

**New York State Regents Examination in Geometry  
(Common Core)**

**2014 Field Test Analysis,  
Equating Procedure, and Scaling of  
Operational Test Forms**

**Technical Report**



Prepared for the New York State Education Department  
by Pearson

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## Section I: Introduction

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### PURPOSE

The purpose of this report is to document the psychometric properties of the New York State Regents Examination in Geometry. In addition, this report documents the procedures used to analyze the results of the field test and to equate and scale the operational test forms. For 2014, there are separate Common Core and Non-Common Core portions. The present report addresses only the Common Core portion; the Non-Common Core portion is addressed in a separate Technical Report.

## Section II: Field Test Analysis

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In May 2014, prospective items for the New York State Regents Examination in Geometry (Common Core) were field tested. The results of this testing were used to evaluate item quality. Only items with acceptable statistical characteristics can be selected for use on operational tests.

Representative student samples for participation in this testing were selected to mirror the demographics of the student population that is expected to take the operational test. The Need/Resource Capacity Categories in Table 1 were used as variables in the sampling plan.

**Table 1. Need/Resource Capacity Category Definitions**

Need/Resource Capacity (N/RC) Category	Definition
High N/RC Districts: New York City	New York City
Large Cities	Buffalo, Rochester, Syracuse, Yonkers
Urban/Suburban	All districts at or above the 70 <sup>th</sup> percentile on the index with at least 100 students per square mile or enrollment greater than 2500
Rural	All districts at or above the 70 <sup>th</sup> percentile on the index with fewer than 50 students per square mile or enrollment of fewer than 2500
Average N/RC Districts	All districts between the 20 <sup>th</sup> and 70 <sup>th</sup> percentiles on the index
Low N/RC Districts	All districts below the 20 <sup>th</sup> percentile on the index
Charter Schools	Each charter school is a district

## FILE PROCESSING AND DATA CLEANUP

The Regents examinations utilize both multiple-choice (MC) and constructed-response (CR) item types in order to more fully assess student ability. Multiple field test (FT) forms were given during this administration to allow a large number of items to be field tested without placing an undue burden on the students participating in the field test; each student only took a small subset of the items being field tested. The New York State Education Department (NYSED) handled all scanning of MC responses. Scoring of CR responses was performed by Measurement Incorporated (MI) under contract with the NYSED. The NYSED and MI produced separate data files which were provided to Pearson. A test map file that documented the items on each of the FT forms was also provided to Pearson by the NYSED. Finally, student data file layouts containing the position of every field within the student data files from both the NYSED and MI were also provided to Pearson by the NYSED. Upon receipt of these files, Pearson staff checked the data, test map, and layouts for consistency. Any anomalies were referred back to the NYSED for resolution. After these had been resolved and corrected as necessary final processing of the data file then took place. Merging of the NYSED and MI provided data was accomplished through uniquely assigned booklet numbers. This processing included the identification and deletion of invalid student test records through the application of a set of predefined exclusion rules.<sup>1</sup> The original student data file received from the NYSED contained 51,547 records (which contained student records for both the Common Core and Non-Common Core portions of the examination); the final field test data file for the Common Core portion contained 19,041 records.

Within the final data file used in the field test analyses, MC responses were scored according to the item keys contained in the test map; correct responses received a score of 1, while incorrect responses received a score of 0. CR item scores were taken directly from the student data file, with the exception that out-of-range scores were assigned scores of 0. For Item Response Theory (IRT) calibrations, blanks (i.e., missing data, not omits) were also scored as 0.

In addition to the scored data, the final data file also contained the unscored student responses and scores. Unscored data was used to calculate the percentage of students who selected the various answer choices for the MC items or the percentage of students who received each achievable score point for the CR items. The frequency of students leaving items blank was also calculated. The scored data were used for all other analyses.

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<sup>1</sup> These exclusion rules flagged records without both an MC and a CR component, records with invalid or out-of-range form numbers, records without any responses, and duplicate records. These records were dropped prior to analysis.

## CLASSICAL ANALYSIS

Classical Test Theory assumes that any observed test score  $x$  is composed of both true score  $t$  and error score  $e$ . This assumption is expressed as follows:

$$x = t + e$$

All test scores are composed of both a true and an error component. For example, the choice of test items or administration conditions might influence student responses, making a student's observed score higher or lower than the student's true ability would warrant. This error component is random and uncorrelated with (i.e., unrelated to) the student's true score. Across an infinitely large number of administrations, the mean of the error scores would be zero. Thus, the best estimate of a student's true score for any test administration (or their expected score given their [unobservable] true level of ability or true score) is that student's observed score. This expectation is expressed as follows:

$$E(x) = t$$

Item difficulties, point-biserial correlations, reliability estimates, and various statistics related to rater agreement have been calculated and are summarized in the following section.

### *Item Difficulty*

Item difficulty is typically defined as the average of scores for a given item. For MC items, this value (commonly referred to as a p-value) ranges from 0 to 1. For CR items, this value ranges from 0 to the maximum possible score. In order to place all item means on a common metric (ranging from 0 to 1), CR item means were divided by the maximum points possible for the item.

### *Item Discrimination*

Item discrimination is defined as the correlation between a score on a given test question and the overall raw test score. These correlations are Pearson correlation coefficients. For MC items, it is also known as the "point biserial correlation."

Table 2 presents a summary of the classical item analysis for each of the field test forms. The first three columns from the left identify the form number, the number of students who took each form, and the number of items on each field test form, respectively. The remaining columns are divided into two sections (i.e., item difficulty and discrimination). Recall that for CR items, item means were divided by the maximum number of points possible in order to place them in the same metric as the MC items. No item had a difficulty greater than 0.90, and 19 items had correlations that were less than 0.25. In addition to the summary information provided in Table 2, further classical item statistics are provided in Appendix A.

**Table 2. Classical Item Analysis Summary**

Form	N-Count	No. of Items	Item Difficulty			Item Discrimination		
			<0.50	0.50 to 0.90	>0.90	<0.25	0.25 to 0.50	>0.50
201	927	10	8	2	0	0	6	4
202	947	10	9	1	0	1	4	5
203	946	10	8	2	0	1	7	2
204	957	10	8	2	0	0	7	3
205	960	10	7	3	0	0	5	5
206	964	10	6	3	0	2	4	3
207	966	10	7	3	0	1	6	3
208	958	10	7	2	0	0	7	2
209	949	10	7	3	0	0	7	3
210	953	10	8	2	0	0	6	4
211	953	10	10	0	0	1	7	2
212	963	10	9	1	0	1	7	2
213	941	10	7	2	0	2	5	2
214	945	10	9	1	0	0	5	5
215	952	10	7	3	0	1	6	3
216	945	10	8	2	0	0	8	2
217	952	10	6	3	0	1	6	2
218	946	10	6	4	0	4	3	3
219	963	10	8	2	0	3	4	3
220	954	10	9	1	0	1	6	3

For some forms, the item counts in the “Item Difficulty” and “Item Discrimination” columns may not sum to the value in the “No. of Items” column due to DNS (Do Not Score) items.

### *Test Reliability*

Reliability is the consistency of the results obtained from a measurement with respect to time or between items or subjects that constitute a test. As such, test reliability can be estimated in a variety of ways. Internal consistency indices are a measure of how consistently examinees respond to items within a test. Two factors influence estimates of internal consistency: (1) test length and (2) homogeneity of the items. In general, the more items on the examination, the higher the reliability and the more similar the items, the higher the reliability.

Table 3 contains the internal consistency statistics for each of the field test forms under the heading “Test Reliability.” These statistics ranged from 0.41 to 0.66. It should be noted that these field test forms were very short; operational tests generally are composed of more items, and will likely have much higher reliabilities.

### *Scoring Reliability*

One concern with CR items is the reliability of the scoring process (i.e., consistency of the score assignment). CR items must be read by scorers who assign scores based on a comparison between the rubric and student responses. Consistency between scorers is a critical part of the reliability of the assessment. To track scorer consistency, approximately 10% of the test booklets are scored a second time (these are termed “second read scores”) and compared to the original set of scores (also known as “first read scores”).

As an overall measure of scoring reliability, the Pearson correlation coefficient between the first and second scores for all CR items with second read scores was computed for each form. This statistic is often used as an overall indicator of scoring reliability, and it generally ranges from 0 to 1. Table 3 contains these values in the column headed “Scoring Reliability.” They ranged from 0.82 to 0.95, indicating a high degree of reliability.

**Table 3. Test and Scoring Reliability**

<b>Form Number</b>	<b>Test Reliability</b>	<b>Scoring Reliability</b>
201	0.66	0.91
202	0.65	0.92
203	0.52	0.90
204	0.56	0.88
205	0.65	0.83
206	0.57	0.94
207	0.58	0.84
208	0.57	0.94
209	0.62	0.93
210	0.60	0.92
211	0.47	0.83
212	0.55	0.82
213	0.41	0.95
214	0.66	0.91
215	0.61	0.93
216	0.57	0.92
217	0.59	0.92
218	0.52	0.91
219	0.55	0.88
220	0.61	0.89

### *Inter-rater Agreement*

For each CR item, the difference between the first and second reads was tracked and the number of times each possible difference between the scores occurred was

tabulated. These values were then used to calculate the percentage of times each possible difference occurred. When examining inter-rater agreement statistics, it should be kept in mind that the maximum number of points per item varies, as shown in the “Score Points” column. Blank cells in the table indicate out-of-range differences (e.g., it is impossible for two raters to differ by more than one point in their scores on an item with a maximum possible score of one; cells in the table other than -1, 0, and 1 would therefore be blanked out).

Appendix B contains the proportion of occurrence of these differences for each CR item. CR item maximum point values ranged between two and six. Rates of exact agreement (i.e., differences of zero points) ranged between 51 and 100%. Appendix C contains additional summary information regarding the first and second reads, including the percentage of first and second scores that were exact or adjacent matches. Percentages of exact plus adjacent agreement ranged between 92 and 100%.

#### *Constructed-Response Item Means and Standard Deviations*

Appendix C also contains the mean and standard deviation of the first and second scores for each CR item. The largest difference between the item means and standard deviations for the first and second read scores was 0.1.

#### *Intraclass Correlation*

In addition, Appendix C contains the intraclass correlations for the items. These correlations are calculated using a formulation given by Shrout and Fleiss (1979). Specifically, they described six different models based on various configurations of judges and targets (in this case, papers that are being scored). For this assessment, the purpose of the statistic is to describe the reliability of single ratings, and each paper is scored by two judges who are randomly assigned from the larger pool of judges, and who score multiple papers. This description fits their “Case 1.” Further, they distinguish between situations where the score assigned to the paper is that of a single rater versus that when the score is the mean of  $k$  raters. Since the students’ operational scores are those from single (i.e., the first) raters, the proper intraclass correlation in this instance is termed by Shrout and Fleiss as “ICC(1,1).” It will be referred to herein simply as the “intraclass correlation” (ICC).

While the ICC is a bona fide correlation coefficient, it differs from a regular correlation coefficient in that its value remains the same regardless of how the raters are ordered. A regular Pearson correlation coefficient would change values if, for example, half of the second raters were switched to the first position, while the ICC would maintain a consistent value. Because the papers were randomly assigned to the judges, ordering is arbitrary, and thus the ICC is a more appropriate measure of reliability than the Pearson correlation coefficient in this situation. The ICC ranges from zero (the scores given by the two judges are unrelated) to one (the scores from the two judges match perfectly); negative values are possible, but rare, and have essentially the same meaning as values of zero. It should also be noted that the ICC can be affected by low degrees of variance in the scores being related, similar to the way that regular Pearson correlation coefficients are affected. ICCs for items where almost every

examinee achieved the same score point (e.g., an extremely easy dichotomous item where almost every examinee was able to answer it correctly) may have a low or negative ICC even though almost all ratings by the judges matched exactly.

McGraw and Wong (1996, Table 4, p. 35) state that the ICC can be interpreted as “the degree of absolute agreement among measurements made on randomly selected objects. It estimates the correlation of any two measurements.” Since it is a correlation coefficient, its square indicates the percent of variance in the scores that is accounted for by the relationship between the two sets of scores (i.e., the two measurements). In this case, these scores are those of the pair of judges. ICC values greater than 0.60 indicate that at least 36% ( $0.60^2$ ) of the variation in the scores given by the raters is accounted for by variations in the responses to the items that are being scored (e.g., variations in the ability being measured) rather than by variations caused by a combination of differences in the severity of the judges, interactions between judge severity and the items, and random error (e.g., variations exterior to the ability being measured). It is generally preferred that items have ICCs at this level or higher. Only one item had an ICC below 0.60 (at 0.58). There are no ICC values for item 10 of Form 212 and item 10 of Form 213. The former item had 48% blank and 49% score = 0, while the latter item had 26% blank and 74% score = 0. Consistent with other information provided in the table, these values indicate a high to very high level of scoring reliability for almost all of the items in the field test.

### *Weighted Kappa*

Weighted Kappa (Cohen, 1968) was also calculated for each item based on the first and second reads and is included in Appendix C as well. This statistic is an estimate of the agreement of the score classifications over and above that that would be expected to occur by chance. Similar to the ICC, its value can range between zero (the scores given by the judges agree as often as would be expected by chance) and one (scores given by the judges agree perfectly). In addition, negative values are possible, but rare, and have the same interpretation as zero values. One set of guidelines for the evaluation of this statistic is (Fleiss, 1981):

- $k > 0.75$  denotes excellent reproducibility
- $0.4 < k \leq 0.75$  denotes good reproducibility
- $0 < k \leq 0.4$  denotes marginal reproducibility

The results show excellent reproducibility between the first and second reads for all but 19 items, and good reproducibility for those 19. With the lowest kappa being equal to 0.47, there were no items displaying marginal reproducibility. The scoring reliability analyses offer strong evidence that the scoring of the CR items was performed in a highly reliable manner.

