Maryland High School Assessment
2017 Technical Report

Biology
Government

Educational Testing Service
November 2017

Foreword

The technical information included in this report is intended for use by those who evaluate tests, interpret scores, or use test results in making educational decisions. It is assumed that the reader has some technical knowledge of test construction and measurement procedures, as stated in *Standards of Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014).

Table of Contents

List of Tables

List of Figures

Section 1. Introduction

The current Maryland High School Assessments (MD HSAs) in 2017 consist of end-of-course tests in Biology and Government. Please note that starting from 2016, the end-of-course tests in Algebra and English are being replaced by PARCC (Partnership for Assessment of Readiness for College and Careers) tests. For 2016-2017 administration, there was no new form construction. The tests forms of Biology and Government in the 2015-2016 administration were reused.

Prior to the Summer 2011 administration, the HSAs included a test in Government. From Summer 2011 to October 2012, the Government test was excluded from the MD HSAs. Starting in January 2013, the Government test was re-introduced into the MD HSAs. The MD HSAs are referred to as "end-of-course" tests because students take each test as they complete the appropriate coursework. In addition, results from the Biology administrations are used in the Maryland State Department of Education (MSDE) Adequate Yearly Progress (AYP) reports, required under the No Child Left Behind (NCLB) Act for the 2017 school year.

With the reinstatement of Government tests in January 2013, students entering 9th grade in the 2012-2013 school year or in a prior year (including students who entered 9th grade in 2011-2012, 2010-2011, or 2009-2010) have the option of earning a combined score of 1602 on all four MD HSAs or a combined score of 1208 on three MD HSAs (excluding Government) to be granted a Maryland High School Diploma.[1] Students entering 9th grade in 2013-14 and beyond will be required to pass all four HSAs, including Government, or obtain a combined score of 1602 to fulfill the graduation requirement.

Students who were enrolled in HSA-aligned courses (Government and Biology) during the 2016-2017 school year are required to pass the HSA, achieve an approved combined score, or satisfy the graduation requirement via the Bridge Plan[2]. Students in the graduating class of 2017 were not required to pass the Government HSA, but may use the score on the HSA towards a combined score option. The combined score options for the graduating class of 2017 vary depending on whether or not students have a score from the previous HSA English or HSA Algebra assessments.

All MD HSAs contain selected-response (SR) items, which require students to choose between four short response options. Starting in January 2014, Government tests include brief constructed-response (BCR) items which require students to write a short response. All MD HSA items are based on content outlined in Maryland's Core Learning Goals (CLGs).[3] The SR items are machine-scored and the BCR items are scored by two raters (with resolution ratings as

[1] More information on the testing requirement for graduation is available on the Maryland State Department of Education website at http://mdk12.org/assessments/high_school/index.html.
[2] Bridge plan provides a process that helps ensure all students have a fair opportunity to demonstrate their knowledge and skills if traditional testing instruments are not effective measures for them. See more details at http://mdk12.msde.maryland.gov/share/pdf/bridge_final.pdf.
[3] The HSA Core Learning Goals documents can be found on the Maryland School Improvement website at http://www.mdk12.org/assessments/standards/9-12.html.

needed.) For BCR items, the higher rating was used for both calibration and scoring. Since May 2009, the MD HSAs have been administered online as well as in paper-and-pencil format. Studies of the comparability of online and paper forms of the MD HSAs were conducted in 2009 and 2010. The 2009 report is provided in the 2009 HSA Technical Report in Appendix 1C. The 2010 results were provided to the MSDE (Educational Testing Service, October 29, 2010). Further mode comparability studies have not been conducted.

This report provides information about the January, May, and Summer 2017 administrations. For the January 2017 administration, three forms were administered: two forms for the primary administration, and one form for the makeup administration. For the May 2017 administration, ten test forms were administered: eight for the primary testing window (each has the same core set with different field test sets) and two for each of two makeup testing windows. For the Summer 2017 administration, two primary forms were administered: one for the first week of testing and the other one for the second week of testing.

Each test form consisted of operational and field test items. The operational items were used to produce student scores. Field test items were scored along with the operational items, but test takers' scores on these items were not included in the computation of their total test scores. For the 2017 administrations, since the forms were reused from the previous year, the calibration of the field test items was not implemented and performance on the field test items was not analyzed.

