1.4	A1.1.1	A1.2.1	A2.1.4	A2.1.4	A2.1.4	A2.3.3		
84	L2.2.1	A2.2	A2.2	A2.2.1	A2.2.1	A2.2.1	A2.2.1		
85	L2.1	A1.1.1	A1.1.1	A1.2.1	A1.2.1	A1.2.1	A2.4.1		
86	L4.1	L4.2	L4.2	L4.2	L4.2	L4.2	S4.2.1		
87	L4.2	L4.2	L4.2	L4.2	L4.2	G1.4.3	S4.2.1		

Table 12.9
Objectives Coded to Each Item by Reviewers
Michigan Mathematics Study 2006 (modified)

88	L1.2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
89	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
90	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
91	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
92	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
93	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1			
94	L2.1	L2.1	L2.1	L2.1	L2.1	S1.2.1	S1.2.1			
95	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1			
96	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1			
97	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
98	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
99	L2.1	L2.1	L2.1	S1.1.1	S1.1.1	S1.2.1	S1.2.1			
100	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.1.1			
101	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.1.1			
102	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1			
103	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1			
104	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.1.1			
105	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.1.1			
106	L2.1	L2.1	L2.1	L3.1	L3.1.1	L3.1.1	L3.1.1			
107	L2.1	L2.1	L2.1	L2.1	L2.1	L3.1.1	L3.1.1	A1.1.1		
108	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	L3.1.1			
109	L2.1	L3.1.1	A1.1.1	G1.4.1	G1.4.1	G1.4.1	G1.4.1	G1.4.1		
110	L1.2.1	L1.2.1	L2.1	L2.1	L2.1	L3.1.1	A1.1.1			
111	L2.1	L2.1	L2.1	L2.1	L3.1.1	A1.2.1	G1.4.1	G1.4.1		
112	L2.1	L2.1	L2.1	L2.1	L2.1	L3.1.1	A1.2.1			
113	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
114	L2.1	L2.1	L2.1	L2.1	L2.1	L2.1	A1.2.1			
115	L2.1	L2.1	L2.1	L3.1.1	A1.2.1	G1.2.2	G1.4.1	G1.4.1	G1.4.1	G1.4.1
116	L1.2.1	L2.1	L2.1	L2.1	A1.2.1	G1.4.1	G1.4.1			
117	L2.1	A1.2.1	G1.4.1	G1.8.1	G1.8.1	G1.8.1	G2.1.3			

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics Study 2006 (modified)

Low		Medium		High
0		3.846154		226

L1																				
L1.1	1	19																		
L1.1.1	54																			
L1.1.2																				
L1.1.3																				
L1.1.4	27																			
L1.1.5	17																			
L1.1.6																				
L1.2																				
L1.2.1	2	8	38	54	88	110	110	116												
L1.2.2	5	51																		
L1.2.3																				
L1.2.4	32	34	45	50	61	61	61	61	62	62	62	62	62	63	63	63	63	63	64	64
	64	64	65	65	65	65	65	66	66	66	66	66	67	67	67	67	67	68	68	
	68	68	68	69	69	69	69	69	70	70	70	70	71	71	71	71	72	72	72	
	72	73	73	73	73	74	74	74	74	75	75	75	75	76	76	76	76	76		
L1.3																				
L1.3.1	26																			
L1.3.2																				
L1.3.3																				
L2	61																			
L2.1	1	1	1	1	1	5	5	5	5	6	7	7	7	7	7	7	8	8	8	8
	8	9	9	9	9	24	24	24	24	24	27	27	31	32	32	33	33	33	33	
	37	37	38	38	38	38	38	40	45	54	61	62	63	64	64	65	66	67	68	
	69	70	71	72	73	74	75	76	81	81	81	81	82	85	88	88	88	88	88	
	89	89	89	89	89	89	90	90	90	90	90	90	91	91	91	91	91	91	92	
	92	92	92	92	92	93	93	93	93	93	93	93	94	94	94	94	94	95	95	
	95	95	95	95	95	96	96	96	96	96	96	96	97	97	97	97	97	97	98	
	98	98	98	98	98	99	99	99	100	100	100	100	100	100	101	101	101	101	101	
	101	102	102	102	102	102	102	102	103	103	103	103	103	103	103	104	104	104	104	
	104	104	105	105	105	105	105	105	106	106	106	107	107	107	107	107	108	108	108	
	108	108	108	109	110	110	110	111	111	111	111	112	112	112	112	112	113	113	113	
	113	113	113	114	114	114	114	114	114	115	115	115	116	116	116	117				
L2.1.1																				
L2.1.2	4	4	5	19	19	19	19	19	22											
L2.1.3																				
L2.1.4	83																			
L2.1.5																				
L2.1.6																				
L2.2	5	10																		
L2.2.1	9	9	10	10	10	10	10	84												
L2.2.2	9	81	81																	
L2.2.3	9																			
L3																				
L3.1	106																			
L3.1.1	1	106	106	106	107	107	108	109	110	111	112	115								
L3.1.2																				
L3.2																				
L3.2.1																				
L3.2.2																				

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics Study 2006 (modified)