## ITEM RESPONSE THEORY (IRT) AND THE CALIBRATION AND EQUATING OF THE FIELD TEST ITEMS

While classical test theory-based statistical measures are useful for assessing the suitability of items for operational use (i.e., use as part of an assessment used to measure student ability and thus having real-world consequences for students, teachers, schools, and administrators), their values are dependent on both the psychometric properties of the items and the ability distributions of the samples upon which they are based. In other words, classical test theory-based statistics are *sample-dependent statistics*.

In contrast, Item Response Theory (IRT) based statistics are not dependent on the sample over which they are estimated—they are invariant across different samples (Hambleton, Swaminathan & Rogers, 1991; Lord, 1980). This invariance allows student ability to be estimated on a common metric even if different sets of items are used (as with different test forms over different test administrations).

The process of estimating IRT-based item parameters is referred to as “item calibration,” and the placing of these parameters on a common metric or scale is termed “equating.” While one reason for the field testing of items is to allow their suitability for use in the operational measurement of student ability to be assessed, the data resulting from field testing is also used to place items on the scale of the operational test (i.e., they are equated to the operational metric). Once items are on this common metric, any form composed of items from this pool can be scaled (the process through which scale score equivalents for each achievable raw score are derived) and the resulting scale scores will be directly comparable to those from other administrations, even though the underlying test forms are composed of different sets of items.

There are several variations of IRT that differ mainly in the way item behavior is modeled. The New York State Regents Examinations use the Rasch family of IRT statistics (Rasch, 1980; Masters, 1982) to calibrate, scale, and equate all subjects.

The most basic expression of the Rasch model is in the item characteristic curve. It conceptualizes the probability of a correct response to an item as a function of the ability level and the item’s difficulty. The probability of a correct response is bounded by “1” (certainty of a correct response) and “0” (certainty of an incorrect response). The ability scale is theoretically unbounded. In practice, the ability scale ranges from approximately -4 to +4 logits. The relationship between examinee ability  $\theta$ , item difficulty  $D_i$ , and probability of answering the item correctly  $P_i$  is shown in the equation below:

$$P_i(\theta) = \frac{\exp(\theta - D_i)}{1 + \exp(\theta - D_i)}$$

Examinee ability ( $\theta$ ) and item difficulty ( $D_i$ ) are on the same scale. This is useful for certain purposes. An examinee with an ability level equal to the item difficulty will have a 50% chance of answering the item correctly; if his or her ability level is higher than the

item difficulty, then the probability of answering the item correctly is commensurately higher, and the converse is also true.

The Rasch Partial Credit Model (PCM) (Masters, 1982) is a direct extension of the dichotomous one-parameter IRT model above. For an item involving  $m$  score categories, the general expression for the probability of achieving a score of  $x$  on the item is given by

$$P_x(\theta) = \frac{\exp[\sum_{k=0}^x(\theta - D_k)]}{\sum_{h=0}^m \exp[\sum_{k=0}^h(\theta - D_k)]}$$

where

$$D_0 \equiv 0.0$$

In the above equation,  $P_x$  is the probability of achieving a score of  $x$  given an ability of  $\theta$ ;  $m$  is the number of achievable score points minus one (note that the subscript  $k$  runs from 0 to  $m$ ); and  $D_k$  is the step parameter for step  $k$ . The steps are numbered from 0 to the number of achievable score points minus one, and step 0 ( $D_0$ ) is defined as being equal to zero. Note that a four-point item, for example, usually has five achievable score points (0, 1, 2, 3, and 4), thus the step numbers usually mirror the achievable point values.

According to this model, the probability of an examinee scoring in a particular category (step) is the sum of the logit (log-odds) differences between  $\theta$  and  $D_k$  of all the completed steps, divided by the sum of the differences of all the steps of an item. Thissen and Steinberg (1986) refer to this model as a divide-by-total model. The parameters estimated by this model are  $m_i - 1$  threshold (difficulty) estimates and represent the points on the ability continuum where the probability of the examinee achieving score  $m_i$  exceeds that of  $m_{i-1}$ . The mean of these threshold estimates is used as an overall summary of the polytomous item's difficulty.

If the number of achievable score points is one (i.e., the item is dichotomous), then the PCM reduces to the basic Rasch IRT model for dichotomous items. This means that dichotomous and polytomous items are being scaled using a common model and therefore can be calibrated, equated, and scaled together. It should be noted that the Rasch model assumes that all items have equal levels of discrimination and that there is no guessing on MC items. However, it is robust to violations of these assumptions, and items that violate these assumptions to a large degree are usually flagged for item-model misfit.

### *Item Calibration*

When interpreting IRT item parameters, it is important to remember that they do not have an absolute scale—rather, their scale (in terms of mean and standard deviation) is purely arbitrary. It is conventional to set the mean of the item difficulties to zero when an assessment is scaled for the first time. Rasch IRT scales the theta measures in terms of

*logits*, or “log-odds units.” The length of a logit varies from test to test, but generally the standard deviation of the item difficulties of a test scaled for the first time will be somewhere in the area of 0.6–0.8. While the item difficulties are invariant with respect to one another, the absolute level of difficulty represented by their mean is dependent on the overall difficulty of the group of items with which it was tested. In addition, there is no basis for assuming that the difficulty values are normally distributed around their mean—their distribution again depends solely upon the intrinsic difficulties of the items themselves. Thus, if a particularly difficult set of items (relative to the set of items originally calibrated) was field tested, their overall mean would most probably be greater than zero, and their standard deviation would be considerably less than one. In addition, they would most probably not be normally distributed.

Rasch item difficulties generally range from –3.0 to 3.0, although very easy or difficult items can fall outside of this range. Items should not be discounted solely on the basis of their difficulty. A particular topic may require either a difficult or an easy item. Items are usually most useful if their difficulty is close to a cut score, as items provide the highest level of information at the ability level equal to their difficulty. Items with difficulties farther away from the cuts provide less information about students with abilities close to the cut scores (and, hence, are more susceptible to misclassification), but are still useful. In general, items should be selected for use based on their content, with their Rasch difficulty being only a secondary consideration.

#### *Item Fit Evaluation*

The INFIT statistic is used to assess how well items fit the Rasch model. Rasch theory models the probability of a student being able to answer an item correctly as a function of the student’s level of ability and the item’s difficulty, as stated previously. The Rasch model also assumes that items’ discriminations do not differ, and that the items are not susceptible to guessing. If these assumptions do not hold (if, for example, an item has an extremely high or low level of discrimination), then the item’s behavior will not be well modeled by Rasch IRT. Guidelines for interpretation of the INFIT statistic are taken from Linacre (2005) and can be found in Table 4 below.

**Table 4. Criteria to Evaluate Mean-Square Fit Statistics**

<b>INFIT</b>	<b>Interpretation</b>
>2.0	Distorts or degrades the measurement system
1.5–2.0	Unproductive for construction of measurement, but not degrading
0.5–1.5	Productive for measurement
<0.5	Unproductive for measurement, but not degrading. May produce misleadingly good reliabilities and separations

INFIT is an information-weighted fit statistic, which is more sensitive to unexpected behavior affecting responses to items near the person's measure (or ability) level. In general, values near 1.0 indicate little distortion of the measurement system, while values less than 1.0 indicate observations are too predictable (redundancy, model overfit). Values greater than 1.0 indicate unpredictability (unmodeled noise, model underfit).

Table 5 contains a summary of the analysis for each of the field test forms. The first column from the left lists the form numbers. The next two columns list the number of students who participated and the number of items on each field test form, respectively. The following columns show the frequency of items at three levels of difficulty (easier items with a Rasch difficulty  $<-2.0$ , moderate items with a Rasch difficulty between  $-2.0$  and  $2.0$ , and more difficult items with a Rasch difficulty  $>2.0$ ), and frequencies of item misfits as classified in the preceding table. Of 196 scorable items, 173 (88%) fell within the moderate  $-2.0$  to  $+2.0$  difficulty range, and there were no items with an INFIT statistic outside the range most productive for measurement. Item level results of the analysis can be found in Appendix D.

**Table 5. Partial-Credit Model Item Analysis Summary**

Form	N-Count	No. of Items	Rasch			INFIT			
			$<-2.0$	$-2.0$ to $2.0$	$>2.0$	$<0.5$	$0.5$ to $1.5$	$1.5$ to $2.0$	$>2.0$
201	927	10	0	9	1	0	10	0	0
202	947	10	0	9	1	0	10	0	0
203	946	10	0	10	0	0	10	0	0
204	957	10	0	10	0	0	10	0	0
205	960	10	1	6	3	0	10	0	0
206	964	10	0	9	0	0	9	0	0
207	966	10	0	9	1	0	10	0	0
208	958	10	0	9	0	0	9	0	0
209	949	10	0	8	2	0	10	0	0
210	953	10	0	10	0	0	10	0	0
211	953	10	0	10	0	0	10	0	0
212	963	10	0	8	2	0	10	0	0
213	941	10	1	8	0	0	9	0	0
214	945	10	0	7	3	0	10	0	0
215	952	10	0	10	0	0	10	0	0
216	945	10	0	8	2	0	10	0	0
217	952	10	0	9	0	0	9	0	0
218	946	10	0	9	1	0	10	0	0
219	963	10	0	8	2	0	10	0	0
220	954	10	0	10	0	0	10	0	0

For some forms, the item counts in the “Rasch” and “INFIT” columns may not sum to the value in the “No. of Items” column due to DNS (Do Not Score) items.

## DIFFERENTIAL ITEM FUNCTIONING

Differential Item Functioning (DIF) occurs when members of a particular group have a different probability of success than members of another group who have the same level of ability for reasons unrelated to the academic skill or construct being measured. For example, items testing English grammar skills may be more difficult for LEP students as opposed to non-LEP students, but such differences are likely due to the fact that the item measures an academic skill related to English language proficiency. Such items would not be considered to be functioning differentially.

### *The Mantel Chi-Square and Standardized Mean Difference*

The Mantel  $\chi^2$  is a conditional mean comparison of the ordered response categories for reference and focal groups combined over values of the matching variable score. "Ordered" means that a response earning a score of "1" on an item is better than a response earning a score of "0" or "2" is better than "1," and so on. "Conditional," on the other hand, refers to the comparison of members from the two groups who received the same score on the matching variable, that is, the total test score in our analysis.

Group	Item Score				Total
	$y_1$	$y_2$	...	$y_T$	
Reference	$n_{R1k}$	$n_{R2k}$	...	$n_{Rtk}$	$n_{R+k}$
Focal	$n_{F1k}$	$n_{F2k}$	...	$n_{Ftk}$	$n_{F+k}$
Total	$n_{+1k}$	$n_{+2k}$	...	$n_{+tk}$	$n_{++k}$

**Figure 1.  $2 \times t$  Contingency Table at the  $k^{\text{th}}$  of  $K$  Levels.**

Figure 1 (from Zwick, Donoghue & Grima, 1993) shows a  $2 \times t$  contingency table at the  $k^{\text{th}}$  of  $K$  levels, where  $t$  represents the number of response categories and  $k$  represents the number of levels of the matching variable. The values  $y_1, y_2, \dots, y_T$  represent the  $t$  scores that can be gained on the item. The values  $n_{Ftk}$  and  $n_{Rtk}$  represent the numbers of focal and reference groups who are at the  $k^{\text{th}}$  level of the matching variable and gain an item score of  $y_t$ . The "+" indicates the total number over a particular index (Zwick et al., 1993). The Mantel statistic is defined as the following formula:

$$\text{Mantel}\chi^2 = \frac{\left( \sum_k F_k - \sum_k E(F_k) \right)^2}{\sum_k \text{Var}(F_k)}$$

in which  $F_k$  represents the sum of scores for the focal group at the  $k^{\text{th}}$  level of the matching variable and is defined as follows:

$$F_k = \sum_t y_t n_{Ftk}$$

The expectation of  $F_k$  under the null hypothesis is

$$E(F_k) = \frac{n_{F+k}}{n_{++k}} \sum_t y_t n_{Ftk}$$

The variance of  $F_k$  under the null hypothesis is as follows:

$$Var(F_k) = \frac{n_{R+k}n_{F+k}}{n_{++k}^2(n_{++k} - 1)} \left[ (n_{++k} \sum_t y_t^2 n_{+tk}) - (\sum_t y_t n_{+tk})^2 \right]$$

Under  $H_0$ , the Mantel statistic has a chi-square distribution with one degree of freedom. In DIF applications, rejecting  $H_0$  suggests that the students of the reference and focal groups who are similar in overall test performance tend to differ in their mean performance on the item. For dichotomous items the statistic is identical to the Mantel-Haenszel (MH) (1959) statistic without the continuity correction (Zwick et al., 1993).

A summary statistic to accompany the Mantel approach is the standardized mean difference (SMD) between the reference and focal groups proposed by Dorans and Schmitt (1991). This statistic compares the means of the reference and focal groups, adjusting for differences in the distribution of the reference and focal group members across the values of the matching variable. The SMD has the following form:

$$SMD = \sum_k p_{Fk} m_{Fk} - \sum_k p_{Fk} m_{Rk}$$

in which

$$p_{Fk} = \frac{n_{F+k}}{n_{F++}}$$

is the proportion of the focal group members who are at the  $k^{\text{th}}$  level of the matching variable;

$$m_{Fk} = \frac{1}{n_{F+k} \sum_t y_t n_{Ftk}}$$

is the mean item score of the focal group members at the  $k^{\text{th}}$  level; and  $m_{Rk}$  is the analogous value for the reference group. As can be seen from the equation above, the SMD is the difference between the unweighted item mean of the focal group and the weighted item mean of the reference group. The weights for the reference group are applied to make the weighted number of the reference-group students the same as in the focal group within the same level of ability. A negative SMD value implies that the focal group has a lower mean item score than the reference group, conditional on the matching variable.