The item response models are used to generate both total test scores and subscores using item-pattern (IP) scoring. They are based on the three-parameter logistic (3PL) model for the selected response items (see Section 2 for an introduction to item types) and the generalized partial credit model (GPCM) for the brief constructed response items on the Government HSA. Refer to *Scale Scores* of Section 4 for the details of IP Scoring procedure and IRT Models. Students' total test scores and subscores are scale scores derived using the 3PL and GPCM and item-pattern scoring procedures. Total test results in the scale score metric are reported to students. Subscores are not reported to students but are aggregated at the classroom level to provide teachers and administrators with additional information about student performance in each of the subscore categories.

Pre-equated item parameter estimates are used to generate student scores. When pre-equated item parameter estimates are used, the parameters are not estimated following an administration; instead, existing bank parameter estimates are used to produce student scores. Using this approach, scores can be calculated and assigned to students immediately after their answer documents have been processed. (Prior to 2004, students' scores were based on item parameter estimates after each administration.)

All technical support and analyses were carried out in accordance with both the *ETS Standards for Quality and Fairness* (2014) and the *Standards for Educational and Psychological Testing*, issued jointly by the American Educational Research Association [AERA], American Psychological Association [APA], and National Council on Measurement in Education [NCME] (2014).

The MD HSA chapter of this technical report consists of seven sections and two appendices.

- Section 1 provides an introduction to the MD HSA program.
- Section 2 describes the procedures used for test construction and administration.
- Section 3 discusses the validity of the MD HSAs.
- Section 4 delineates the scoring procedures and score types.
- Section 5 summarizes the results of the analyses of test reliability, decision consistency and decision accuracy.
- Section 6 provides summary statistics and descriptive information about student characteristics.
- Section 7 gives the results of the analysis of the operational test data, including classical item analysis and differential item functioning.
- Appendix A provides classical item statistics for each operational test item by form administered.

Section 2. Test Construction and Administration

Test Development

Planning

ETS content leaders collaborated with their content counterparts at MSDE and decided to use reprint forms from 2016 for all of the 2017 administrations. When these forms were first created for the 2016 administration the planning for the test development process began with the creation of item development plans for each content area.

The item bank was reviewed to determine how well the available item pool matched the test form requirements set forth in the test form blueprint as defined by the Core Learning Goals (CLGs) and the 2016 form construction templates provided by MSDE. Areas that contained low item counts were given priority when determining which indicators were to be addressed by the item writers. After these areas with critical need were defined and addressed, any remaining items to be developed (as determined by the requirements set forth in the RFP) were distributed among the indicators in a fashion that would best ensure sufficient numbers of items for use in the construction of forms for future administrations.

Item Types

As noted in Section 1, two item types were included on the 2017 MD HSA reprint tests. These item types included the following:

- Selected response (SR)—questions in multiple-choice format with four answer options;
- Brief constructed response (BCR)—an item type used in Government only, for which the students need to write a short response.

Table 2.1 shows how these item types were distributed by content area. Each SR item is worth one point, and each BCR is worth 4 points.

Table 2.1 Number of Operational Items by Item Type for Each MD HSA Content Area

	Operational Items by Item Type		
Content Area	SR	BCR	Total
Biology	76	-	76
Government	62	5	67

Test Specifications and Design

MSDE predetermined the basic test design and provided it to ETS in the form of the content-specific "Test Specifications—Test Form Matrix" document. This basic test design document provides information based on specified expectations and the distribution of the number of items by item type for each reporting category. How the specific items were placed throughout the forms was left to the collaborative efforts of ETS and MSDE content specialists. Construction of the forms was based on test blueprints approved by MSDE. Blueprints for each content area are presented in Tables 2.2 and 2.3.

Table 2.2 MD HSA Biology Blueprint

	Number of Items	Total Points per Category
Goal 1* Skills and Processes of Biology	16	16
Expectation 3.1 Structure and Function of Biological Molecules	12	12
Expectation 3.2 Structure and Function of Cells and Organisms	13	13
Expectation 3.3 Inheritance of Traits	13	13
Expectation 3.4 Mechanism of Evolutionary Change	9	9
Expectation 3.5 Interdependence of Organisms in the Biosphere	13	13
Total	76	76

Note. Information on the referenced indicators can be found in the Maryland Core Learning Goals for Biology, available on the Maryland School Improvement website at http://www.mdk12.org/assessments/standards/9-12.html.
Goal 1 includes Expectation 1.1 through Expectation 1.7

Table 2.3 MD HSA Government Blueprint

	Number of Items	Total Points per Category
Goal 1		
Expectation1.1 U.S. Government Structure, Functions and Principles	21	24
Expectation 1.2 Protecting Rights and Maintaining Order	17	20
Goal 2 Systems of Government and U.S. Foreign Policy	9	12
Goal 3 Impact of Geography on Governmental Policy	8	11
Goal 4 Economic Principles, Institutions and Processes	12	15
Total	67	82

Note. Information on the referenced indicators can be found in the Maryland Core Learning Goals for Government, available on the Maryland School Improvement website at http://www.mdk12.org/assessments/standards/9-12.html.