L3.2.3																					
L4																					
L4.1	77	77	86																		
L4.1.1	8																				
L4.1.2																					
L4.1.3																					
L4.2	77	77	77	77	77	86	86	86	86	86	87	87	87	87	87						
L4.2.1																					
L4.2.2																					
L4.2.3																					
L4.2.4																					
L4.3																					
L4.3.1																					
L4.3.2																					
L4.3.3																					
A1																					
A1.1																					
A1.1.1	2	10	11	11	11	11	11	16	20	20	40	51	53	54	54	83	85	85	100	101	
	104	105	107	109	110																
A1.1.2																					
A1.1.3	23	23	23	23	23	23	42	42	42	56	56	56	56	56	56	56					
A1.1.4	14	14	14	14	14	14	14	15	23	42	42	42	42								
A1.1.5	42																				
A1.1.6																					
A1.2	51																				
A1.2.1	2	2	2	11	11	15	16	16	20	20	20	20	20	28	28	30	30	30	30	30	
	35	36	40	41	83	85	85	85	88	89	90	91	92	97	98	111	112	113	114		
	115	116	117																		
A1.2.2																					
A1.2.3	4	4	4	4	7	15	28	28	28	28	30	31	31	31	31	31	36	36	36	36	
	36	36	41	41	41	41	41	41	48												
A1.2.4	28	51	51	51	54	54															
A1.2.5																					
A1.2.6	4																				
A1.2.7	21																				
A1.2.8	15	15	15	27																	
A1.2.9	16	17	21	21	21	21	21	40	43	43	43	43	43	43	45	45	45	45	47	80	
	80	80																			
A1.2.10																					
A2																					
A2.1	44	57	58	58																	
A2.1.1	79																				
A2.1.2	22	22	22	22	22	22	44	58	58												
A2.1.3	79																				
A2.1.4	83	83	83																		
A2.1.5																					
A2.1.6	51																				
A2.1.7	21	31	79	80	80	80															
A2.2	44	44	44	44	84	84															
A2.2.1	44	84	84	84	84																
A2.2.2	58	58	79	79																	
A2.2.3	58																				
A2.3																					
A2.3.1																					
A2.3.2																					

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics Study 2006 (modified)

A2.3.3	83																			
A2.4	60																			
A2.4.1	16	16	16	16	43	45	85													
A2.4.2	60	80																		
A2.4.3																				
A2.4.4	49	49	49	49	49	49														
A2.5																				
A2.5.1	24																			
A2.5.2																				
A2.5.3																				
A2.5.4																				
A2.5.5																				
A2.6																				
A2.6.1																				
A2.6.2	79																			
A2.6.3																				
A2.6.4																				
A2.6.5																				
A2.7																				
A2.7.1																				
A2.7.2	60																			
A2.7.3																				
A2.8																				
A2.8.1																				
A2.8.2																				
A2.8.3																				
A2.9																				
A2.9.1																				
A2.9.2																				
A2.10	55																			
A2.10.1	57	59	59	59																
A2.10.2																				
A2.10.3	59	59																		
A2.10.4																				
A2.10.5																				
A3																				
A3.1	32	33																		
A3.1.1																				
A3.1.2																				
A3.1.3	27	27	60	79																
G1																				
G1.1	45	49																		
G1.1.1	35	35	35	35	35	39														
G1.1.2	12	12	12	12	12	18	39													
G1.1.3																				
G1.1.4																				
G.1.1.5	17	17	17	17	17															
G.1.1.6																				
G1.2	39	53																		
G1.2.1	12	39	39	53																
G1.2.2	3	12	12	12	13	13	13	13	13	18	18	25	39	39	40	40	48	53	53	53
	115																			
G1.2.3	3	3	3	25	25															
G1.2.4																				
G1.2.5	35	53																		

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics Study 2006 (modified)

G1.3	24	25	25	53																
G1.3.1	25	26	26	26	26	26	26	53	55	55	55	55	55	55	57	57	57	57	59	
G1.3.2	40	57																		
G1.3.3																				
G1.4	6																			
G1.4.1	6	6	30	30	37	37	37	37	37	40	46	48	48	48	48	52	109	109	109	109
	109	111	111	115	115	115	115	116	116	117										
G1.4.2																				
G1.4.3	87																			
G1.4.4																				
G1.5																				
G1.5.1	6	6	52	52																
G1.5.2	52	52	52																	
G1.6	47	47																		
G1.6.1	15	47																		
G1.6.2	3	47	59																	
G1.6.3	3	3																		
G1.6.4	3	3																		
G1.7																				
G.1.7.1	47	47																		
G1.7.2																				
G1.7.3																				
G1.8																				
G1.8.1	46	46	46	46	46	117	117	117												
G1.8.2																				
G2																				
G2.1	6	13	46	48																
G2.1.1	13																			
G2.1.2	52																			
G2.1.3	117																			
G2.2																				
G2.2.1																				
G2.2.2																				
G2.3																				
G2.3.1																				
G2.3.2																				
G2.3.3																				
G2.3.4	18	18	25	25	25															
G2.3.5	27																			
G3																				
G3.1																				
G3.1.1																				
G3.1.2																				
G3.1.3																				
G3.2																				
G3.2.1	34																			
G3.2.2																				
S1																				
S1.1	70																			
S1.1.1	32	33	34	34	34	60	60	61	62	63	64	65	75	75	76	99	99			
S1.1.2	50																			
S1.2																				
S1.2.1	2	2	2	50	50	50	50	50	94	94	99	99								
S1.2.2	50																			
S1.2.3																				

Table 12.10
Items Coded by Reviewers to Each Objective
Michigan Mathematics Study 2006 (modified)