### *Multiple-Choice Items*

For the MC items, the MH odds ratio (converted to the ETS delta scale [D]) is used to classify items into one of three categories of DIF.

### *The Odds Ratio*

The odds of a correct response (proportion passing divided by proportion failing) are  $P/Q$  or  $P/(1-P)$ . The *odds ratio* is the odds of a correct response of the reference group divided by the odds of a correct response of the focal group. For a given item, the odds ratio is defined as follows:

$$\alpha_{MH} = \frac{P_r/Q_r}{P_f/Q_f}$$

and the corresponding null hypothesis is that the odds of getting the item correct are equal for the two groups. Thus, the odds ratio is equal to 1:

$$\alpha_{MH} = \frac{P_r/Q_r}{P_f/Q_f} = 1$$

### *The Delta Scale*

To make the odds ratio symmetrical around zero with its range being in the interval  $-\infty$  to  $+\infty$ , the odds ratio is transformed into a log odds ratio according to this equation:

$$\beta_{MH} = \ln(\alpha_{MH})$$

This simple natural logarithm transformation of the odds ratio is symmetrical around zero. This DIF measure is a signed index; a positive value signifies DIF in favor of the reference group, a negative value indicates DIF in favor of the focal group, and zero has the interpretation of equal odds of success on the item.  $\beta_{MH}$  also has the advantage of a linear relationship to other interval scale metrics (Camilli & Shepard, 1994).  $\beta_{MH}$  is placed on the ETS delta scale (D) using the following equation:

$$D = -2.35\beta_{MH}$$

### *DIF Classification for MC Items*

Table 6 depicts DIF classifications for MC items. Classification depends on the delta (D) value and the significance of its difference from zero ( $p < 0.05$ ). The criteria are derived from those used by the National Assessment of Educational Progress (Allen, Carlson & Zelenak, 1999) in the development of their assessments.

**Table 6. DIF Classification for MC Items**

Category	Description	Criterion
A	No DIF	D not significantly different from zero or $ D  < 1.0$
B	Moderate DIF	$1.0 \leq  D  < 1.5$ or not otherwise A or C
C	High DIF	D is significantly different from zero and $ D  \geq 1.5$

### *DIF Classification for CR Items*

The SMD is divided by the total group item standard deviation to obtain an effect-size value for the SMD ( $ES_{SMD}$ ). The value of  $ES_{SMD}$  and the significance of the Mantel  $\chi^2$  statistic ( $p < 0.05$ ) are then used to determine the DIF category of the item as depicted in Table 7.

**Table 7. DIF Classification for CR Items**

Category	Description	Criterion
AA	No DIF	Non-significant Mantel $\chi^2$ or $ ES_{SMD}  \leq 0.17$

BB	Moderate DIF	Significant Mantel $\chi^2$ and $0.17 <  ES_{SMD}  \leq 0.25$
CC	High DIF	Significant Mantel $\chi^2$ and $0.25 <  ES_{SMD} $

Reliable DIF results are dependent on the number of examinees in both the focal and reference groups. Clauser and Mazor (1998) state that a minimum of 200 to 250 examinees per group are sufficient to provide reliable results. Some testing organizations require as many as 300 to 400 examinees per group (Zwick, 2012) in some applications. For the field testing of the Regents examinations, the sample sizes were such that only comparisons based on gender (e.g., males vs. females) were possible. Even for gender, sample sizes were only moderately large, and so the results should be interpreted with caution.

The DIF statistics for gender are shown in Appendix E. MC items in DIF categories “B” and “C” and CR items in categories “BB” and “CC” were flagged. These flags are shown in the “DIF Category” column (“A” and “AA” category items will have blank cells here). The “Favored Group” column indicates which gender is favored for items that are flagged.

### **Section III: Equating Procedure**

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Students participating in the 2014 field test administration for the New York State Regents Examination in Geometry received one of 52 test forms (numbered 201–252). Forms 201–220 addressed the Common Core based curriculum. Form 220 was the anchor form for the equating and was an intact form that had been administered in the prior year. Because the form had been previously administered, its items had known parameters on the operational scale. The remaining test forms were composed of items that had not been administered to New York State students. Test forms were spiraled within classrooms, so that students had an equal chance of receiving any of the 52 forms, depending solely on their ordinal position within the classroom. In essence, students were randomly assigned to test forms, forming randomly equivalent groups taking each of the forms. Appendices A and D (with the classical and Rasch IRT item level statistics) may be consulted to determine the characteristics of the items (e.g., item type and maximum number of points possible) that made up each form.

#### **RANDOMLY EQUIVALENT GROUP EQUATING DESIGN**

The equating analyses were based on the assumption that the groups taking the different forms had equivalent ability distributions and means. Given the random assignment of forms to examinees, this was a reasonable assumption. The initial step in the analyses was to calibrate all forms, both the anchor form and the remaining field test forms. All forms were calibrated using Winsteps, version 3.60 (Linacre, 2005).

The anchor form calibration began with all anchor item difficulty parameters fixed to their known values from the previous year. Because it is possible for item parameters to

“drift” (shift their difficulties relative to one another), a stability check was integrated into the analysis.

Winsteps provides an item level statistic, termed “displacement.” Linacre (2011, p. 545) describes this statistic as:

...the size of the change in the parameter estimate that would be observed in the next estimation iteration if this parameter was free (unanchored) and all other parameter estimates were anchored at their current values. For a parameter (item or person) that is anchored in the main estimation, (the displacement value) indicates the size of disagreement between an estimate based on the current data and the anchor value.

This statistic was used to identify items with difficulties that had shifted, relative to the difficulties of the other items on the form. After the initial calibration run, the Winsteps displacement values for all anchor form items were examined for absolute values greater than 0.30. If present, the item with the largest absolute displacement value was removed from anchored status, but remained on the test form. Its difficulty value was subsequently reestimated relative to the difficulties of the remaining anchored items. The Winsteps calibration was then rerun with the reduced anchor set, after which the displacement values were again checked for absolute values in excess of 0.30. If another was found, it was also removed from anchored status and the calibration rerun. This iterative procedure continued until all anchored items had displacements of 0.30 or less. No items were identified as having drifted for the 2014 analyses.

After a stable anchor item set had been identified, the mean of the ability estimates of the students who took the anchor form was computed.<sup>2</sup> This mean ability was then used as the target ability for the forms with the field test items. Because the groups taking the different forms were randomly equivalent and thus had the same mean ability, adjustment of the parameters of the field test items on any form to values that produced an ability distribution for students who had taken the form with a mean equal to the target ability from the anchor form would result in the parameters for the field test items on that form being equated to the scale of the anchor form, which was also the operational scale.

The equated mean ability estimate for Form 220 was 0.22. This value became the target mean ability estimate for the field test forms.

At this point in the analyses, the calibration of the anchor form was complete. The next step was the initial calibration of the field test forms. This was a “free” calibration, meaning that the item parameters were not constrained in any way. This initial calibration produced a set of Rasch difficulty parameters for the items on each form.

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<sup>2</sup> Because under Rasch IRT the ability of students with extreme scores (either zero or perfect scores) cannot be exactly computed (they are equal to  $-\infty$  and  $+\infty$ , respectively), they were excluded from this and all other analyses for both the anchor and other field test forms.

Also produced as a part of the Winsteps calibration was a set of person ability estimates for each form.

The next step was the computation of an equating constant for each form. Under Rasch IRT, if all of the difficulty parameters on a form have a constant added to them, the ability estimates for examinees will also be changed from their previous values by the amount represented by that constant. Therefore, to adjust the item difficulty parameters such that the mean of the ability distribution is set equal to the target mean ability from the anchor form, an equating constant was calculated for each field test form by subtracting the field test form mean ability from the target mean ability. This value was then added to the Rasch difficulty parameter of all items on the field test form. These adjusted values were then used as anchors for a second Winsteps calibration of the field test form. The mean of the person ability values from this second calibration was computed and compared to the target mean. If the anchored field test mean ability differed from the target mean ability by 0.005 or more, then an additional equating constant was computed using the difference between the mean ability from the field test form anchored run and the target mean ability, and another anchored run was completed. This process continued until all adjusted field test form mean abilities were within the 0.005 tolerance limit around the targeted mean ability. The final equating constant for any field test form was the sum of the constants from each anchored round for that form. At this point, with the adjusted mean abilities for the field test forms all equal (within the specified limits) to the target abilities, all of the adjusted field test item parameters and the anchor item parameters were on the common operational scale, and thus could be used in any subsequent operational administration. The initial mean abilities and final equating constants for the field test forms can be found in Table 8.

**Table 8. Initial Mean Abilities and Equating Constants**

<b>Form Number</b>	<b>Mean Ability</b>	<b>Constant</b>
201	-0.71	0.89
202	-0.66	0.84
203	-0.91	1.07
204	-0.61	0.79
205	-0.79	0.96
206	-0.46	0.64
207	-0.85	1.02
208	-0.41	0.57
209	-0.79	0.96
210	-0.50	0.68
211	-1.00	1.15
212	-1.05	1.20
213	-0.62	0.74
214	-0.88	1.04
215	-0.46	0.64
216	-0.91	1.06
217	-0.12	0.30
218	-0.64	0.82
219	-0.84	1.00

#### **Section IV: Scaling of Operational Test Forms**

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There was no Geometry Common Core scaling in 2014.

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## Appendix A: Classical Item Analysis

In the following table, “Max” is the maximum number of possible points. “N-Count” refers to the number of student records in the analysis. “Alpha” contains Cronbach’s Coefficient  $\alpha$  (since this is a test [form] level statistic, it has the same value for all items within each form). For MC items, “B” represents the proportion of students who left the item blank, and “M1” through “M4” are the proportions of students who selected each of the four answer choices. For CR items, “B” represents the proportion of students who left the item blank, and “M0” through “M6” are the proportions of students who received scores of 0 through 6. “Mean” is the average of the scores received by the students. The final (right) column contains the Point-Biserial correlation for each item. There may be some instances of items with missing statistics; this occurs when an item was not scored.

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	201	MC	01	1	927	0.66	0.03		0.40	0.25	0.23	0.09			0.40	0.49
2014_GEOC	201	MC	02	1	927	0.66	0.03		0.47	0.13	0.31	0.05			0.47	0.55
2014_GEOC	201	MC	03	1	927	0.66	0.04		0.11	0.16	0.53	0.16			0.53	0.47
2014_GEOC	201	MC	04	1	927	0.66	0.04		0.08	0.20	0.46	0.22			0.22	0.34
2014_GEOC	201	MC	05	1	927	0.66	0.04		0.59	0.18	0.11	0.08			0.59	0.46
2014_GEOC	201	MC	06	1	927	0.66	0.05		0.17	0.35	0.28	0.16			0.35	0.53
2014_GEOC	201	MC	07	1	927	0.66	0.06		0.41	0.09	0.17	0.27			0.41	0.42
2014_GEOC	201	CR	08	2	927	0.66	0.19	0.68	0.07	0.06					0.19	0.47
2014_GEOC	201	CR	09	2	927	0.66	0.22	0.49	0.23	0.06					0.35	0.53
2014_GEOC	201	CR	10	6	927	0.66	0.16	0.47	0.12	0.07	0.06	0.04	0.05	0.03	1.03	0.83
2014_GEOC	202	MC	01	1	947	0.65	0.04		0.15	0.11	0.62	0.08			0.62	0.48
2014_GEOC	202	MC	02	1	947	0.65	0.03		0.26	0.43	0.14	0.14			0.43	0.51
2014_GEOC	202	MC	03	1	947	0.65	0.06		0.31	0.19	0.22	0.22			0.22	0.39
2014_GEOC	202	MC	04	1	947	0.65	0.05		0.28	0.39	0.12	0.16			0.39	0.40
2014_GEOC	202	MC	05	1	947	0.65	0.05		0.06	0.17	0.44	0.28			0.44	0.38
2014_GEOC	202	MC	06	1	947	0.65	0.05		0.44	0.14	0.13	0.25			0.44	0.24
2014_GEOC	202	MC	07	1	947	0.65	0.04		0.37	0.10	0.35	0.14			0.37	0.51