Item Writing

Since the decision was made to use reprints of the 2016 forms for all of the 2017 administrations, no new item development occurred in 2017.

All items that are in the forms were originally developed by item writers. Item writers were employed to develop high-quality test items that were aligned with the Core Learning Goals. For each of the content areas, most of the item writers were Maryland educators. Only a small portion of the total number of items written was developed by ETS content specialists. Item writers were selected on the basis of their depth of content knowledge and familiarity with the MD HSA program. Many were experienced MD HSA item writers.

Item writers were trained on general item writing techniques as well as writing guidelines that are specific to the MD HSA program. Approximately one month after the initial item writer training, a follow-up training session was provided. The session was designed to evaluate how well the item writers' writing skills had developed to that point, to facilitate peer review of items, and to provide constructive feedback to guide the rest of their writing assignment.

Upon completion of their writing assignment, the item writers submitted their items to ETS. Items that were accepted by the ETS content team proceeded to the item review and revision process.

Item Review and Revision

All items on the forms underwent a series of reviews in accordance with the following procedures:

- Items were edited according to standard rules developed in conjunction with MSDE.
- Items were reviewed for accuracy, organization, comprehension, style, usage, consistency, and fairness/sensitivity.
- Item content was reviewed to establish whether the item measured the intended Goal-Expectation-Indicator-Assessment Limit, with the Goal being the broadest category and Assessment Limit being the narrowest parameter of content being assessed.
- Copyright and/or trademark permissions were verified for any materials requiring permissions, for both field test and operational material.
- Items were reviewed by ETS editorial staff to ensure the item adhered to both the stated MSDE style guide and standard grammar rules.
- Internal reviews were conducted and historical records were established for all version changes.

After ETS performed the required internal reviews, items were submitted to MSDE for review. MSDE content specialists performed a review of the items and provided feedback to ETS content specialists. The edits suggested by the MSDE specialists were incorporated into the items. MSDE and ETS content specialists then met to conduct a side-by-side review of the items. Any further edits to the items were made. Finally, the items were prepared for review by the Content and Bias/Sensitivity Review Committees.

The Content and Bias/Sensitivity Review committees, selected by MSDE, were composed of diverse groups of Maryland educators. The committees reviewed each item to ensure that the content (a) accurately reflected what was taught in Maryland schools; (b) correctly matched the intended CLG indicator; and (c) did not unfairly favor or disadvantage an individual or group. Upon completion of this final round of reviews, MSDE and ETS content specialists conducted side-by-side meetings to evaluate the reviews and to reconcile the results of the various groups. ETS then applied the requested edits to the items and/or revisions to the accompanying graphics.

A total of 445 items were taken to the 2016 summer meetings for Biology and Government tests. Of the 445 items submitted for committee reviews, 419 items were accepted by the Content and Bias/Sensitivity Review Committees, so the acceptance rate was 94%. The status for each accepted item was then set to field test ready and it is eligible for placement in the field test positions for future test forms.

Testing Accommodations

A number of alternate test formats are available to MD HSA test takers, including large-print, braille, online audio, and Kurzweil versions of the MD HSA tests developed for each content area. For 2017, reprints of all four alternate test formats are available at each administration. Data from these alternate formats are included in the psychometric analyses.

Test Specifications

All of the forms administered in 2017 were reprints of the 2016 forms that were constructed using items from the Maryland HSA item bank. The pool of items that was available for use in the construction of the 2016 forms included all items that had been administered, calibrated, and linked to the operational scale. For Biology and Government, the MD HSA operational scale was defined in 2003 and included items administered in 2002 and 2003. Items flagged for poor fit were excluded from the item pool. Items flagged for substantial differential item functioning (DIF) against any of the comparison groups are marked as such in the item bank and they are not used unless required to fulfill content specifications, and then, only after review and approval by MSDE. (See Section 7 for a more detailed account of these analyses and flagging criteria.)