S1.3																				
S1.3.1																				
S1.3.2																				
S1.3.3																				
S1.3.4																				
S2																				
S2.1																				
S2.1.1																				
S2.1.2	60																			
S2.1.3																				
S2.1.4																				
S2.2																				
S2.2.1																				
S2.2.2																				
S3																				
S3.1	61	62	63	64	65	66	66	67	67	68	68	69	69	70	70	71	71	71	72	72
	72	73	73	73	74	74	74	75	76											
S3.1.1																				
S3.1.2																				
S3.1.3																				
S4																				
S4.1	29																			
S4.1.1	29	29	78	78	82															
S4.1.2	29	29																		
S4.2																				
S4.2.1	29	29	29	77	78	78	78	78	78	82	82	82	82	82	86	87				
S4.2.2	29																			

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

Michigan Mathematics Study 2006 (modified)

Low		Medium		High
1		3		7

L1													
L1.1	1:1	19:1											
L1.1.1	54:1												
L1.1.2													
L1.1.3													
L1.1.4	27:1												
L1.1.5	17:1												
L1.1.6													
L1.2													
L1.2.1	2:1	8:1	38:1	54:1	88:1	110:2	116:1						
L1.2.2	5:1	51:1											
L1.2.3													
L1.2.4	32:1	34:1	45:1	50:1	61:4	62:5	63:5	64:4	65:5	66:5	67:5	68:5	69:5
	70:4	71:4	72:4	73:4	74:4	75:4	76:5						
L1.3													
L1.3.1	26:1												
L1.3.2													
L1.3.3													
L2	61:1												
L2.1	1:5	5:4	6:1	7:6	8:5	9:4	24:5	27:2	31:1	32:2	33:4	37:2	38:5
	40:1	45:1	54:1	61:1	62:1	63:1	64:2	65:1	66:1	67:1	68:1	69:1	70:1
	71:1	72:1	73:1	74:1	75:1	76:1	81:4	82:1	85:1	88:5	89:6	90:6	91:6
	92:6	93:7	94:5	95:7	96:7	97:6	98:6	99:3	100:6	101:6	102:7	103:7	104:6
	105:6	106:3	107:5	108:6	109:1	110:3	111:4	112:5	113:6	114:6	115:3	116:3	117:1
L2.1.1													
L2.1.2	4:2	5:1	19:5	22:1									
L2.1.3													
L2.1.4	83:1												
L2.1.5													
L2.1.6													
L2.2	5:1	10:1											
L2.2.1	9:2	10:5	84:1										
L2.2.2	9:1	81:2											
L2.2.3	9:1												
L3													
L3.1	106:1												
L3.1.1	1:1	106:3	107:2	108:1	109:1	110:1	111:1	112:1	115:1				
L3.1.2													
L3.2													
L3.2.1													
L3.2.2													
L3.2.3													
L4													
L4.1	77:2	86:1											
L4.1.1	8:1												

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

Michigan Mathematics Study 2006 (modified)

L4.1.2													
L4.1.3													
L4.2	77:5	86:5	87:5										
L4.2.1													
L4.2.2													
L4.2.3													
L4.2.4													
L4.3													
L4.3.1													
L4.3.2													
L4.3.3													
A1													
A1.1													
A1.1.1	2:1	10:1	11:5	16:1	20:2	40:1	51:1	53:1	54:2	83:1	85:2	100:1	101:1
	104:1	105:1	107:1	109:1	110:1								
A1.1.2													
A1.1.3	23:6	42:3	56:7										
A1.1.4	14:7	15:1	23:1	42:4									
A1.1.5	42:1												
A1.1.6													
A1.2	51:1												
A1.2.1	2:3	11:2	15:1	16:2	20:5	28:2	30:5	35:1	36:1	40:1	41:1	83:1	85:3
	88:1	89:1	90:1	91:1	92:1	97:1	98:1	111:1	112:1	113:1	114:1	115:1	116:1
	117:1												
A1.2.2													
A1.2.3	4:4	7:1	15:1	28:4	30:1	31:5	36:6	41:6	48:1				
A1.2.4	28:1	51:3	54:2										
A1.2.5													
A1.2.6	4:1												
A1.2.7	21:1												
A1.2.8	15:3	27:1											
A1.2.9	16:1	17:1	21:5	40:1	43:6	45:4	47:1	80:3					
A1.2.10													
A2													
A2.1	44:1	57:1	58:2										
A2.1.1	79:1												
A2.1.2	22:6	44:1	58:2										
A2.1.3	79:1												
A2.1.4	83:3												
A2.1.5													
A2.1.6	51:1												
A2.1.7	21:1	31:1	79:1	80:3									
A2.2	44:4	84:2											
A2.2.1	44:1	84:4											
A2.2.2	58:2	79:2											
A2.2.3	58:1												
A2.3													
A2.3.1													
A2.3.2													
A2.3.3	83:1												

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

Michigan Mathematics Study 2006 (modified)

A2.4	60:1									
A2.4.1	16:4	43:1	45:1	85:1						
A2.4.2	60:1	80:1								
A2.4.3										
A2.4.4	49:6									
A2.5										
A2.5.1	24:1									
A2.5.2										
A2.5.3										
A2.5.4										
A2.5.5										
A2.6										
A2.6.1										
A2.6.2	79:1									
A2.6.3										
A2.6.4										
A2.6.5										
A2.7										
A2.7.1										
A2.7.2	60:1									
A2.7.3										
A2.8										
A2.8.1										
A2.8.2										
A2.8.3										
A2.9										
A2.9.1										
A2.9.2										
A2.10	55:1									
A2.10.1	57:1	59:3								
A2.10.2										
A2.10.3	59:2									
A2.10.4										
A2.10.5										
A3										
A3.1	32:1	33:1								
A3.1.1										
A3.1.2										
A3.1.3	27:2	60:1	79:1							
G1										
G1.1	45:1	49:1								
G1.1.1	35:5	39:1								
G1.1.2	12:5	18:1	39:1							
G1.1.3										
G1.1.4										
G.1.1.5	17:5									
G.1.1.6										
G1.2	39:1	53:1								
G1.2.1	12:1	39:2	53:1							
G1.2.2	3:1	12:3	13:5	18:2	25:1	39:2	40:2	48:1	53:3	115:1