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	202	CR	08	2	947	0.65	0.13	0.48	0.22	0.17					0.56	0.62
2014_GEOC	202	CR	09	4	947	0.65	0.29	0.60	0.05	0.03	0.02	0.01			0.22	0.58
2014_GEOC	202	CR	10	4	947	0.65	0.16	0.58	0.14	0.02	0.02	0.08			0.55	0.73
2014_GEOC	203	MC	01	1	946	0.52	0.03		0.69	0.11	0.13	0.03			0.69	0.32
2014_GEOC	203	MC	02	1	946	0.52	0.04		0.52	0.18	0.18	0.08			0.52	0.54
2014_GEOC	203	MC	03	1	946	0.52	0.04		0.21	0.40	0.17	0.18			0.21	0.10
2014_GEOC	203	MC	04	1	946	0.52	0.04		0.27	0.27	0.16	0.26			0.26	0.47
2014_GEOC	203	MC	05	1	946	0.52	0.03		0.23	0.25	0.19	0.29			0.25	0.36
2014_GEOC	203	MC	06	1	946	0.52	0.06		0.13	0.37	0.30	0.14			0.37	0.25
2014_GEOC	203	MC	07	1	946	0.52	0.06		0.28	0.37	0.10	0.20			0.20	0.43
2014_GEOC	203	CR	08	2	946	0.52	0.18	0.70	0.06	0.07					0.20	0.48
2014_GEOC	203	CR	09	6	946	0.52	0.16	0.44	0.17	0.10	0.05	0.05	0.02	0.01	0.91	0.83
2014_GEOC	203	CR	10	2	946	0.52	0.21	0.35	0.31	0.12					0.56	0.38
2014_GEOC	204	MC	01	1	957	0.56	0.03		0.12	0.14	0.62	0.10			0.62	0.39
2014_GEOC	204	MC	02	1	957	0.56	0.06		0.10	0.28	0.42	0.14			0.42	0.31
2014_GEOC	204	MC	03	1	957	0.56	0.04		0.29	0.49	0.14	0.04			0.49	0.43
2014_GEOC	204	MC	04	1	957	0.56	0.03		0.06	0.28	0.15	0.46			0.28	0.25
2014_GEOC	204	MC	05	1	957	0.56	0.04		0.29	0.05	0.09	0.53			0.53	0.44
2014_GEOC	204	MC	06	1	957	0.56	0.06		0.23	0.36	0.25	0.10			0.23	0.27
2014_GEOC	204	MC	07	1	957	0.56	0.06		0.33	0.34	0.13	0.14			0.34	0.39
2014_GEOC	204	CR	08	2	957	0.56	0.14	0.72	0.07	0.07					0.21	0.54
2014_GEOC	204	CR	09	6	957	0.56	0.11	0.60	0.06	0.09	0.03	0.05	0.02	0.05	0.92	0.81
2014_GEOC	204	CR	10	2	957	0.56	0.19	0.33	0.25	0.23					0.71	0.56
2014_GEOC	205	MC	01	1	960	0.65	0.03		0.45	0.21	0.14	0.16			0.16	0.34
2014_GEOC	205	MC	02	1	960	0.65	0.02		0.83	0.07	0.05	0.03			0.83	0.43
2014_GEOC	205	MC	03	1	960	0.65	0.03		0.14	0.55	0.22	0.05			0.55	0.55
2014_GEOC	205	MC	04	1	960	0.65	0.03		0.19	0.47	0.21	0.11			0.21	0.39
2014_GEOC	205	MC	05	1	960	0.65	0.04		0.08	0.48	0.29	0.10			0.48	0.45

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	205	MC	06	1	960	0.65	0.03		0.18	0.12	0.16	0.51			0.51	0.58
2014_GEOC	205	MC	07	1	960	0.65	0.04		0.41	0.44	0.08	0.04			0.44	0.51
2014_GEOC	205	CR	08	2	960	0.65	0.11	0.75	0.04	0.10					0.24	0.62
2014_GEOC	205	CR	09	6	960	0.65	0.29	0.63	0.02	0.04	0.01	0.01	0.00	0.00	0.18	0.56
2014_GEOC	205	CR	10	2	960	0.65	0.17	0.40	0.40	0.03					0.46	0.47
2014_GEOC	206	MC	01	.												
2014_GEOC	206	MC	02	1	964	0.57	0.04		0.41	0.18	0.18	0.19			0.18	0.18
2014_GEOC	206	MC	03	1	964	0.57	0.04		0.11	0.57	0.12	0.15			0.57	0.38
2014_GEOC	206	MC	04	1	964	0.57	0.05		0.31	0.40	0.16	0.08			0.40	0.18
2014_GEOC	206	MC	05	1	964	0.57	0.04		0.53	0.11	0.17	0.15			0.53	0.43
2014_GEOC	206	MC	06	1	964	0.57	0.05		0.09	0.18	0.21	0.47			0.47	0.48
2014_GEOC	206	MC	07	1	964	0.57	0.06		0.17	0.22	0.41	0.14			0.41	0.32
2014_GEOC	206	CR	08	2	964	0.57	0.05	0.48	0.41	0.06					0.52	0.62
2014_GEOC	206	CR	09	2	964	0.57	0.22	0.13	0.20	0.45					1.10	0.65
2014_GEOC	206	CR	10	6	964	0.57	0.14	0.37	0.07	0.08	0.03	0.23	0.03	0.04	1.68	0.86
2014_GEOC	207	MC	01	1	966	0.58	0.05		0.14	0.63	0.09	0.09			0.63	0.33
2014_GEOC	207	MC	02	1	966	0.58	0.02		0.05	0.04	0.84	0.05			0.05	0.18
2014_GEOC	207	MC	03	1	966	0.58	0.03		0.28	0.16	0.18	0.35			0.35	0.35
2014_GEOC	207	MC	04	1	966	0.58	0.02		0.27	0.29	0.28	0.13			0.27	0.35
2014_GEOC	207	MC	05	1	966	0.58	0.04		0.10	0.19	0.33	0.33			0.33	0.35
2014_GEOC	207	MC	06	1	966	0.58	0.03		0.17	0.13	0.58	0.09			0.58	0.40
2014_GEOC	207	MC	07	1	966	0.58	0.04		0.53	0.18	0.19	0.06			0.19	0.29
2014_GEOC	207	CR	08	2	966	0.58	0.13	0.42	0.29	0.16					0.60	0.66
2014_GEOC	207	CR	09	2	966	0.58	0.08	0.27	0.19	0.46					1.12	0.62
2014_GEOC	207	CR	10	6	966	0.58	0.20	0.39	0.08	0.23	0.03	0.04	0.01	0.01	0.92	0.75
2014_GEOC	208	MC	01	1	958	0.57	0.06		0.21	0.28	0.34	0.11			0.34	0.36
2014_GEOC	208	MC	02	1	958	0.57	0.02		0.03	0.68	0.05	0.23			0.68	0.46
2014_GEOC	208	MC	03	1	958	0.57	0.04		0.37	0.23	0.23	0.13			0.37	0.44

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	208	MC	04	1	958	0.57	0.02		0.73	0.09	0.10	0.06			0.73	0.43
2014_GEOC	208	MC	05	1	958	0.57	0.03		0.18	0.19	0.20	0.41			0.41	0.54
2014_GEOC	208	MC	06	1	958	0.57	0.05		0.16	0.36	0.35	0.07			0.36	0.47
2014_GEOC	208	MC	07	1	958	0.57	0.04		0.25	0.16	0.34	0.21			0.34	0.34
2014_GEOC	208	CR	08	2	958	0.57	0.09	0.61	0.15	0.16					0.47	0.67
2014_GEOC	208	CR	09	2	958	0.57	0.12	0.63	0.17	0.07					0.32	0.50
2014_GEOC	208	CR	10	.												
2014_GEOC	209	MC	01	1	949	0.62	0.05		0.18	0.34	0.35	0.08			0.34	0.39
2014_GEOC	209	MC	02	1	949	0.62	0.02		0.18	0.17	0.37	0.26			0.37	0.27
2014_GEOC	209	MC	03	1	949	0.62	0.03		0.20	0.13	0.25	0.39			0.39	0.43
2014_GEOC	209	MC	04	1	949	0.62	0.03		0.68	0.12	0.07	0.09			0.68	0.45
2014_GEOC	209	MC	05	1	949	0.62	0.03		0.13	0.15	0.54	0.15			0.54	0.55
2014_GEOC	209	MC	06	1	949	0.62	0.03		0.15	0.14	0.45	0.23			0.23	0.41
2014_GEOC	209	MC	07	1	949	0.62	0.04		0.54	0.16	0.14	0.12			0.54	0.48
2014_GEOC	209	CR	08	2	949	0.62	0.12	0.71	0.13	0.04					0.20	0.47
2014_GEOC	209	CR	09	6	949	0.62	0.05	0.12	0.48	0.13	0.09	0.07	0.02	0.03	1.57	0.81
2014_GEOC	209	CR	10	2	949	0.62	0.24	0.66	0.06	0.04					0.14	0.52
2014_GEOC	210	MC	01	1	953	0.60	0.04		0.14	0.39	0.19	0.24			0.39	0.28
2014_GEOC	210	MC	02	1	953	0.60	0.04		0.16	0.16	0.22	0.42			0.42	0.50
2014_GEOC	210	MC	03	1	953	0.60	0.03		0.14	0.06	0.44	0.32			0.44	0.53
2014_GEOC	210	MC	04	1	953	0.60	0.03		0.57	0.19	0.11	0.09			0.57	0.53
2014_GEOC	210	MC	05	1	953	0.60	0.06		0.15	0.27	0.41	0.11			0.41	0.31
2014_GEOC	210	MC	06	1	953	0.60	0.04		0.06	0.55	0.05	0.30			0.30	0.37
2014_GEOC	210	MC	07	1	953	0.60	0.05		0.71	0.07	0.13	0.04			0.71	0.46
2014_GEOC	210	CR	08	2	953	0.60	0.12	0.51	0.25	0.12					0.48	0.43
2014_GEOC	210	CR	09	2	953	0.60	0.11	0.69	0.11	0.09					0.30	0.54
2014_GEOC	210	CR	10	6	953	0.60	0.13	0.48	0.19	0.11	0.03	0.02	0.02	0.02	0.78	0.74
2014_GEOC	211	MC	01	1	953	0.47	0.03		0.13	0.36	0.26	0.23			0.36	0.47

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	211	MC	02	1	953	0.47	0.03		0.24	0.25	0.22	0.25			0.22	0.20
2014_GEOC	211	MC	03	1	953	0.47	0.03		0.38	0.18	0.14	0.26			0.26	0.26
2014_GEOC	211	MC	04	1	953	0.47	0.04		0.16	0.13	0.36	0.31			0.36	0.39
2014_GEOC	211	MC	05	1	953	0.47	0.04		0.14	0.25	0.25	0.31			0.25	0.29
2014_GEOC	211	MC	06	1	953	0.47	0.04		0.57	0.10	0.22	0.08			0.22	0.33
2014_GEOC	211	MC	07	1	953	0.47	0.05		0.20	0.09	0.46	0.19			0.46	0.38
2014_GEOC	211	CR	08	2	953	0.47	0.14	0.54	0.13	0.18					0.50	0.64
2014_GEOC	211	CR	09	4	953	0.47	0.13	0.51	0.26	0.07	0.02	0.01			0.51	0.56
2014_GEOC	211	CR	10	4	953	0.47	0.14	0.76	0.01	0.07	0.01	0.01			0.23	0.49
2014_GEOC	212	MC	01	1	963	0.55	0.03		0.25	0.19	0.48	0.05			0.48	0.46
2014_GEOC	212	MC	02	1	963	0.55	0.06		0.18	0.29	0.30	0.17			0.30	0.43
2014_GEOC	212	MC	03	1	963	0.55	0.03		0.38	0.19	0.11	0.29			0.29	0.39
2014_GEOC	212	MC	04	1	963	0.55	0.03		0.15	0.48	0.19	0.15			0.48	0.51
2014_GEOC	212	MC	05	1	963	0.55	0.04		0.07	0.20	0.58	0.11			0.58	0.49
2014_GEOC	212	MC	06	1	963	0.55	0.06		0.16	0.33	0.26	0.19			0.33	0.12
2014_GEOC	212	MC	07	1	963	0.55	0.06		0.36	0.16	0.23	0.19			0.36	0.45
2014_GEOC	212	CR	08	2	963	0.55	0.24	0.59	0.15	0.02					0.20	0.46
2014_GEOC	212	CR	09	4	963	0.55	0.18	0.35	0.22	0.13	0.11	0.01			0.84	0.73
2014_GEOC	212	CR	10	4	963	0.55	0.48	0.49	0.01	0.01	0.00	0.00			0.03	0.29
2014_GEOC	213	MC	01	1	941	0.41	0.03		0.42	0.28	0.22	0.04			0.28	0.34
2014_GEOC	213	MC	02	1	941	0.41	0.04		0.37	0.28	0.24	0.07			0.24	0.21
2014_GEOC	213	MC	03	1	941	0.41	0.05		0.14	0.37	0.31	0.12			0.37	0.43
2014_GEOC	213	MC	04	1	941	0.41	0.04		0.18	0.10	0.50	0.18			0.50	0.55
2014_GEOC	213	MC	05	1	941	0.41	0.04		0.18	0.20	0.41	0.18			0.18	0.37
2014_GEOC	213	MC	06	1	941	0.41	0.03		0.79	0.10	0.05	0.02			0.79	0.44
2014_GEOC	213	MC	07	1	941	0.41	0.04		0.20	0.33	0.21	0.22			0.21	0.41
2014_GEOC	213	CR	08	2	941	0.41	0.10	0.51	0.19	0.20					0.59	0.68
2014_GEOC	213	CR	09	.												