Each test form was constructed to meet specific test blueprint specifications. Tables 2.2 through 2.3 indicate the distribution of items within each reporting category by item type and the number of score points associated with each item type.

Item Selection and Form Design

To conserve the item pool, when multiple forms were included in an administration, each test form consisted of a common set of operational items shared across forms within an administration, as well as a unique set of items. Within these administrations (i.e., January, May, and Summer), approximately 60 percent of the operational items in each form were common across the test sections. The remaining items in the forms consisted of combinations of items that varied across forms. The guidelines used to construct the forms are provided in Tables 2.4 through 2.6. The exact composition of the forms varied slightly based on available items in the pool.

Table 2.4 Form Construction Specifications for the MD HSA January 2016 Administration (Reprinted for the MD HSA January 2017 Administration)

Primary Week Form A	Primary Week Form B	Makeup 1 Form C
Common set—60% Unique items—40% Field Test Section—Unique items	Same as Form A Same as Form A Field Test Section—Unique items	Common set—60% Unique items—40% Field Test Section—Reuse of field test set from Form A or B, or a combination of both

Table 2.5 Form Construction Specifications for the MD HSA May 2016 Administration (Reprinted for the MD HSA May 2017 Administration)

Primary Week Forms D–L	Makeup 1 Form X	Makeup 2 Form Y
Common Set—60% Unique Items—40% Field Test Section—Unique sets of items for Forms D–L	Common Set—60% Half of items from primary week's 40% unique items—20% Unique items—20% Field Test Section—Reuse of one or a combination of the field test sets used in forms D–L, with a preference for form D; however, the actual selection of field test items was determined by the constraints imposed by the operational items	Common Set—60% Half of items from primary week's 40% unique items—20% Unique items—20% Field Test Section—Reuse of one or a combination of the field test sets used in forms D-L, with a preference of using the same set used for form X; however, the actual selection of field test items was determined by the constraints imposed by the operational items

Table 2.6 Form Construction Specifications for the MD HSA Summer 2016 Administration (Reprinted for the MD HSA Summer 2017 Administration)

Primary Week 1 Form P	Primary Week 2 Form Q
Common Set—60% Unique items—40%	Common Set—60% Unique items—40%
Field Test Section—Reuse of prior administration field test set	Field Test Section— Reuse of prior administration field test set

In addition to the operational items, embedded field test items were included with each version of the test form, resulting in multiple versions of a test form containing different sets of field test items. The percentage of field test items per form varied by content area, as shown in Table 2.7.

Table 2.7 Number of Operational (OP) and Field Test (FT) Items by MD HSA Content Area

Content Area	OP Items	FT Items	% FT Items
Biology	76	23	23%
Government	67	14	17%

Since the 2017 administrations consisted of reprint tests from 2016, there were no new field test items used in 2017. The items that were field tested in 2016 were primarily newly written items, with a small number of previously administered items that had been revised due to content concerns or problematic item statistics. Items with problematic statistics were ones that were judged to be acceptable from a content perspective but had one or more of the following statistical characteristics: *p*-values less than 0.10 or greater than 0.90 (For CR items, divide the average item score by maximum score points to obtain the *p*-value); item-total correlations of less than 0.15 for both the dichotomous and polytomous items; very high omit rates (5% or more for SR items and 15% for CR items); or SR items with a positive point-biserial correlation for one or more distractors. For administrations in which there was more than one primary form available at the same time (January and May), the forms were spiraled at the student level. Spiraling at the student level means that multiple forms of the test were packaged in order (e.g., D, E, F) and distributed to students according to this order. Spiraling at the student level helps ensure that all forms are randomly distributed throughout the state.

The 2016 forms were constructed using the test construction software associated with the customer item bank. The goal was to match the test characteristic curves (TCCs) and the conditional standard error of measurement (CSEM) curves with the "target" form defined as the base form used to set the operational scale. For Biology and Government, the base forms were originally developed in 2003. These base forms contained brief constructed response (BCR) items. Between summer 2009 and October 2013, BCR items were discontinued on the MD

Government HSAs and the target TCCs for the HSAs were revised so that they were no longer influenced by the characteristics of CR items. Refer to ETS memorandum: *Considerations for Setting New Target Test Characteristic Curves for the Maryland High School Assessments (HSAs)* (Educational Testing Service, 2009) for details on how new target TCCs were created. However, starting in January 2014, BCR items were re-introduced to Government HSAs so the government target TCCs have been revised back to include BCR items in the calculation of TCCs and CSEMs.