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)
Michigan Mathematics Study 2006 (modified)

G1.2.3	3:3	25:2										
G1.2.4												
G1.2.5	35:1	53:1										
G1.3	24:1	25:2	53:1									
G1.3.1	25:1	26:6	53:1	55:6	57:4	59:1						
G1.3.2	40:1	57:1										
G1.3.3												
G1.4	6:1											
G1.4.1	6:2	30:2	37:5	40:1	46:1	48:4	52:1	109:5	111:2	115:4	116:2	117:1
G1.4.2												
G1.4.3	87:1											
G1.4.4												
G1.5												
G1.5.1	6:2	52:2										
G1.5.2	52:3											
G1.6	47:2											
G1.6.1	15:1	47:1										
G1.6.2	3:1	47:1	59:1									
G1.6.3	3:2											
G1.6.4	3:2											
G1.7												
G.1.7.1	47:2											
G1.7.2												
G1.7.3												
G1.8												
G1.8.1	46:5	117:3										
G1.8.2												
G2												
G2.1	6:1	13:1	46:1	48:1								
G2.1.1	13:1											
G2.1.2	52:1											
G2.1.3	117:1											
G2.2												
G2.2.1												
G2.2.2												
G2.3												
G2.3.1												
G2.3.2												
G2.3.3												
G2.3.4	18:2	25:3										
G2.3.5	27:1											
G3												
G3.1												
G3.1.1												
G3.1.2												
G3.1.3												
G3.2												
G3.2.1	34:1											
G3.2.2												
S1												

Table 12.11

Number of Reviewers Coding an Item by Objective (Item Number: Number of Reviewers)

Michigan Mathematics Study 2006 (modified)

S1.1	70:1												
S1.1.1	32:1	33:1	34:3	60:2	61:1	62:1	63:1	64:1	65:1	75:2	76:1	99:2	
S1.1.2	50:1												
S1.2													
S1.2.1	2:3	50:5	94:2	99:2									
S1.2.2	50:1												
S1.2.3													
S1.3													
S1.3.1													
S1.3.2													
S1.3.3													
S1.3.4													
S2													
S2.1													
S2.1.1													
S2.1.2	60:1												
S2.1.3													
S2.1.4													
S2.2													
S2.2.1													
S2.2.2													
S3													
S3.1	61:1	62:1	63:1	64:1	65:1	66:2	67:2	68:2	69:2	70:2	71:3	72:3	73:3
	74:3	75:1	76:1										
S3.1.1													
S3.1.2													
S3.1.3													
S4													
S4.1	29:1												
S4.1.1	29:2	78:2	82:1										
S4.1.2	29:2												
S4.2													
S4.2.1	29:3	77:1	78:5	82:5	86:1	87:1							
S4.2.2	29:1												

Table 12.12

Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)

Michigan Mathematics Study 2006 (modified)

Low		Medium		High
1		3		7

1	L1.1:1	L2.1:5	L3.1.1:1				
2	L1.2.1:1	A1.1.1:1	A1.2.1:3	S1.2.1:3			
3	G1.2.2:1	G1.2.3:3	G1.6.2:1	G1.6.3:2	G1.6.4:2		
4	L2.1.2:2	A1.2.3:4	A1.2.6:1				
5	L1.2.2:1	L2.1:4	L2.1.2:1	L2.2:1			
6	L2.1:1	G1.4:1	G1.4.1:2	G1.5.1:2	G2.1:1		
7	L2.1:6	A1.2.3:1					
8	L1.2.1:1	L2.1:5	L4.1.1:1				
9	L2.1:4	L2.2.1:2	L2.2.2:1	L2.2.3:1			
10	L2.2:1	L2.2.1:5	A1.1.1:1				
11	A1.1.1:5	A1.2.1:2					
12	G1.1.2:5	G1.2.1:1	G1.2.2:3				
13	G1.2.2:5	G2.1:1	G2.1.1:1				
14	A1.1.4:7						
15	A1.1.4:1	A1.2.1:1	A1.2.3:1	A1.2.8:3	G1.6.1:1		
16	A1.1.1:1	A1.2.1:2	A1.2.9:1	A2.4.1:4			
17	L1.1.5:1	A1.2.9:1	G.1.1.5:5				
18	G1.1.2:1	G1.2.2:2	G2.3.4:2				
19	L1.1:1	L2.1.2:5					
20	A1.1.1:2	A1.2.1:5					
21	A1.2.7:1	A1.2.9:5	A2.1.7:1				
22	L2.1.2:1	A2.1.2:6					
23	A1.1.3:6	A1.1.4:1					
24	L2.1:5	A2.5.1:1	G1.3:1				
25	G1.2.2:1	G1.2.3:2	G1.3:2	G1.3.1:1	G2.3.4:3		
26	L1.3.1:1	G1.3.1:6					
27	L1.1.4:1	L2.1:2	A1.2.8:1	A3.1.3:2	G2.3.5:1		
28	A1.2.1:2	A1.2.3:4	A1.2.4:1				
29	S4.1:1	S4.1.1:2	S4.1.2:2	S4.2.1:3	S4.2.2:1		
30	A1.2.1:5	A1.2.3:1	G1.4.1:2				
31	L2.1:1	A1.2.3:5	A2.1.7:1				
32	L1.2.4:1	L2.1:2	A3.1:1	S1.1.1:1			
33	L2.1:4	A3.1:1	S1.1.1:1				
34	L1.2.4:1	G3.2.1:1	S1.1.1:3				
35	A1.2.1:1	G1.1.1:5	G1.2.5:1				
36	A1.2.1:1	A1.2.3:6					
37	L2.1:2	G1.4.1:5					
38	L1.2.1:1	L2.1:5					
39	G1.1.1:1	G1.1.2:1	G1.2:1	G1.2.1:2	G1.2.2:2		
40	L2.1:1	A1.1.1:1	A1.2.1:1	A1.2.9:1	G1.2.2:2	G1.3.2:1	G1.4.1:1
41	A1.2.1:1	A1.2.3:6					
42	A1.1.3:3	A1.1.4:4	A1.1.5:1				
43	A1.2.9:6	A2.4.1:1					
44	A2.1:1	A2.1.2:1	A2.2:4	A2.2.1:1			
45	L1.2.4:1	L2.1:1	A1.2.9:4	A2.4.1:1	G1.1:1		