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	213	CR	10	4	941	0.41	0.26	0.74	0.00	0.00	0.00	0.00			0.00	
2014_GEOC	214	MC	01	1	945	0.66	0.02		0.44	0.05	0.25	0.23			0.25	0.27
2014_GEOC	214	MC	02	1	945	0.66	0.02		0.09	0.20	0.35	0.33			0.35	0.53
2014_GEOC	214	MC	03	1	945	0.66	0.03		0.28	0.48	0.12	0.09			0.48	0.47
2014_GEOC	214	MC	04	1	945	0.66	0.02		0.29	0.19	0.25	0.24			0.25	0.41
2014_GEOC	214	MC	05	1	945	0.66	0.04		0.16	0.41	0.26	0.13			0.41	0.41
2014_GEOC	214	MC	06	1	945	0.66	0.03		0.46	0.03	0.03	0.44			0.46	0.51
2014_GEOC	214	MC	07	1	945	0.66	0.05		0.61	0.08	0.10	0.15			0.61	0.45
2014_GEOC	214	CR	08	2	945	0.66	0.15	0.78	0.01	0.06					0.12	0.56
2014_GEOC	214	CR	09	4	945	0.66	0.16	0.67	0.11	0.03	0.01	0.03			0.30	0.61
2014_GEOC	214	CR	10	4	945	0.66	0.11	0.67	0.13	0.04	0.02	0.03			0.39	0.68
2014_GEOC	215	MC	01	1	952	0.61	0.03		0.07	0.75	0.10	0.05			0.75	0.39
2014_GEOC	215	MC	02	1	952	0.61	0.06		0.22	0.25	0.26	0.22			0.22	0.22
2014_GEOC	215	MC	03	1	952	0.61	0.03		0.27	0.16	0.28	0.25			0.27	0.42
2014_GEOC	215	MC	04	1	952	0.61	0.04		0.20	0.17	0.21	0.38			0.20	0.33
2014_GEOC	215	MC	05	1	952	0.61	0.03		0.57	0.09	0.24	0.06			0.57	0.39
2014_GEOC	215	MC	06	1	952	0.61	0.04		0.21	0.36	0.25	0.13			0.36	0.44
2014_GEOC	215	MC	07	1	952	0.61	0.04		0.69	0.07	0.05	0.16			0.69	0.42
2014_GEOC	215	CR	08	4	952	0.61	0.14	0.38	0.14	0.09	0.08	0.16			1.21	0.78
2014_GEOC	215	CR	09	2	952	0.61	0.15	0.62	0.06	0.16					0.38	0.53
2014_GEOC	215	CR	10	4	952	0.61	0.09	0.35	0.18	0.10	0.16	0.11			1.31	0.70
2014_GEOC	216	MC	01	1	945	0.57	0.02		0.14	0.14	0.46	0.24			0.46	0.40
2014_GEOC	216	MC	02	1	945	0.57	0.02		0.72	0.03	0.03	0.20			0.20	0.40
2014_GEOC	216	MC	03	1	945	0.57	0.02		0.09	0.12	0.45	0.31			0.45	0.31
2014_GEOC	216	MC	04	1	945	0.57	0.02		0.20	0.11	0.17	0.49			0.17	0.40
2014_GEOC	216	MC	05	1	945	0.57	0.03		0.08	0.20	0.59	0.09			0.59	0.41
2014_GEOC	216	MC	06	1	945	0.57	0.02		0.57	0.10	0.07	0.23			0.57	0.41
2014_GEOC	216	MC	07	1	945	0.57	0.03		0.35	0.07	0.15	0.39			0.39	0.40

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	216	CR	08	2	945	0.57	0.21	0.75	0.03	0.01					0.06	0.40
2014_GEOC	216	CR	09	4	945	0.57	0.09	0.39	0.12	0.20	0.10	0.10			1.23	0.76
2014_GEOC	216	CR	10	4	945	0.57	0.11	0.62	0.21	0.03	0.01	0.03			0.40	0.62
2014_GEOC	217	MC	01	1	952	0.59	0.03		0.27	0.42	0.15	0.14			0.42	0.41
2014_GEOC	217	MC	02	1	952	0.59	0.03		0.11	0.32	0.32	0.22			0.32	0.47
2014_GEOC	217	MC	03	1	952	0.59	0.03		0.20	0.05	0.69	0.03			0.69	0.46
2014_GEOC	217	MC	04	1	952	0.59	0.04		0.05	0.57	0.14	0.19			0.57	0.42
2014_GEOC	217	MC	05	1	952	0.59	0.04		0.08	0.08	0.10	0.71			0.71	0.43
2014_GEOC	217	MC	06	1	952	0.59	0.04		0.41	0.29	0.23	0.04			0.41	0.45
2014_GEOC	217	MC	07	1	952	0.59	0.08		0.18	0.31	0.36	0.07			0.36	0.23
2014_GEOC	217	CR	08	2	952	0.59	0.15	0.41	0.13	0.31					0.76	0.65
2014_GEOC	217	CR	09	.												
2014_GEOC	217	CR	10	4	952	0.59	0.13	0.22	0.13	0.15	0.35	0.03			1.59	0.77
2014_GEOC	218	MC	01	1	946	0.52	0.05		0.14	0.15	0.52	0.15			0.52	0.22
2014_GEOC	218	MC	02	1	946	0.52	0.03		0.12	0.07	0.50	0.28			0.50	0.48
2014_GEOC	218	MC	03	1	946	0.52	0.05		0.21	0.39	0.19	0.16			0.39	0.24
2014_GEOC	218	MC	04	1	946	0.52	0.04		0.51	0.25	0.06	0.14			0.51	0.45
2014_GEOC	218	MC	05	1	946	0.52	0.03		0.07	0.09	0.41	0.40			0.07	-0.05
2014_GEOC	218	MC	06	1	946	0.52	0.03		0.61	0.21	0.11	0.04			0.61	0.45
2014_GEOC	218	MC	07	1	946	0.52	0.06		0.18	0.26	0.27	0.22			0.27	0.24
2014_GEOC	218	CR	08	2	946	0.52	0.15	0.49	0.22	0.15					0.51	0.51
2014_GEOC	218	CR	09	4	946	0.52	0.18	0.28	0.22	0.25	0.04	0.03			0.98	0.71
2014_GEOC	218	CR	10	4	946	0.52	0.20	0.30	0.12	0.26	0.04	0.08			1.08	0.68
2014_GEOC	219	MC	01	1	963	0.55	0.02		0.07	0.85	0.05	0.01			0.85	0.29
2014_GEOC	219	MC	02	1	963	0.55	0.03		0.40	0.42	0.08	0.07			0.08	0.11
2014_GEOC	219	MC	03	1	963	0.55	0.03		0.17	0.14	0.45	0.22			0.45	0.41
2014_GEOC	219	MC	04	1	963	0.55	0.03		0.15	0.29	0.34	0.18			0.29	0.24
2014_GEOC	219	MC	05	1	963	0.55	0.03		0.26	0.53	0.09	0.10			0.53	0.45

Test	Form	Type	Item	Max	N-Count	Alpha	B	M0	M1	M2	M3	M4	M5	M6	Mean	Pt Bis
2014_GEOC	219	MC	06	1	963	0.55	0.03		0.11	0.36	0.14	0.36			0.11	0.22
2014_GEOC	219	MC	07	1	963	0.55	0.05		0.35	0.16	0.33	0.10			0.33	0.33
2014_GEOC	219	CR	08	2	963	0.55	0.11	0.65	0.14	0.10					0.34	0.56
2014_GEOC	219	CR	09	4	963	0.55	0.16	0.14	0.22	0.23	0.18	0.08			1.52	0.73
2014_GEOC	219	CR	10	4	963	0.55	0.07	0.62	0.20	0.04	0.01	0.06			0.56	0.71
2014_GEOC	220	MC	01	1	954	0.61	0.02		0.05	0.79	0.09	0.05			0.79	0.35
2014_GEOC	220	MC	02	1	954	0.61	0.04		0.24	0.18	0.20	0.34			0.34	0.45
2014_GEOC	220	MC	03	1	954	0.61	0.04		0.20	0.22	0.41	0.13			0.41	0.36
2014_GEOC	220	MC	04	1	954	0.61	0.05		0.16	0.38	0.23	0.18			0.18	0.34
2014_GEOC	220	MC	05	1	954	0.61	0.05		0.22	0.20	0.30	0.23			0.23	0.19
2014_GEOC	220	MC	06	1	954	0.61	0.05		0.33	0.38	0.16	0.08			0.33	0.40
2014_GEOC	220	MC	07	1	954	0.61	0.05		0.16	0.29	0.20	0.29			0.29	0.44
2014_GEOC	220	CR	08	2	954	0.61	0.13	0.43	0.30	0.14					0.58	0.65
2014_GEOC	220	CR	09	4	954	0.61	0.12	0.24	0.06	0.19	0.25	0.15			1.76	0.74
2014_GEOC	220	CR	10	4	954	0.61	0.23	0.51	0.14	0.03	0.03	0.06			0.52	0.69

## Appendix B: Inter-rater Consistency – Point Differences Between First and Second Reads

The first three columns from the left contain the form ID, item sequence number, and number of score points for each item. The remaining columns contain the percentage of times each possible difference between the first and second raters' scores occurred. Blank cells indicate out-of-range differences (e.g., differences greater than the maximum possible given the point value of that particular item).

Form	Item	Score Pts	Difference (First Read Minus Second Read)												
			-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
201	08	2					0%	1%	95%	4%	1%				
201	09	2					0%	14%	71%	14%	1%				
201	10	6	0%	0%	0%	0%	1%	11%	77%	9%	3%	0%	0%	0%	0%
202	08	2					1%	6%	85%	7%	1%				
202	09	4			0%	0%	1%	2%	93%	3%	1%	0%	0%		
202	10	4			0%	0%	1%	3%	86%	11%	0%	0%	0%		
203	08	2					0%	1%	97%	2%	0%				
203	09	6	0%	0%	0%	0%	2%	16%	68%	12%	2%	0%	0%	0%	0%
203	10	2					0%	11%	70%	19%	1%				
204	08	2					0%	2%	95%	2%	0%				
204	09	6	0%	0%	0%	0%	4%	2%	88%	2%	4%	0%	0%	0%	0%
204	10	2					1%	12%	70%	14%	2%				
205	08	2					0%	2%	96%	1%	1%				
205	09	6	0%	0%	0%	0%	1%	2%	94%	1%	2%	0%	0%	0%	0%
205	10	2					0%	9%	81%	10%	0%				
206	08	2					1%	9%	79%	11%	0%				
206	09	2					0%	1%	95%	4%	0%				
206	10	6	0%	0%	0%	0%	4%	7%	80%	5%	4%	0%	0%	0%	0%
207	08	2					1%	11%	77%	12%	0%				
207	09	2					2%	10%	77%	10%	2%				

Form	Item	Score Pts	Difference (First Read Minus Second Read)												
			-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
207	10	6	0%	0%	0%	0%	2%	10%	78%	4%	5%	0%	0%	0%	0%
208	08	2					0%	2%	94%	4%	0%				
208	09	2					0%	4%	94%	2%	0%				
209	08	2					0%	4%	89%	7%	0%				
209	09	6	0%	0%	0%	0%	2%	11%	79%	5%	2%	0%	0%	0%	0%
209	10	2					0%	3%	93%	4%	0%				
210	08	2					0%	5%	89%	6%	0%				
210	09	2					0%	4%	86%	10%	0%				
210	10	6	0%	0%	0%	0%	1%	5%	85%	7%	2%	0%	0%	0%	0%
211	08	2					1%	6%	90%	4%	0%				
211	09	4			0%	0%	2%	10%	69%	19%	0%	0%	0%		
211	10	4			0%	0%	1%	2%	96%	1%	1%	0%	0%		
212	08	2					0%	2%	91%	6%	1%				
212	09	4			0%	0%	2%	13%	69%	13%	2%	0%	0%		
212	10	4			0%	0%	1%	0%	98%	1%	1%	0%	0%		
213	08	2					0%	4%	93%	2%	1%				
213	10	4			0%	0%	0%	0%	100%	0%	0%	0%	0%		
214	08	2					1%	0%	97%	1%	1%				
214	09	4			0%	0%	2%	4%	89%	5%	0%	0%	0%		
214	10	4			0%	0%	0%	9%	84%	7%	1%	0%	0%		
215	08	4			0%	0%	1%	8%	82%	6%	3%	0%	0%		
215	09	2					0%	2%	96%	2%	0%				
215	10	4			0%	0%	1%	11%	68%	17%	3%	0%	0%		
216	08	2					0%	3%	96%	1%	0%				
216	09	4			0%	0%	4%	13%	66%	15%	2%	0%	0%		
216	10	4			0%	0%	0%	2%	94%	2%	1%	0%	0%		
217	08	2					0%	3%	95%	2%	0%				

Form	Item	Score Pts	Difference (First Read Minus Second Read)												
			-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
217	10	4			0%	0%	3%	9%	76%	9%	3%	0%	0%		
218	08	2					0%	17%	71%	11%	0%				
218	09	4			0%	0%	1%	10%	80%	8%	1%	0%	0%		
218	10	4			0%	0%	0%	8%	86%	6%	0%	0%	0%		
219	08	2					1%	5%	89%	5%	1%				
219	09	4			0%	0%	3%	23%	51%	18%	5%	0%	0%		
219	10	4			0%	0%	0%	3%	94%	1%	2%	0%	0%		
220	08	2					1%	12%	72%	15%	1%				
220	09	4			0%	0%	3%	15%	67%	10%	5%	0%	0%		
220	10	4			0%	0%	1%	3%	91%	3%	2%	0%	0%		
201	08	2					0%	1%	95%	4%	1%				
201	09	2					0%	14%	71%	14%	1%				
201	10	6	0%	0%	0%	0%	1%	11%	77%	9%	3%	0%	0%	0%	0%
202	08	2					1%	6%	85%	7%	1%				
202	09	4			0%	0%	1%	2%	93%	3%	1%	0%	0%		
202	10	4			0%	0%	1%	3%	86%	11%	0%	0%	0%		
203	08	2					0%	1%	97%	2%	0%				
203	09	6	0%	0%	0%	0%	2%	16%	68%	12%	2%	0%	0%	0%	0%
203	10	2					0%	11%	70%	19%	1%				
204	08	2					0%	2%	95%	2%	0%				
204	09	6	0%	0%	0%	0%	4%	2%	88%	2%	4%	0%	0%	0%	0%
204	10	2					1%	12%	70%	14%	2%				
205	08	2					0%	2%	96%	1%	1%				
205	09	6	0%	0%	0%	0%	1%	2%	94%	1%	2%	0%	0%	0%	0%
205	10	2					0%	9%	81%	10%	0%				
206	08	2					1%	9%	79%	11%	0%				
206	09	2					0%	1%	95%	4%	0%				