The following general steps were completed during the test construction process:

1. For each administration, all forms were constructed simultaneously in order to provide the best opportunity to construct parallel forms.
2. Items that matched the test blueprint were selected to match the target TCCs and CSEMs.
3. Test developers were careful to ensure that the item selections met all content specifications, including matching items to the test blueprint, distribution of keys, and avoidance of clueing[4] or clanging.[5]

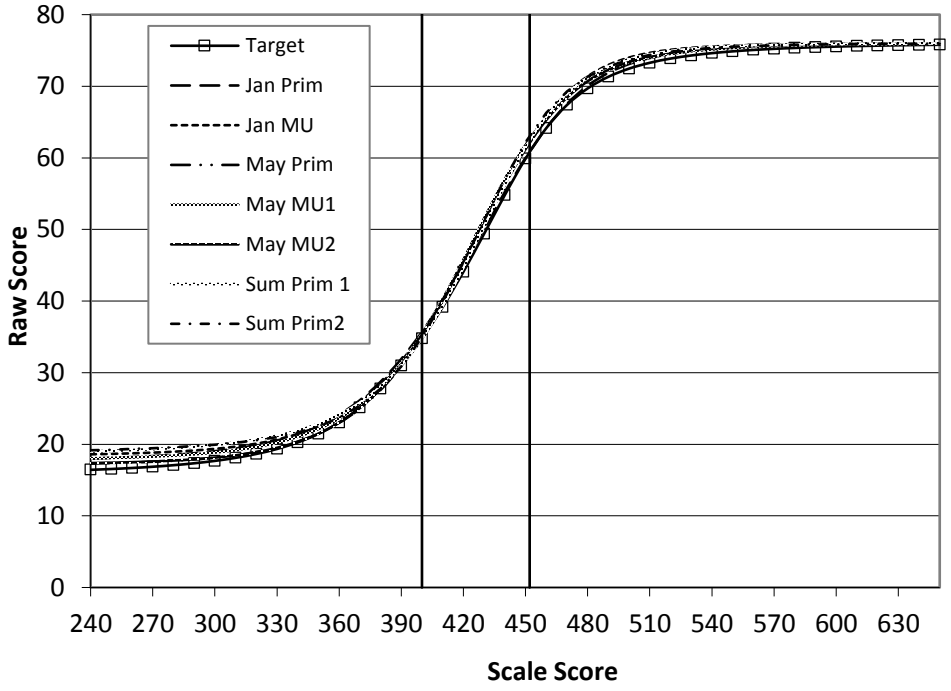
4. After the operational items were selected for the test forms, the field test sets were constructed. Field test sets consisted of SR items in all content areas as well as BCR items for Government. While the field test sets were not constructed to meet any psychometric criteria, they were constructed to meet content criteria. For Biology and Government, the field test sets were estimated to be able to be completed by students in approximately 30-35 minutes. The field test items were embedded in the test according to a variety of content and template criteria, including, but not limited to, coverage of the reporting categories and assessment limits, cognitive balance, key balance/distribution, and clueing/clanging within the field test set and among the surrounding operational items.

Figures 2.1 to 2.4 show the plots of the TCCs and CSEMs for the target form and forms developed for each content area. The vertical lines in the figures are the proficiency (Proficient and Advanced) cuts for each content area. Government has only one cut- Proficient. It is important to note that the TCCs and CSEMs shown in the plots are based on preequated item parameters and therefore are curves calculated prior to administration of the tests. In general, the TCCs and CSEMs were similar to the target curves. The TCC plots indicate that all forms for each content area were within or very close to the acceptable range of the target curve for the full range of scale score values. When forms varied in difficulty, differences between forms were typically less than 5 percent of the total raw score across the score range, especially in the range of the cut scores. When forms had differences slightly greater than 5 percent, these larger differences were typically seen at the very low end of the scale score range and at the high end of the scale. As expected, the CSEM plots indicate that the CSEMs for each content area were

[4] Clueing refers to information within a passage, stimulus, item, graphic, or other test component that allows respondents to select/construct the correct answer to one or more items in an assessment without the knowledge and/or skill targeted by the item.