Table 12.12

Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
Michigan Mathematics Study 2006 (modified)

46	G1.4.1:1	G1.8.1:5	G2.1:1				
47	A1.2.9:1	G1.6:2	G1.6.1:1	G1.6.2:1	G.1.7.1:2		
48	A1.2.3:1	G1.2.2:1	G1.4.1:4	G2.1:1			
49	A2.4.4:6	G1.1:1					
50	L1.2.4:1	S1.1.2:1	S1.2.1:5	S1.2.2:1			
51	L1.2.2:1	A1.1.1:1	A1.2:1	A1.2.4:3	A2.1.6:1		
52	G1.4.1:1	G1.5.1:2	G1.5.2:3	G2.1.2:1			
53	A1.1.1:1	G1.2:1	G1.2.1:1	G1.2.2:3	G1.2.5:1	G1.3:1	G1.3.1:1
54	L1.1.1:1	L1.2.1:1	L2.1:1	A1.1.1:2	A1.2.4:2		
55	A2.10:1	G1.3.1:6					
56	A1.1.3:7						
57	A2.1:1	A2.10.1:1	G1.3.1:4	G1.3.2:1			
58	A2.1:2	A2.1.2:2	A2.2.2:2	A2.2.3:1			
59	A2.10.1:3	A2.10.3:2	G1.3.1:1	G1.6.2:1			
60	A2.4:1	A2.4.2:1	A2.7.2:1	A3.1.3:1	S1.1.1:2	S2.1.2:1	
61	L1.2.4:4	L2:1	L2.1:1	S1.1.1:1	S3.1:1		
62	L1.2.4:5	L2.1:1	S1.1.1:1	S3.1:1			
63	L1.2.4:5	L2.1:1	S1.1.1:1	S3.1:1			
64	L1.2.4:4	L2.1:2	S1.1.1:1	S3.1:1			
65	L1.2.4:5	L2.1:1	S1.1.1:1	S3.1:1			
66	L1.2.4:5	L2.1:1	S3.1:2				
67	L1.2.4:5	L2.1:1	S3.1:2				
68	L1.2.4:5	L2.1:1	S3.1:2				
69	L1.2.4:5	L2.1:1	S3.1:2				
70	L1.2.4:4	L2.1:1	S1.1:1	S3.1:2			
71	L1.2.4:4	L2.1:1	S3.1:3				
72	L1.2.4:4	L2.1:1	S3.1:3				
73	L1.2.4:4	L2.1:1	S3.1:3				
74	L1.2.4:4	L2.1:1	S3.1:3				
75	L1.2.4:4	L2.1:1	S1.1.1:2	S3.1:1			
76	L1.2.4:5	L2.1:1	S1.1.1:1	S3.1:1			
77	L4.1:2	L4.2:5	S4.2.1:1				
78	S4.1.1:2	S4.2.1:5					
79	A2.1.1:1	A2.1.3:1	A2.1.7:1	A2.2.2:2	A2.6.2:1	A3.1.3:1	
80	A1.2.9:3	A2.1.7:3	A2.4.2:1				
81	L2.1:4	L2.2.2:2					
82	L2.1:1	S4.1.1:1	S4.2.1:5				
83	L2.1.4:1	A1.1.1:1	A1.2.1:1	A2.1.4:3	A2.3.3:1		
84	L2.2.1:1	A2.2:2	A2.2.1:4				
85	L2.1:1	A1.1.1:2	A1.2.1:3	A2.4.1:1			
86	L4.1:1	L4.2:5	S4.2.1:1				
87	L4.2:5	G1.4.3:1	S4.2.1:1				
88	L1.2.1:1	L2.1:5	A1.2.1:1				
89	L2.1:6	A1.2.1:1					
90	L2.1:6	A1.2.1:1					
91	L2.1:6	A1.2.1:1					
92	L2.1:6	A1.2.1:1					
93	L2.1:7						
94	L2.1:5	S1.2.1:2					
95	L2.1:7						

Table 12.12

Number of Reviewers Coding an Objective by Item (Objective: Number of Reviewers)
Michigan Mathematics Study 2006 (modified)