Form	Item	Score Pts	Difference (First Read Minus Second Read)												
			-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
206	10	6	0%	0%	0%	0%	4%	7%	80%	5%	4%	0%	0%	0%	0%
207	08	2					1%	11%	77%	12%	0%				
207	09	2					2%	10%	77%	10%	2%				
207	10	6	0%	0%	0%	0%	2%	10%	78%	4%	5%	0%	0%	0%	0%
208	08	2					0%	2%	94%	4%	0%				
208	09	2					0%	4%	94%	2%	0%				
209	08	2					0%	4%	89%	7%	0%				
209	09	6	0%	0%	0%	0%	2%	11%	79%	5%	2%	0%	0%	0%	0%
209	10	2					0%	3%	93%	4%	0%				
210	08	2					0%	5%	89%	6%	0%				
210	09	2					0%	4%	86%	10%	0%				
210	10	6	0%	0%	0%	0%	1%	5%	85%	7%	2%	0%	0%	0%	0%
211	08	2					1%	6%	90%	4%	0%				
211	09	4			0%	0%	2%	10%	69%	19%	0%	0%	0%		
211	10	4			0%	0%	1%	2%	96%	1%	1%	0%	0%		
212	08	2					0%	2%	91%	6%	1%				
212	09	4			0%	0%	2%	13%	69%	13%	2%	0%	0%		
212	10	4			0%	0%	1%	0%	98%	1%	1%	0%	0%		
213	08	2					0%	4%	93%	2%	1%				
213	10	4			0%	0%	0%	0%	100%	0%	0%	0%	0%		
214	08	2					1%	0%	97%	1%	1%				
214	09	4			0%	0%	2%	4%	89%	5%	0%	0%	0%		
214	10	4			0%	0%	0%	9%	84%	7%	1%	0%	0%		
215	08	4			0%	0%	1%	8%	82%	6%	3%	0%	0%		
215	09	2					0%	2%	96%	2%	0%				
215	10	4			0%	0%	1%	11%	68%	17%	3%	0%	0%		
216	08	2					0%	3%	96%	1%	0%				

Form	Item	Score Pts	Difference (First Read Minus Second Read)												
			-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
216	09	4			0%	0%	4%	13%	66%	15%	2%	0%	0%		
216	10	4			0%	0%	0%	2%	94%	2%	1%	0%	0%		
217	08	2					0%	3%	95%	2%	0%				
217	10	4			0%	0%	3%	9%	76%	9%	3%	0%	0%		
218	08	2					0%	17%	71%	11%	0%				
218	09	4			0%	0%	1%	10%	80%	8%	1%	0%	0%		
218	10	4			0%	0%	0%	8%	86%	6%	0%	0%	0%		
219	08	2					1%	5%	89%	5%	1%				
219	09	4			0%	0%	3%	23%	51%	18%	5%	0%	0%		
219	10	4			0%	0%	0%	3%	94%	1%	2%	0%	0%		
220	08	2					1%	12%	72%	15%	1%				
220	09	4			0%	0%	3%	15%	67%	10%	5%	0%	0%		
220	10	4			0%	0%	1%	3%	91%	3%	2%	0%	0%		

## Appendix C: Additional Measures of Inter-rater Reliability and Agreement

The first four columns from the left contain the form ID, item sequence number, number of score points, and the total count of items receiving a first and second read. In the fifth column the percent of exact matches between the first and second scores is provided. The following column (“Adj.”) is the percentage of the first and second scores with a difference of –1 or 1. “Total” is the sum of Exact and Adjacent matches (e.g., the two prior columns).

Form	Item	Score Points	Total N-Count	Agreement (%)			Raw Score Mean		Raw Score Standard Deviation		Intraclass Corr.	Weighted Kappa
				Exact	Adj.	Total	First Read	Second Read	First Read	Second Read		
201	08	2	157	94.9%	4.5%	99.4%	0.2	0.1	0.48	0.43	0.83	0.79
201	09	2	161	71.4%	28.0%	99.4%	0.4	0.4	0.62	0.58	0.58	0.47
201	10	6	159	76.7%	19.5%	96.2%	1.0	1.0	1.70	1.70	0.94	0.82
202	08	2	161	85.1%	13.7%	98.8%	0.6	0.6	0.74	0.75	0.83	0.78
202	09	4	162	93.2%	4.9%	98.1%	0.3	0.2	0.77	0.72	0.89	0.81
202	10	4	160	85.6%	13.8%	99.4%	0.7	0.6	1.26	1.26	0.95	0.86
203	08	2	163	96.9%	3.1%	100.0%	0.2	0.2	0.56	0.54	0.95	0.91
203	09	6	161	68.3%	28.0%	96.3%	1.1	1.1	1.55	1.59	0.91	0.77
203	10	2	160	70.0%	29.4%	99.4%	0.7	0.6	0.77	0.72	0.71	0.61
204	08	2	164	95.1%	4.9%	100.0%	0.2	0.2	0.55	0.55	0.92	0.87
204	09	6	162	87.7%	4.3%	92.0%	0.8	0.7	1.52	1.51	0.92	0.84
204	10	2	166	70.5%	26.5%	97.0%	0.7	0.7	0.80	0.82	0.71	0.62
205	08	2	164	96.3%	3.0%	99.4%	0.2	0.2	0.61	0.61	0.93	0.89
205	09	6	161	93.8%	3.7%	97.5%	0.2	0.2	0.61	0.61	0.82	0.72
205	10	2	168	81.0%	19.0%	100.0%	0.5	0.5	0.59	0.57	0.72	0.67
206	08	2	164	79.3%	19.5%	98.8%	0.5	0.5	0.64	0.63	0.70	0.65
206	09	2	165	95.2%	4.8%	100.0%	1.1	1.1	0.91	0.92	0.97	0.95
206	10	6	165	80.0%	12.1%	92.1%	1.8	1.8	2.05	2.07	0.95	0.87
207	08	2	165	77.0%	22.4%	99.4%	0.6	0.6	0.76	0.67	0.76	0.68

Form	Item	Score Points	Total N-Count	Agreement (%)			Raw Score Mean		Raw Score Standard Deviation		Intraclass Corr.	Weighted Kappa
				Exact	Adj.	Total	First Read	Second Read	First Read	Second Read		
207	09	2	165	77.0%	19.4%	96.4%	1.3	1.3	0.87	0.87	0.77	0.70
207	10	6	164	78.0%	14.6%	92.7%	0.9	0.9	1.33	1.34	0.88	0.77
208	08	2	163	93.9%	6.1%	100.0%	0.5	0.5	0.77	0.79	0.95	0.92
208	09	2	168	94.0%	6.0%	100.0%	0.3	0.3	0.61	0.61	0.92	0.88
209	08	2	162	88.9%	11.1%	100.0%	0.2	0.2	0.47	0.45	0.74	0.68
209	09	6	166	78.9%	16.9%	95.8%	1.6	1.6	1.39	1.39	0.91	0.82
209	10	2	164	93.3%	6.7%	100.0%	0.2	0.2	0.49	0.49	0.86	0.78
210	08	2	161	89.4%	10.6%	100.0%	0.5	0.5	0.68	0.67	0.88	0.84
210	09	2	167	86.2%	13.8%	100.0%	0.3	0.3	0.66	0.65	0.84	0.74
210	10	6	163	84.7%	12.3%	96.9%	1.0	0.9	1.46	1.39	0.94	0.86
211	08	2	163	89.6%	9.2%	98.8%	0.5	0.6	0.82	0.87	0.90	0.85
211	09	4	165	69.1%	28.5%	97.6%	0.6	0.5	0.85	0.80	0.72	0.56
211	10	4	165	95.8%	2.4%	98.2%	0.2	0.2	0.61	0.65	0.88	0.82
212	08	2	161	91.3%	8.1%	99.4%	0.2	0.2	0.47	0.41	0.72	0.71
212	09	4	164	68.9%	26.8%	95.7%	0.8	0.8	1.09	0.96	0.79	0.67
212	10	4	163	97.5%	1.2%	98.8%	0.0	0.0	0.19	0.16	NA	NA
213	08	2	164	93.3%	6.1%	99.4%	0.6	0.6	0.81	0.80	0.93	0.91
213	10	4	161	100.0%	0.0%	100.0%	0.0	0.0	0.00	0.00	NA	NA
214	08	2	159	97.5%	1.3%	98.7%	0.2	0.2	0.55	0.52	0.89	0.87
214	09	4	161	88.8%	9.3%	98.1%	0.3	0.4	0.86	0.91	0.89	0.78
214	10	4	164	83.5%	15.9%	99.4%	0.5	0.5	1.07	1.06	0.92	0.78
215	08	4	163	82.2%	14.1%	96.3%	1.2	1.2	1.52	1.50	0.94	0.86
215	09	2	162	95.7%	4.3%	100.0%	0.3	0.3	0.67	0.67	0.95	0.91
215	10	4	161	67.7%	28.0%	95.7%	1.3	1.2	1.44	1.40	0.89	0.76
216	08	2	160	96.3%	3.8%	100.0%	0.1	0.1	0.35	0.37	0.85	0.80
216	09	4	163	65.6%	28.2%	93.9%	1.5	1.5	1.45	1.52	0.88	0.75

Form	Item	Score Points	Total N-Count	Agreement (%)			Raw Score Mean		Raw Score Standard Deviation		Intraclass Corr.	Weighted Kappa
				Exact	Adj.	Total	First Read	Second Read	First Read	Second Read		
216	10	4	161	94.4%	4.3%	98.8%	0.4	0.4	0.79	0.76	0.92	0.88
217	08	2	163	95.1%	4.9%	100.0%	0.7	0.7	0.90	0.91	0.97	0.95
217	10	4	163	76.1%	17.8%	93.9%	1.7	1.7	1.31	1.36	0.88	0.79
218	08	2	161	71.4%	28.6%	100.0%	0.4	0.5	0.69	0.70	0.71	0.56
218	09	4	158	80.4%	18.4%	98.7%	1.1	1.1	1.17	1.17	0.91	0.83
218	10	4	162	85.8%	14.2%	100.0%	1.1	1.1	1.30	1.31	0.96	0.90
219	08	2	164	89.0%	9.8%	98.8%	0.4	0.4	0.65	0.64	0.82	0.79
219	09	4	164	50.6%	41.5%	92.1%	1.7	1.7	1.28	1.28	0.78	0.60
219	10	4	165	93.9%	4.2%	98.2%	0.5	0.5	1.07	1.04	0.95	0.91
220	08	2	162	71.6%	27.2%	98.8%	0.7	0.6	0.76	0.73	0.71	0.61
220	09	4	165	66.7%	25.5%	92.1%	1.7	1.7	1.46	1.49	0.87	0.75
220	10	4	162	90.7%	6.2%	96.9%	0.6	0.6	1.14	1.14	0.93	0.87

## Appendix D: Partial-Credit Model Item Analysis

The first five columns from the left contain the test name, form name, item type, item number on the form, and maximum points possible for the item. The sixth column contains the number of students that the item was administered to. The remaining eight columns contain the Rasch Item Difficulty, step difficulties (for multi-point items only), and the INFIT Rasch model fit statistic. Items without statistics are DNS (Do Not Score) status items.

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	201	MC	01	1	927	0.5429							1.00
2014_GEOC	201	MC	02	1	927	0.1763							0.91
2014_GEOC	201	MC	03	1	927	-0.1336							1.02
2014_GEOC	201	MC	04	1	927	1.5929							1.12
2014_GEOC	201	MC	05	1	927	-0.4643							1.01
2014_GEOC	201	MC	06	1	927	0.8517							0.94
2014_GEOC	201	MC	07	1	927	0.5144							1.10
2014_GEOC	201	CR	08	2	927	2.2490	0.61942	-0.61942					1.09
2014_GEOC	201	CR	09	2	927	1.9495	-0.66273	0.66273					1.04
2014_GEOC	201	CR	10	6	927	1.5755	-0.07592	-0.59133	-0.42728	0.18199	0.01048	0.90206	0.74
2014_GEOC	202	MC	01	1	947	-0.5634							0.95
2014_GEOC	202	MC	02	1	947	0.4243							0.94
2014_GEOC	202	MC	03	1	947	1.5502							1.03
2014_GEOC	202	MC	04	1	947	0.5949							1.04
2014_GEOC	202	MC	05	1	947	0.3556							1.10
2014_GEOC	202	MC	06	1	947	0.3820							1.25
2014_GEOC	202	MC	07	1	947	0.7034							0.93
2014_GEOC	202	CR	08	2	947	1.0828	-0.07673	0.07673					0.93
2014_GEOC	202	CR	09	4	947	2.3468	0.77629	-0.61883	-0.34603	0.18857			0.94
2014_GEOC	202	CR	10	4	947	1.5147	0.24279	1.04679	0.18327	-1.4728			0.83
2014_GEOC	203	MC	01	1	946	-0.8446							1.05
2014_GEOC	203	MC	02	1	946	0.0511							0.86

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	203	MC	03	1	946	1.6485							1.23
2014_GEOC	203	MC	04	1	946	1.3397							0.92
2014_GEOC	203	MC	05	1	946	1.3707							1.02
2014_GEOC	203	MC	06	1	946	0.7359							1.14
2014_GEOC	203	MC	07	1	946	1.7129							0.94
2014_GEOC	203	CR	08	2	946	1.9279	1.06043	-1.0604					0.98
2014_GEOC	203	CR	09	6	946	1.6077	-0.40882	-0.65606	-0.06898	-0.30676	0.8061	0.63452	0.60
2014_GEOC	203	CR	10	2	946	1.1673	-0.51096	0.51096					1.21
2014_GEOC	204	MC	01	1	957	-0.4470							0.99
2014_GEOC	204	MC	02	1	957	0.5142							1.12
2014_GEOC	204	MC	03	1	957	0.1619							0.99
2014_GEOC	204	MC	04	1	957	1.2005							1.14
2014_GEOC	204	MC	05	1	957	0.0082							0.95
2014_GEOC	204	MC	06	1	957	1.5265							1.10
2014_GEOC	204	MC	07	1	957	0.8847							1.02
2014_GEOC	204	CR	08	2	957	1.9542	0.83773	-0.83773					0.88
2014_GEOC	204	CR	09	6	957	1.3714	1.17521	-1.2578	0.62637	-0.87043	1.24201	-0.91533	0.68
2014_GEOC	204	CR	10	2	957	0.7311	-0.04247	0.04247					1.00
2014_GEOC	205	MC	01	1	960	2.1401							1.11
2014_GEOC	205	MC	02	1	960	-2.1091							1.00
2014_GEOC	205	MC	03	1	960	-0.1788							0.89
2014_GEOC	205	MC	04	1	960	1.7767							1.09
2014_GEOC	205	MC	05	1	960	0.1828							1.08
2014_GEOC	205	MC	06	1	960	0.0138							0.87
2014_GEOC	205	MC	07	1	960	0.4119							1.00
2014_GEOC	205	CR	08	2	960	1.9664	1.54516	-1.5452					0.84
2014_GEOC	205	CR	09	6	960	3.3540	0.70386	-2.5188	0.41607	-0.80778	2.20666		0.91
2014_GEOC	205	CR	10	2	960	2.0799	-1.6819	1.68193					1.11
2014_GEOC	206	MC	01	.									