[5] Clanging occurs when an identical or similar word(s) appears in both the item stem and one or more item distractors. Also, if two or more items that are near each other share common key words, even if the item content does not clue, the items are said to clang because the interpretation of the word in one item can affect the interpretation of another item.

lowest in the middle range of scale scores, where the majority of student scores are located. (Please refer to Figures 6.1 to 6.2 for histograms of student performance.)



Note: Maximum possible raw score is 76.

Figure 2.1 Test Characteristic Curves for the MD HSA 2017 Biology Forms

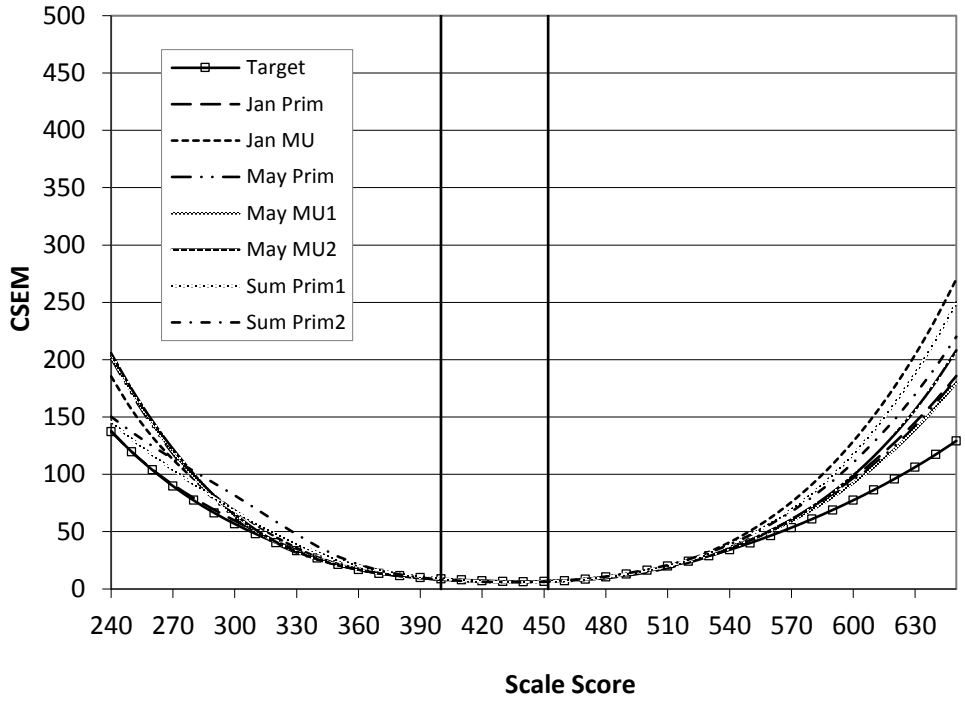
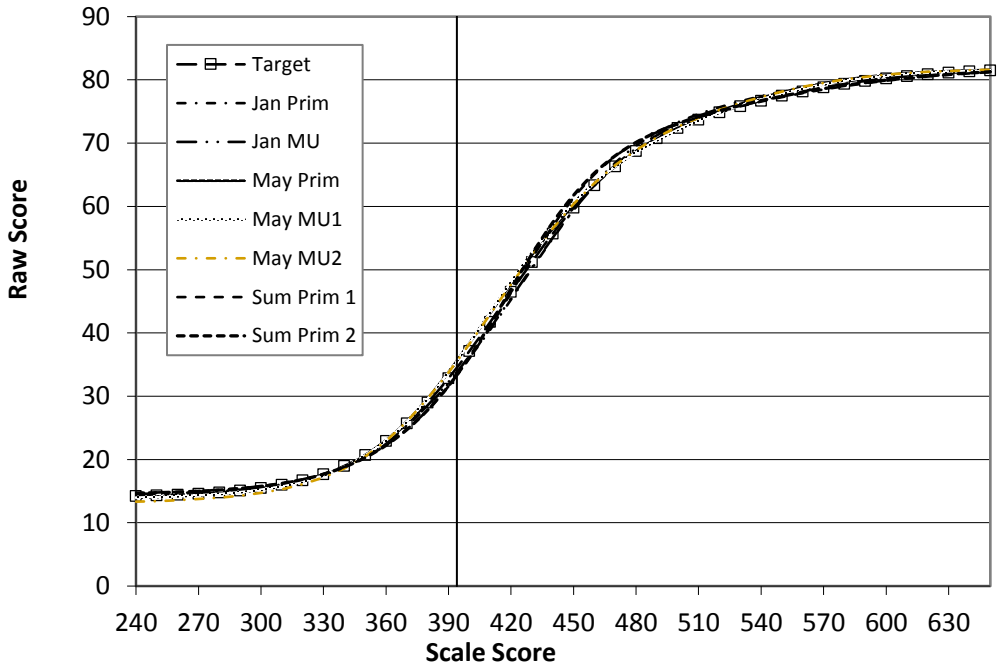