96	L2.1:7				
97	L2.1:6	A1.2.1:1			
98	L2.1:6	A1.2.1:1			
99	L2.1:3	S1.1.1:2	S1.2.1:2		
100	L2.1:6	A1.1.1:1			
101	L2.1:6	A1.1.1:1			
102	L2.1:7				
103	L2.1:7				
104	L2.1:6	A1.1.1:1			
105	L2.1:6	A1.1.1:1			
106	L2.1:3	L3.1:1	L3.1.1:3		
107	L2.1:5	L3.1.1:2	A1.1.1:1		
108	L2.1:6	L3.1.1:1			
109	L2.1:1	L3.1.1:1	A1.1.1:1	G1.4.1:5	
110	L1.2.1:2	L2.1:3	L3.1.1:1	A1.1.1:1	
111	L2.1:4	L3.1.1:1	A1.2.1:1	G1.4.1:2	
112	L2.1:5	L3.1.1:1	A1.2.1:1		
113	L2.1:6	A1.2.1:1			
114	L2.1:6	A1.2.1:1			
115	L2.1:3	L3.1.1:1	A1.2.1:1	G1.2.2:1	G1.4.1:4
116	L1.2.1:1	L2.1:3	A1.2.1:1	G1.4.1:2	
117	L2.1:1	A1.2.1:1	G1.4.1:1	G1.8.1:3	G2.1.3:1

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics Study 2006 (modified)

Low DOK		Matched DOK		High DOK
1		3		7

L1 [2]:													
L1.1 [2]:	1:1 [1]	19:1 [1]											
L1.1.1 [2]:	54:1 [2]												
L1.1.2 [2]:													
L1.1.3 [2]:													
L1.1.4 [2]:	27:1 [2]												
L1.1.5 [3]:	17:1 [2]												
L1.1.6 [3]:													
L1.2 [2]:													
L1.2.1 [1]:	2:1 [2]	8:1 [2]	38:1 [1]	54:1 [2]	88:1 [1]	110:2 [1.5]	116:1 [2]						
L1.2.2 [2]:	5:1 [1]	51:1 [2]											
L1.2.3 [2]:													
L1.2.4 [2]:	32:1 [1]	34:1 [2]	45:1 [2]	50:1 [3]	61:4 [2]	62:5 [1.2]	63:5 [1.2]	64:4 [1.75]	65:5 [1.4]	66:5 [1.4]	67:5 [2.2]	68:5 [1.2]	69:5 [2.4]
	70:4 [2.25]	71:4 [1.5]	72:4 [1.25]	73:4 [1.5]	74:4 [1.75]	75:4 [2]	76:5 [1.6]						
L1.3 [2]:													
L1.3.1 [3]:	26:1 [2]												
L1.3.2 [2]:													
L1.3.3 [2]:													
L2 [2]:	61:1 [1]												
L2.1 [2]:	1:5 [1.2]	5:4 [1.25]	6:1 [2]	7:6 [1.83]	8:5 [2]	9:4 [2]	24:5 [1]	27:2 [1.5]	31:1 [1]	32:2 [1.5]	33:4 [1.5]	37:2 [1.5]	38:5 [1]
	40:1 [2]	45:1 [1]	54:1 [1]	61:1 [2]	62:1 [2]	63:1 [2]	64:2 [1.5]	65:1 [2]	66:1 [2]	67:1 [2]	68:1 [2]	69:1 [2]	70:1 [2]
	71:1 [2]	72:1 [2]	73:1 [2]	74:1 [2]	75:1 [2]	76:1 [2]	81:4 [1.5]	82:1 [2]	85:1 [1]	88:5 [1]	89:6 [1]	90:6 [1]	91:6 [1]
	92:6 [1]	93:7 [1.14]	94:5 [1.2]	95:7 [1.29]	96:7 [1.14]	97:6 [1]	98:6 [1]	99:3 [1.33]	100:6 [1.33]	101:6 [1.33]	102:7 [1.29]	103:7 [1]	104:6 [1.5]
	105:6 [1.33]	106:3 [1.33]	107:5 [2]	108:6 [1.83]	109:1 [2]	110:3 [2]	111:4 [2]	112:5 [1.4]	113:6 [1.67]	114:6 [2]	115:3 [2]	116:3 [2]	117:1 [2]
L2.1.1 [2]:													
L2.1.2 [1]:	4:2 [1]	5:1 [1]	19:5 [1]	22:1 [1]									
L2.1.3 [3]:													
L2.1.4 [1]:	83:1 [2]												

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics Study 2006 (modified)