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	206	MC	02	1	964	1.8890							1.16
2014_GEOC	206	MC	03	1	964	-0.1928							1.07
2014_GEOC	206	MC	04	1	964	0.5996							1.27
2014_GEOC	206	MC	05	1	964	0.0099							1.01
2014_GEOC	206	MC	06	1	964	0.2834							0.96
2014_GEOC	206	MC	07	1	964	0.5745							1.12
2014_GEOC	206	CR	08	2	964	1.5825	-1.2725	1.2725					0.84
2014_GEOC	206	CR	09	2	964	-0.0442	0.33099	-0.33099					0.87
2014_GEOC	206	CR	10	6	964	1.0653	0.57848	-1.1053	0.47843	-2.3975	2.03235	0.41362	0.67
2014_GEOC	207	MC	01	1	966	-0.5137							1.10
2014_GEOC	207	MC	02	1	966	3.3839							1.02
2014_GEOC	207	MC	03	1	966	0.8585							1.07
2014_GEOC	207	MC	04	1	966	1.2644							1.06
2014_GEOC	207	MC	05	1	966	0.9491							1.07
2014_GEOC	207	MC	06	1	966	-0.2745							1.02
2014_GEOC	207	MC	07	1	966	1.8135							1.07
2014_GEOC	207	CR	08	2	966	1.0354	-0.34975	0.34975					0.82
2014_GEOC	207	CR	09	2	966	-0.0861	0.36734	-0.36734					0.87
2014_GEOC	207	CR	10	6	966	1.7237	0.18703	-2.3693	1.13824	-0.55455	1.28736	0.31125	0.81
2014_GEOC	208	MC	01	1	958	0.8821							1.12
2014_GEOC	208	MC	02	1	958	-0.7141							0.97
2014_GEOC	208	MC	03	1	958	0.7536							1.02
2014_GEOC	208	MC	04	1	958	-1.0181							1.01
2014_GEOC	208	MC	05	1	958	0.5592							0.91
2014_GEOC	208	MC	06	1	958	0.7688							0.99
2014_GEOC	208	MC	07	1	958	0.8769							1.14
2014_GEOC	208	CR	08	2	958	1.2229	0.40881	-0.40881					0.80
2014_GEOC	208	CR	09	2	958	1.7754	-0.15577	0.15577					1.05
2014_GEOC	208	CR	10	.									

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	209	MC	01	1	949	0.9660							1.10
2014_GEOC	209	MC	02	1	949	0.8029							1.26
2014_GEOC	209	MC	03	1	949	0.7094							1.05
2014_GEOC	209	MC	04	1	949	-0.8019							0.96
2014_GEOC	209	MC	05	1	949	-0.0379							0.88
2014_GEOC	209	MC	06	1	949	1.6375							1.03
2014_GEOC	209	MC	07	1	949	-0.0432							0.97
2014_GEOC	209	CR	08	2	949	2.5070	-0.24368	0.24368					1.03
2014_GEOC	209	CR	09	6	949	1.2376	-2.9325	0.2275	-0.01744	0.31897	1.90435	0.4991	0.80
2014_GEOC	209	CR	10	2	949	2.5823	0.60257	-0.60257					0.88
2014_GEOC	210	MC	01	1	953	0.6582							1.17
2014_GEOC	210	MC	02	1	953	0.5028							0.94
2014_GEOC	210	MC	03	1	953	0.4054							0.90
2014_GEOC	210	MC	04	1	953	-0.2266							0.89
2014_GEOC	210	MC	05	1	953	0.5492							1.15
2014_GEOC	210	MC	06	1	953	1.1392							1.05
2014_GEOC	210	MC	07	1	953	-1.0112							0.93
2014_GEOC	210	CR	08	2	953	1.3442	-0.28624	0.28624					1.19
2014_GEOC	210	CR	09	2	953	1.7023	0.54525	-0.54525					0.94
2014_GEOC	210	CR	10	6	953	1.7246	-0.54649	-0.54209	0.73505	-0.27844	0.06424	0.56773	0.77
2014_GEOC	211	MC	01	1	953	0.7015							0.93
2014_GEOC	211	MC	02	1	953	1.4152							1.11
2014_GEOC	211	MC	03	1	953	1.1798							1.09
2014_GEOC	211	MC	04	1	953	0.686							1.01
2014_GEOC	211	MC	05	1	953	1.2823							1.05
2014_GEOC	211	MC	06	1	953	1.4745							1.02
2014_GEOC	211	MC	07	1	953	0.2035							1.03
2014_GEOC	211	CR	08	2	953	0.9795	0.68943	-0.68943					0.82
2014_GEOC	211	CR	09	4	953	1.7249	-0.87626	0.21324	0.39522	0.26779			0.98

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	211	CR	10	4	953	1.8888	2.9584	-3.2249	1.16734	-0.90079			0.99
2014_GEOC	212	MC	01	1	963	0.1906							0.98
2014_GEOC	212	MC	02	1	963	1.0782							1.00
2014_GEOC	212	MC	03	1	963	1.1708							1.04
2014_GEOC	212	MC	04	1	963	0.2006							0.92
2014_GEOC	212	MC	05	1	963	-0.2839							0.94
2014_GEOC	212	MC	06	1	963	0.9274							1.35
2014_GEOC	212	MC	07	1	963	0.8032							1.00
2014_GEOC	212	CR	08	2	963	2.593	-0.636	0.636					0.95
2014_GEOC	212	CR	09	4	963	1.8819	-1.1813	-0.83802	-0.68074	2.70007			0.82
2014_GEOC	212	CR	10	4	963	3.4582	1.44296	-1.4006	-0.11083	0.06847			0.89
2014_GEOC	213	MC	01	1	941	1.1395							1.09
2014_GEOC	213	MC	02	1	941	1.3392							1.21
2014_GEOC	213	MC	03	1	941	0.6799							1.02
2014_GEOC	213	MC	04	1	941	0.0977							0.90
2014_GEOC	213	MC	05	1	941	1.7567							1.00
2014_GEOC	213	MC	06	1	941	-1.4957							1.01
2014_GEOC	213	MC	07	1	941	1.5040							0.97
2014_GEOC	213	CR	08	2	941	0.8887	0.24869	-0.24869					0.79
2014_GEOC	213	CR	09	.									
2014_GEOC	213	CR	10	4	941								1.00
2014_GEOC	214	MC	01	1	945	1.3919							1.21
2014_GEOC	214	MC	02	1	945	0.7923							0.91
2014_GEOC	214	MC	03	1	945	0.1647							0.97
2014_GEOC	214	MC	04	1	945	1.3852							1.04
2014_GEOC	214	MC	05	1	945	0.5199							1.07
2014_GEOC	214	MC	06	1	945	0.2235							0.90
2014_GEOC	214	MC	07	1	945	-0.5525							0.97
2014_GEOC	214	CR	08	2	945	2.3408	2.28984	-2.2898					0.87

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	214	CR	09	4	945	2.1270	0.17258	0.29907	1.06478	-1.5364			1.13
2014_GEOC	214	CR	10	4	945	2.0285	-0.10051	0.21491	0.40881	-0.52322			0.95
2014_GEOC	215	MC	01	1	952	-1.1335							1.01
2014_GEOC	215	MC	02	1	952	1.6327							1.14
2014_GEOC	215	MC	03	1	952	1.2941							0.98
2014_GEOC	215	MC	04	1	952	1.7601							1.04
2014_GEOC	215	MC	05	1	952	-0.1883							1.02
2014_GEOC	215	MC	06	1	952	0.8266							0.98
2014_GEOC	215	MC	07	1	952	-0.7958							0.97
2014_GEOC	215	CR	08	4	952	0.8344	0.32399	-0.00657	0.01338	-0.3308			0.80
2014_GEOC	215	CR	09	2	952	1.3522	1.37797	-1.378					1.03
2014_GEOC	215	CR	10	4	952	0.8535	-0.18657	0.06943	-0.6219	0.73904			1.04
2014_GEOC	216	MC	01	1	945	0.3170							1.03
2014_GEOC	216	MC	02	1	945	1.7721							0.99
2014_GEOC	216	MC	03	1	945	0.3828							1.15
2014_GEOC	216	MC	04	1	945	1.9876							0.98
2014_GEOC	216	MC	05	1	945	-0.3175							1.02
2014_GEOC	216	MC	06	1	945	-0.2242							1.00
2014_GEOC	216	MC	07	1	945	0.6605							1.04
2014_GEOC	216	CR	08	2	945	3.1301	0.97171	-0.97171					0.95
2014_GEOC	216	CR	09	4	945	0.9128	0.15236	-1.0966	0.57198	0.37226			0.85
2014_GEOC	216	CR	10	4	945	2.0224	-0.62495	0.96003	0.83428	-1.1694			0.92
2014_GEOC	217	MC	01	1	952	0.5159							1.04
2014_GEOC	217	MC	02	1	952	1.0065							0.95
2014_GEOC	217	MC	03	1	952	-0.7683							0.96
2014_GEOC	217	MC	04	1	952	-0.1677							1.04
2014_GEOC	217	MC	05	1	952	-0.8353							0.97
2014_GEOC	217	MC	06	1	952	0.5790							1.00
2014_GEOC	217	MC	07	1	952	0.7976							1.24

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	217	CR	08	2	952	0.5753	0.81201	-0.81201					0.94
2014_GEOC	217	CR	09	.									
2014_GEOC	217	CR	10	4	952	1.0100	-0.62007	-1.1024	-1.3476	3.07007			0.82
2014_GEOC	218	MC	01	1	946	0.0842							1.16
2014_GEOC	218	MC	02	1	946	0.1607							0.92
2014_GEOC	218	MC	03	1	946	0.6817							1.12
2014_GEOC	218	MC	04	1	946	0.0985							0.94
2014_GEOC	218	MC	05	1	946	2.8604							1.13
2014_GEOC	218	MC	06	1	946	-0.3473							0.93
2014_GEOC	218	MC	07	1	946	1.2481							1.09
2014_GEOC	218	CR	08	2	946	1.1509	0.06258	-0.06258					0.98
2014_GEOC	218	CR	09	4	946	1.2357	-0.60685	-0.9445	1.33074	0.22062			0.81
2014_GEOC	218	CR	10	4	946	0.9889	0.33849	-1.3776	1.65404	-0.6149			0.91
2014_GEOC	219	MC	01	1	963	-1.8802							1.04
2014_GEOC	219	MC	02	1	963	2.9121							1.12
2014_GEOC	219	MC	03	1	963	0.4153							1.01
2014_GEOC	219	MC	04	1	963	1.181							1.16
2014_GEOC	219	MC	05	1	963	0.0412							0.97
2014_GEOC	219	MC	06	1	963	2.4751							1.08
2014_GEOC	219	MC	07	1	963	0.9934							1.09
2014_GEOC	219	CR	08	2	963	1.6167	0.29758	-0.29758					0.94
2014_GEOC	219	CR	09	4	963	0.7367	-0.84775	-0.62766	0.19986	1.27555			0.82
2014_GEOC	219	CR	10	4	963	1.5505	-0.19671	0.68732	0.93379	-1.4244			0.79
2014_GEOC	220	MC	01	1	954	-1.23							0.91
2014_GEOC	220	MC	02	1	954	1.0300							1.01
2014_GEOC	220	MC	03	1	954	0.600							1.10
2014_GEOC	220	MC	04	1	954	1.9100							1.03
2014_GEOC	220	MC	05	1	954	1.5800							1.28
2014_GEOC	220	MC	06	1	954	0.9200							1.03

Test	Form	Type	Item	Max	N-Count	RID	S1	S2	S3	S4	S5	S6	INFIT
2014_GEOC	220	MC	07	1	954	1.2300							1.01
2014_GEOC	220	CR	08	2	954	1.200	-0.82	0.82					0.95
2014_GEOC	220	CR	09	4	954	0.3200	0.83	-1.36	-0.1	0.63			0.84
2014_GEOC	220	CR	10	4	954	1.9500	-0.01	0.34	-0.62	0.29			1.10

## Appendix E: DIF Statistics

The first four columns from the left contain the test name, form ID, item type, and item sequence number within the form. The next three columns contain the Mantel-Haenszel DIF statistical values (note that the MH Delta statistic cannot be calculated for CR items). The final two columns will only have values if the item displays possible moderate or severe DIF; if so, the degree of DIF (B/BB = moderate; C/CC = severe) and the favored group will be shown. Items without statistics are DNS (Do Not Score) status items.