Figure 2.2 Conditional Standard Error Measurement for the MD HSA 2017 Biology Forms



Note: Maximum possible raw score is 82.

Figure 2.3 Test Characteristic Curves for the MD HSA 2017 Government Forms

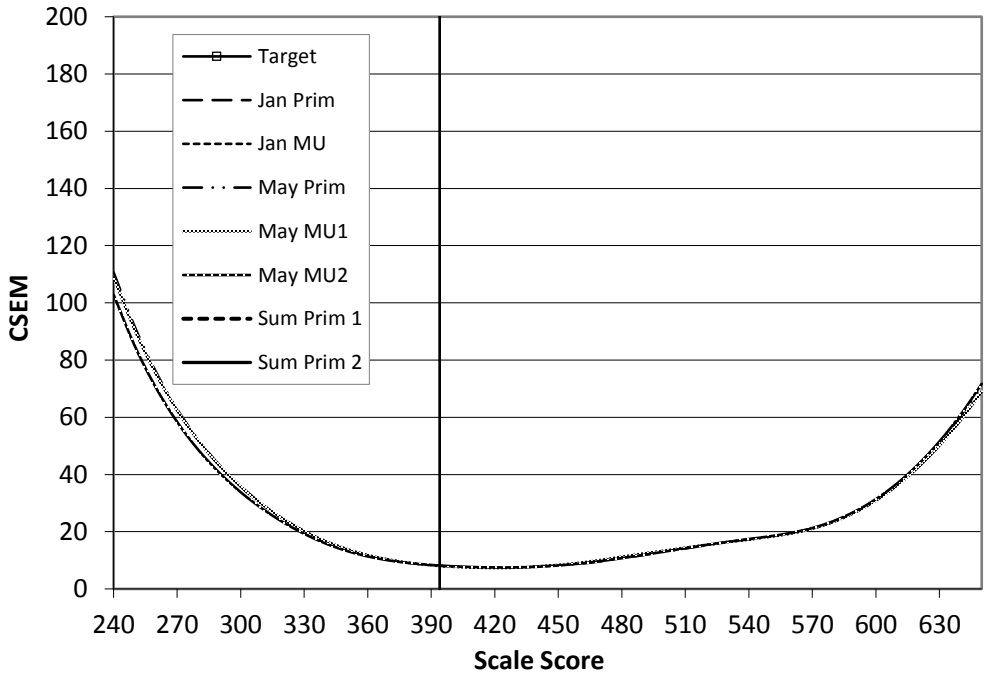


Figure 2.4 Conditional Standard Error of Measurement for the MD HSA 2017 Government Forms

Test Administration

For all MD HSA tests administered in 2017, both paper-and-pencil and online versions were available.

For all administrations, paper-and-pencil primary forms were given during the first week of testing. For the January and May administrations, Makeup Form 1 was offered during the second week. For the May administration only, Makeup Form 2 was administered in the third week of testing.

For the online versions in all administrations, the primary and makeup forms were spiraled equally throughout the testing window. In January, the two primary forms and one makeup form were spiraled over the two-week testing window. In May, the eight primary and two makeup forms were spiraled over the three-week testing window. In the Summer administration, the two primary forms were spiraled over the two-week testing window. All forms administered without extended time accommodations had timing limits indicated in Table 2.8.

Table 2.8 Test Timing Schedule in Minutes by MD HSA Content Area

Content Area	Session One	Break	Session Two	Break	Session Three
Biology	45	5	45	5	45
Government	45	5	45	5	45

Section 3. Validity

Validity is one of the most important attributes of assessment quality and is a fundamental consideration when tests are developed and evaluated (AERA, APA, & NCME, 2014; Messick, 1989). Validity refers to the degree to which logical, empirical, and judgmental evidence supports each proposed interpretation or use of a set of scores. Validity is not based on a single study or type of study but is an ongoing process of gathering evidence to support the interpretation or use of the resulting test scores. The process begins with the test design and continues throughout the entire assessment process, including content specifications, item development, psychometric quality analyses, and inferences made from the test results.