L2.1.5 [2]:													
L2.1.6 [2]:													
L2.2 [2]:	5:1 [2]	10:1 [1]											
L2.2.1 [2]:	9:2 [2]	10:5 [1]	84:1 [3]										
L2.2.2 [2]:	9:1 [2]	81:2 [2]											
L2.2.3 [2]:	9:1 [1]												
L3 [2]:													
L3.1 [3]:	106:1 [1]												
L3.1.1 [2]:	1:1 [1]	106:3 [1.67]	107:2 [2]	108:1 [2]	109:1 [2]	110:1 [2]	111:1 [2]	112:1 [2]	115:1 [2]				
L3.1.2 [3]:													
L3.2 [2]:													
L3.2.1 [3]:													
L3.2.2 [2]:													
L3.2.3 [2]:													
L4 [2]:													
L4.1 [2]:	77:2 [1.5]	86:1 [2]											
L4.1.1 [2]:	8:1 [1]												
L4.1.2 [1]:													
L4.1.3 [2]:													
L4.2 [2]:	77:5 [1.8]	86:5 [2]	87:5 [1.4]										
L4.2.1 [1]:													
L4.2.2 [2]:													
L4.2.3 [2]:													
L4.2.4 [2]:													
L4.3 [3]:													
L4.3.1 [1]:													
L4.3.2 [3]:													
L4.3.3 [3]:													
A1 [2]:													
A1.1 [2]:													
A1.1.1 [2]:	2:1 [1]	10:1 [1]	11:5 [1.4]	16:1 [1]	20:2 [1]	40:1 [1]	51:1 [1]	53:1 [2]	54:2 [2]	83:1 [1]	85:2 [2]	100:1 [2]	101:1 [2]
	104:1 [2]	105:1 [2]	107:1 [2]	109:1 [2]	110:1 [2]								
A1.1.2 [2]:													
A1.1.3 [2]:	23:6 [1.33]	42:3 [2.67]	56:7 [1.86]										
A1.1.4 [2]:	14:7 [1]	15:1 [1]	23:1 [2]	42:4 [1.75]									
A1.1.5 [2]:	42:1 [2]												

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics Study 2006 (modified)

A1.1.6 [2]:													
A1.2 [3]:	51:1 [2]												
A1.2.1 [2]:	2:3 [1.67]	11:2 [2]	15:1 [1]	16:2 [2]	20:5 [1]	28:2 [1]	30:5 [1.4]	35:1 [1]	36:1 [2]	40:1 [1]	41:1 [2]	83:1 [2]	85:3 [2]
	88:1 [2]	89:1 [2]	90:1 [2]	91:1 [2]	92:1 [2]	97:1 [2]	98:1 [2]	111:1 [2]	112:1 [2]	113:1 [2]	114:1 [2]	115:1 [2]	116:1 [2]
	117:1 [2]												
A1.2.2 [1]:													
A1.2.3 [2]:	4:4 [1.5]	7:1 [2]	15:1 [1]	28:4 [1.25]	30:1 [2]	31:5 [1.4]	36:6 [1.67]	41:6 [2]	48:1 [2]				
A1.2.4 [3]:	28:1 [1]	51:3 [2]	54:2 [2.5]										
A1.2.5 [3]:													
A1.2.6 [3]:	4:1 [2]												
A1.2.7 [3]:	21:1 [1]												
A1.2.8 [3]:	15:3 [1]	27:1 [2]											
A1.2.9 [2]:	16:1 [1]	17:1 [1]	21:5 [1.6]	40:1 [1]	43:6 [1.17]	45:4 [1.5]	47:1 [1]	80:3 [1]					
A1.2.10 [2]:													
A2 [2]:													
A2.1 [2]:	44:1 [2]	57:1 [2]	58:2 [1.5]										
A2.1.1 [2]:	79:1 [1]												
A2.1.2 [2]:	22:6 [1]	44:1 [1]	58:2 [1.5]										
A2.1.3 [2]:	79:1 [2]												
A2.1.4 [1]:	83:3 [2.33]												
A2.1.5 [2]:													
A2.1.6 [2]:	51:1 [2]												
A2.1.7 [2]:	21:1 [1]	31:1 [2]	79:1 [1]	80:3 [1.33]									
A2.2 [1]:	44:4 [1.5]	84:2 [2.5]											
A2.2.1 [1]:	44:1 [2]	84:4 [1.75]											
A2.2.2 [2]:	58:2 [1.5]	79:2 [1.5]											
A2.2.3 [1]:	58:1 [2]												
A2.3 [2]:													
A2.3.1 [2]:													

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics Study 2006 (modified)

A2.3.2 [2]:				
A2.3.3 [1]:	83:1 [2]			
A2.4 [2]:	60:1 [1]			
A2.4.1 [2]:	16:4 [1.5]	43:1 [1]	45:1 [2]	85:1 [1]
A2.4.2 [2]:	60:1 [1]	80:1 [1]		
A2.4.3 [2]:				
A2.4.4 [2]:	49:6 [1]			
A2.5 [2]:				
A2.5.1 [2]:	24:1 [1]			
A2.5.2 [2]:				
A2.5.3 [2]:				
A2.5.4 [2]:				
A2.5.5 [3]:				
A2.6 [2]:				
A2.6.1 [2]:				
A2.6.2 [2]:	79:1 [1]			
A2.6.3 [1]:				
A2.6.4 [2]:				
A2.6.5 [2]:				
A2.7 [2]:				
A2.7.1 [2]:				
A2.7.2 [2]:	60:1 [3]			
A2.7.3 [2]:				
A2.8 [2]:				
A2.8.1 [2]:				
A2.8.2 [2]:				
A2.8.3 [2]:				
A2.9 [2]:				
A2.9.1 [2]:				
A2.9.2 [2]:				
A2.10 [2]:	55:1 [2]			
A2.10.1 [2]:	57:1 [2]	59:3 [1.33]		
A2.10.2 [2]:				
A2.10.3 [1]:	59:2 [1]			
A2.10.4 [2]:				
A2.10.5 [2]:				
A3 [2]:				
A3.1 [2]:	32:1 [2]	33:1 [2]		

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics Study 2006 (modified)