Test	Form	Type	Item	MH Delta	MH Chi-Sq	Effect Size	DIF Category	Favored Group
2014_GEOC	201	MC	01	-0.54	2.09	-0.09		
2014_GEOC	201	MC	02	-0.88	5.21	-0.12		
2014_GEOC	201	MC	03	-0.23	0.40	-0.04		
2014_GEOC	201	MC	04	-0.87	4.58	-0.12		
2014_GEOC	201	MC	05	-0.99	6.75	-0.14		
2014_GEOC	201	MC	06	-0.13	0.10	-0.02		
2014_GEOC	201	MC	07	-0.22	0.39	-0.03		
2014_GEOC	201	CR	08		1.02	0.07		
2014_GEOC	201	CR	09		1.48	0.08		
2014_GEOC	201	CR	10		14.58	0.13		
2014_GEOC	202	MC	01	0.78	4.14	0.12		
2014_GEOC	202	MC	02	-0.38	1.08	-0.06		
2014_GEOC	202	MC	03	-0.10	0.07	0.00		
2014_GEOC	202	MC	04	0.20	0.31	0.02		
2014_GEOC	202	MC	05	-0.14	0.16	-0.02		
2014_GEOC	202	MC	06	0.20	0.37	0.03		
2014_GEOC	202	MC	07	-0.55	2.12	-0.08		
2014_GEOC	202	CR	08		0.47	0.05		
2014_GEOC	202	CR	09		2.73	-0.09		
2014_GEOC	202	CR	10		0.37	0.02		
2014_GEOC	203	MC	01	0.28	0.58	0.05		
2014_GEOC	203	MC	02	-0.34	0.79	-0.05		
2014_GEOC	203	MC	03	-0.15	0.14	-0.02		
2014_GEOC	203	MC	04	-0.47	1.33	-0.07		
2014_GEOC	203	MC	05	-0.46	1.47	-0.06		
2014_GEOC	203	MC	06	-0.14	0.18	-0.04		
2014_GEOC	203	MC	07	-1.46	10.81	-0.20	B	M
2014_GEOC	203	CR	08		0.75	-0.06		
2014_GEOC	203	CR	09		4.26	0.07		
2014_GEOC	203	CR	10		5.39	0.15		
2014_GEOC	204	MC	01	-0.33	0.83	-0.06		

Test	Form	Type	Item	MH Delta	MH Chi-Sq	Effect Size	DIF Category	Favored Group
2014_GEOC	204	MC	02	-0.30	0.80	-0.06		
2014_GEOC	204	MC	03	-0.73	4.25	-0.11		
2014_GEOC	204	MC	04	-0.66	3.31	-0.14		
2014_GEOC	204	MC	05	0.02	0.00	0.02		
2014_GEOC	204	MC	06	-1.07	7.69	-0.21	B	M
2014_GEOC	204	MC	07	-0.69	3.76	-0.12		
2014_GEOC	204	CR	08		1.87	0.07		
2014_GEOC	204	CR	09		8.11	0.11		
2014_GEOC	204	CR	10		5.11	0.12		
2014_GEOC	205	MC	01	0.00	0.00	-0.01		
2014_GEOC	205	MC	02	-0.21	0.16	-0.02		
2014_GEOC	205	MC	03	-1.02	6.72	-0.14	B	M
2014_GEOC	205	MC	04	0.07	0.03	0.01		
2014_GEOC	205	MC	05	0.24	0.49	0.05		
2014_GEOC	205	MC	06	0.50	1.64	0.06		
2014_GEOC	205	MC	07	-0.16	0.21	-0.03		
2014_GEOC	205	CR	08		3.04	-0.07		
2014_GEOC	205	CR	09		10.89	0.14		
2014_GEOC	205	CR	10		0.15	-0.02		
2014_GEOC	206	MC	01					
2014_GEOC	206	MC	02	-0.20	0.23	-0.03		
2014_GEOC	206	MC	03	-0.60	2.96	-0.10		
2014_GEOC	206	MC	04	0.21	0.41	0.04		
2014_GEOC	206	MC	05	0.04	0.01	0.03		
2014_GEOC	206	MC	06	0.22	0.37	0.04		
2014_GEOC	206	MC	07	0.17	0.24	0.05		
2014_GEOC	206	CR	08		2.88	0.10		
2014_GEOC	206	CR	09		3.61	-0.08		
2014_GEOC	206	CR	10		0.32	0.03		
2014_GEOC	207	MC	01	-0.17	0.23	-0.01		
2014_GEOC	207	MC	02	-0.41	0.29	-0.04		
2014_GEOC	207	MC	03	0.54	2.46	0.11		
2014_GEOC	207	MC	04	-0.91	6.11	-0.14		
2014_GEOC	207	MC	05	-0.12	0.12	-0.01		
2014_GEOC	207	MC	06	-0.30	0.74	-0.04		
2014_GEOC	207	MC	07	-1.44	11.81	-0.20	B	M
2014_GEOC	207	CR	08		3.79	0.11		
2014_GEOC	207	CR	09		3.77	0.10		
2014_GEOC	207	CR	10		0.04	0.03		
2014_GEOC	208	MC	01	-0.02	0.01	0.00		

Test	Form	Type	Item	MH Delta	MH Chi-Sq	Effect Size	DIF Category	Favored Group
2014_GEOC	208	MC	02	-1.25	10.37	-0.20	B	M
2014_GEOC	208	MC	03	-0.39	1.19	-0.07		
2014_GEOC	208	MC	04	0.12	0.09	0.02		
2014_GEOC	208	MC	05	0.02	0.00	0.00		
2014_GEOC	208	MC	06	-0.33	0.84	-0.05		
2014_GEOC	208	MC	07	0.33	0.94	0.06		
2014_GEOC	208	CR	08		0.50	0.04		
2014_GEOC	208	CR	09		6.18	0.14		
2014_GEOC	208	CR	10					
2014_GEOC	209	MC	01	-0.01	0.00	0.00		
2014_GEOC	209	MC	02	0.60	3.18	0.11		
2014_GEOC	209	MC	03	-0.71	3.97	-0.13		
2014_GEOC	209	MC	04	1.17	8.94	0.18	B	F
2014_GEOC	209	MC	05	-1.69	18.94	-0.23	C	M
2014_GEOC	209	MC	06	-0.21	0.26	-0.01		
2014_GEOC	209	MC	07	0.47	1.66	0.07		
2014_GEOC	209	CR	08		0.06	0.03		
2014_GEOC	209	CR	09		0.85	0.04		
2014_GEOC	209	CR	10		2.44	-0.06		
2014_GEOC	210	MC	01	0.11	0.10	0.03		
2014_GEOC	210	MC	02	-0.05	0.02	-0.01		
2014_GEOC	210	MC	03	-1.60	17.40	-0.24	C	M
2014_GEOC	210	MC	04	0.85	5.05	0.13		
2014_GEOC	210	MC	05	-0.04	0.02	0.00		
2014_GEOC	210	MC	06	-0.61	2.80	-0.10		
2014_GEOC	210	MC	07	-1.09	6.71	-0.14	B	M
2014_GEOC	210	CR	08		8.48	0.20	BB	F
2014_GEOC	210	CR	09		3.42	0.10		
2014_GEOC	210	CR	10		0.14	-0.01		
2014_GEOC	211	MC	01	-0.59	2.54	-0.08		
2014_GEOC	211	MC	02	-0.98	6.55	-0.13		
2014_GEOC	211	MC	03	-0.49	1.74	-0.07		
2014_GEOC	211	MC	04	-0.80	5.08	-0.12		
2014_GEOC	211	MC	05	-0.19	0.24	0.00		
2014_GEOC	211	MC	06	-0.11	0.07	-0.02		
2014_GEOC	211	MC	07	-0.65	3.55	-0.09		
2014_GEOC	211	CR	08		5.71	0.17		
2014_GEOC	211	CR	09		18.99	0.25	BB	F
2014_GEOC	211	CR	10		0.06	0.08		
2014_GEOC	212	MC	01	-0.64	3.34	-0.09		

Test	Form	Type	Item	MH Delta	MH Chi-Sq	Effect Size	DIF Category	Favored Group
2014_GEOC	212	MC	02	-0.86	5.42	-0.12		
2014_GEOC	212	MC	03	-0.49	1.71	-0.07		
2014_GEOC	212	MC	04	-0.03	0.01	0.00		
2014_GEOC	212	MC	05	0.60	2.75	0.09		
2014_GEOC	212	MC	06	-0.66	3.85	-0.12		
2014_GEOC	212	MC	07	0.31	0.76	0.06		
2014_GEOC	212	CR	08		0.26	0.04		
2014_GEOC	212	CR	09		4.68	0.10		
2014_GEOC	212	CR	10		5.87	0.08		
2014_GEOC	213	MC	01	-0.34	0.87	-0.05		
2014_GEOC	213	MC	02	-0.51	1.88	-0.09		
2014_GEOC	213	MC	03	-0.29	0.66	-0.04		
2014_GEOC	213	MC	04	-0.13	0.11	-0.02		
2014_GEOC	213	MC	05	-0.01	0.00	-0.01		
2014_GEOC	213	MC	06	0.12	0.07	0.02		
2014_GEOC	213	MC	07	-0.04	0.01	0.00		
2014_GEOC	213	CR	08		6.64	0.12		
2014_GEOC	213	CR	09					
2014_GEOC	213	CR	10		99.99	100.0		
2014_GEOC	214	MC	01	0.00	0.00	0.01		
2014_GEOC	214	MC	02	-1.01	6.78	-0.14	B	M
2014_GEOC	214	MC	03	0.51	2.03	0.09		
2014_GEOC	214	MC	04	0.78	3.85	0.12		
2014_GEOC	214	MC	05	0.07	0.04	0.01		
2014_GEOC	214	MC	06	-0.93	6.06	-0.13		
2014_GEOC	214	MC	07	-0.14	0.14	-0.03		
2014_GEOC	214	CR	08		0.09	0.03		
2014_GEOC	214	CR	09		0.19	0.03		
2014_GEOC	214	CR	10		0.34	0.03		
2014_GEOC	215	MC	01	-0.49	1.38	-0.08		
2014_GEOC	215	MC	02	-0.50	1.68	-0.09		
2014_GEOC	215	MC	03	-0.89	5.25	-0.13		
2014_GEOC	215	MC	04	0.16	0.16	0.02		
2014_GEOC	215	MC	05	-0.36	1.00	-0.06		
2014_GEOC	215	MC	06	0.19	0.28	0.04		
2014_GEOC	215	MC	07	-0.01	0.00	0.00		
2014_GEOC	215	CR	08		0.58	0.03		
2014_GEOC	215	CR	09		0.92	-0.05		
2014_GEOC	215	CR	10		3.37	0.08		
2014_GEOC	216	MC	01	-0.23	0.45	-0.06		

Test	Form	Type	Item	MH Delta	MH Chi-Sq	Effect Size	DIF Category	Favored Group
2014_GEOC	216	MC	02	-0.75	3.09	-0.10		
2014_GEOC	216	MC	03	0.01	0.00	0.01		
2014_GEOC	216	MC	04	-0.28	0.38	-0.03		
2014_GEOC	216	MC	05	0.22	0.39	0.05		
2014_GEOC	216	MC	06	-0.19	0.29	-0.02		
2014_GEOC	216	MC	07	0.83	5.71	0.15		
2014_GEOC	216	CR	08		5.26	-0.12		
2014_GEOC	216	CR	09		0.08	0.00		
2014_GEOC	216	CR	10		2.13	0.08		
2014_GEOC	217	MC	01	-0.61	3.05	-0.10		
2014_GEOC	217	MC	02	-0.42	1.20	-0.07		
2014_GEOC	217	MC	03	1.34	11.50	0.21	B	F
2014_GEOC	217	MC	04	0.19	0.29	0.04		
2014_GEOC	217	MC	05	0.32	0.62	0.04		
2014_GEOC	217	MC	06	-1.25	12.02	-0.22	B	M
2014_GEOC	217	MC	07	-0.52	2.38	-0.12		
2014_GEOC	217	CR	08		0.06	0.01		
2014_GEOC	217	CR	09					
2014_GEOC	217	CR	10		3.21	0.08		
2014_GEOC	218	MC	01	-0.19	0.35	-0.05		
2014_GEOC	218	MC	02	-0.37	1.05	-0.06		
2014_GEOC	218	MC	03	0.14	0.18	0.02		
2014_GEOC	218	MC	04	-0.81	5.35	-0.13		
2014_GEOC	218	MC	05	-1.16	3.71	-0.13		
2014_GEOC	218	MC	06	-0.02	0.00	0.00		
2014_GEOC	218	MC	07	0.17	0.23	0.03		
2014_GEOC	218	CR	08		4.57	0.12		
2014_GEOC	218	CR	09		2.91	0.09		
2014_GEOC	218	CR	10		0.69	-0.04		
2014_GEOC	219	MC	01	-0.92	3.38	-0.09		
2014_GEOC	219	MC	02	-0.01	0.00	0.00		
2014_GEOC	219	MC	03	-0.47	1.82	-0.08		
2014_GEOC	219	MC	04	0.38	1.13	0.06		
2014_GEOC	219	MC	05	-0.39	1.24	-0.06		
2014_GEOC	219	MC	06	-0.15	0.09	-0.01		
2014_GEOC	219	MC	07	0.24	0.49	0.04		
2014_GEOC	219	CR	08		1.79	-0.06		
2014_GEOC	219	CR	09		2.47	0.08		
2014_GEOC	219	CR	10		0.37	0.05		
2014_GEOC	220	MC	01	0.07	0.03	0.03		

Test	Form	Type	Item	MH Delta	MH Chi-Sq	Effect Size	DIF Category	Favored Group
2014_GEOC	220	MC	02	0.54	2.13	0.12		
2014_GEOC	220	MC	03	-0.22	0.41	-0.03		
2014_GEOC	220	MC	04	-0.19	0.18	-0.02		
2014_GEOC	220	MC	05	-0.01	0.00	0.00		
2014_GEOC	220	MC	06	-0.42	1.36	-0.06		
2014_GEOC	220	MC	07	-0.27	0.50	-0.02		
2014_GEOC	220	CR	08		0.28	0.06		
2014_GEOC	220	CR	09		1.12	-0.03		
2014_GEOC	220	CR	10		3.46	0.11		

DIF category meanings: A/AA = negligible, B/BB = moderate, C/CC = severe.

Favored group meanings: F = Female, M = Male.