A3.1.1 [2]:												
A3.1.2 [2]:												
A3.1.3 [2]:	27:2 [3]	60:1 [2]	79:1 [1]									
G1 [3]:												
G1.1 [3]:	45:1 [1]	49:1 [1]										
G1.1.1 [3]:	35:5 [2]	39:1 [2]										
G1.1.2 [3]:	12:5 [1.6]	18:1 [2]	39:1 [2]									
G1.1.3 [3]:												
G1.1.4 [3]:												
G.1.1.5 [1]:	17:5 [1.2]											
G.1.1.6 [2]:												
G1.2 [3]:	39:1 [2]	53:1 [2]										
G1.2.1 [3]:	12:1 [2]	39:2 [1.5]	53:1 [1]									
G1.2.2 [3]:	3:1 [2]	12:3 [2]	13:5 [1]	18:2 [1.5]	25:1 [3]	39:2 [2]	40:2 [1.5]	48:1 [3]	53:3 [1.67]	115:1 [1]		
G1.2.3 [2]:	3:3 [2]	25:2 [3]										
G1.2.4 [3]:												
G1.2.5 [3]:	35:1 [1]	53:1 [2]										
G1.3 [2]:	24:1 [1]	25:2 [3]	53:1 [2]									
G1.3.1 [2]:	25:1 [3]	26:6 [1.67]	53:1 [2]	55:6 [1.83]	57:4 [2.25]	59:1 [1]						
G1.3.2 [2]:	40:1 [1]	57:1 [2]										
G1.3.3 [2]:												
G1.4 [3]:	6:1 [2]											
G1.4.1 [3]:	6:2 [2]	30:2 [1.5]	37:5 [1.8]	40:1 [2]	46:1 [2]	48:4 [2.5]	52:1 [2]	109:5 [2]	111:2 [2]	115:4 [2]	116:2 [2]	117:1 [2]
G1.4.2 [3]:												
G1.4.3 [3]:	87:1 [1]											
G1.4.4 [3]:												
G1.5 [3]:												
G1.5.1 [2]:	6:2 [2]	52:2 [2]										
G1.5.2 [3]:	52:3 [2]											
G1.6 [3]:	47:2 [1.5]											

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics Study 2006 (modified)

G1.6.1 [2]:	15:1 [1]	47:1 [2]		
G1.6.2 [3]:	3:1 [2]	47:1 [2]	59:1 [2]	
G1.6.3 [3]:	3:2 [2]			
G1.6.4 [2]:	3:2 [2]			
G1.7 [2]:				
G.1.7.1 [2]:	47:2 [2]			
G1.7.2 [2]:				
G1.7.3 [2]:				
G1.8 [2]:				
G1.8.1 [2]:	46:5 [2]	117:3 [1.67]		
G1.8.2 [1]:				
G2 [2]:				
G2.1 [2]:	6:1 [2]	13:1 [1]	46:1 [2]	48:1 [2]
G2.1.1 [2]:	13:1 [2]			
G2.1.2 [2]:	52:1 [2]			
G2.1.3 [2]:	117:1 [1]			
G2.2 [2]:				
G2.2.1 [2]:				
G2.2.2 [2]:				
G2.3 [3]:				
G2.3.1 [3]:				
G2.3.2 [3]:				
G2.3.3 [3]:				
G2.3.4 [2]:	18:2 [1.5]	25:3 [2.67]		
G2.3.5 [2]:	27:1 [3]			
G3 [1]:				
G3.1 [1]:				
G3.1.1 [1]:				
G3.1.2 [1]:				
G3.1.3 [2]:				
G3.2 [2]:				
G3.2.1 [1]:	34:1 [1]			
G3.2.2 [2]:				
S1 [2]:				
S1.1 [2]:	70:1 [2]			

Table 12.13

Assessment Item DOK vs Consensus DOK (Item Number: Number of Reviewers [Average DOK])

Michigan Mathematics Study 2006 (modified)

S1.1.1 [2]:	32:1 [1]	33:1 [2]	34:3 [2.33]	60:2 [2.5]	61:1 [2]	62:1 [2]	63:1 [2]	64:1 [2]	65:1 [2]	75:2 [2]	76:1 [1]	99:2 [1.5]	
S1.1.2 [2]:	50:1 [2]												
S1.2 [2]:													
S1.2.1 [2]:	2:3 [1.67]	50:5 [2.2]	94:2 [1.5]	99:2 [1]									
S1.2.2 [2]:	50:1 [2]												
S1.2.3 [2]:													
S1.3 [2]:													
S1.3.1 [2]:													
S1.3.2 [2]:													
S1.3.3 [2]:													
S1.3.4 [2]:													
S2 [2]:													
S2.1 [2]:													
S2.1.1 [2]:													
S2.1.2 [2]:	60:1 [2]												
S2.1.3 [2]:													
S2.1.4 [3]:													
S2.2 [2]:													
S2.2.1 [2]:													
S2.2.2 [2]:													
S3 [3]:													
S3.1 [3]:	61:1 [2]	62:1 [2]	63:1 [2]	64:1 [2]	65:1 [2]	66:2 [2]	67:2 [3]	68:2 [3]	69:2 [3]	70:2 [3]	71:3 [1.67]	72:3 [1]	73:3 [2]
	74:3 [1.67]	75:1 [2]	76:1 [1]										
S3.1.1 [2]:													
S3.1.2 [3]:													
S3.1.3 [3]:													
S4 [2]:													
S4.1 [2]:	29:1 [1]												
S4.1.1 [2]:	29:2 [1.5]	78:2 [1]	82:1 [1]										
S4.1.2 [2]:	29:2 [1.5]												
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S4.2.1 [2]:	29:3 [1.67]	77:1 [2]	78:5 [1.2]	82:5 [1.2]	86:1 [1]	87:1 [1]							
S4.2.2 [3]:	29:1 [1]												