Students' scores on an MD HSA are assumed to reflect students' level of knowledge and skills in a content area. The scores are used to classify students in terms of their level of proficiency using cut scores established by the state.

Evidence Based on Analyses of Test Content

The MD HSAs are referred to as end-of-course tests because students take each test as they complete the appropriate coursework. Consequently, items are developed to measure the knowledge and skills expected of students following completion of coursework. As discussed in Section 2, the development of test content for each MD HSA is overseen by a content expert who has a depth of knowledge and teaching experience related to the course in which the MD HSA is to be administered. Appropriate content leads who have similar qualifications review the test development work of these individuals.

Evidence based on analyses of test content includes logical analyses that determine the degree to which the items in a test represent the content domain that the test is intended to measure (AERA, APA, & NCME, 2014, p. 14). The test development process for the MD HSAs provides numerous opportunities for the MSDE to review test content and make changes to ensure that the items measure the knowledge and skills of Maryland students according to course standards. Every item that is created is referenced to a particular instructional standard (i.e., goal, expectation, or indicator). During the internal ETS development process, the specific reference is confirmed or changed to reflect changes to the item. When the item is sent to a committee of Maryland educators for a content review, the members of the committee make independent judgments about the match of the item content to the standard it is intended to measure and evaluate the appropriateness for the age of students being tested. These judgments are tabulated and reviewed by the content experts, who use the information to decide which items will advance to the field test stage of development.

Evidence Based on Analyses of Internal Test Structure

Analyses of the internal structure of a test typically involve studies of the relationship among test items and/or test components in the interest of establishing the degree to which the items or components appear to reflect the construct on which a test score interpretation is based (AERA, APA & NCME, 2014, p. 16). The term construct is used here to refer to the characteristic that a

test is intended to measure; in the case of the MD HSAs, the characteristic of interest is the knowledge and skills defined by the test blueprint for each content area.

These test blueprints are derived from Maryland's Core Learning Goals for each course. The test blueprints are presented in Section 2 (see Tables 2.2 and 2.3); the CLGs can be found on the MSDE website at http://www.mdk12.org/assessments/standards/9-12.html or http://www.mdk12.org/assessments/high_school/#/01.

High total group internal consistencies as well as similar reliabilities between subgroups with roughly the same sample size provide additional evidence of validity. High reliability over items within a test implies that the test items within a domain are measuring the intended construct. Cronbach's alpha reliability results for each administration for the overall population, as well as for subgroups can be found in Section 6 of this report, in Tables 6.6 through 6.11.

Another way to assess the internal structure of the test is through the evaluation of Pearson correlation matrices between the individual MD HSA subscores. If subscores within a content area are strongly related to each other, this is another indicator of validity. Tables 3.1 and 3.2 highlight the Pearson correlations found between subscores within each content area of the MD May HSA tests since the May tests had the largest sample sizes of all the 2017 administrations. Results indicate that each subscore is positively correlated with the total Scale Score in both content areas, especially Government. It is also noted that the Government subscore correlations are higher compared to those in Biology and this pattern was observed in 2016 as well.

Table 3.1 Correlations between Subscores by MD HSA Content Area –Biology

	Biology (N = 41,567)						
	SS	1	2	3	4	5	6
Overall SS	1						
Subscore 1	.81	1					
Subscore 2	.69	.54	1				
Subscore 3	.74	.56	.53	1			
Subscore 4	.73	.58	.51	.55	1		
Subscore 5	.66	.53	.48	.51	.52	1	
Subscore 6	.72	.56	.50	.54	.52	.49	1

Table 3.2 Correlations between Subscores by MD HSA Content Area –Government

	Government (N = 40,348)					
	SS	1	2	3	4	5
Overall SS	1					
Subscore 1	.92	1				
Subscore 2	.88	.79	1			
Subscore 3	.83	.74	.72	1		
Subscore 4	.81	.70	.67	.65	1	
Subscore 5	.84	.74	.72	.70	.66	1

Finally, the internal structure of the MD HSA tests can be assessed in relation to the degree to which these tests meet the requirements of the statistical models used to estimate item parameters and student scores. Confirmatory factor analyses (CFAs) for each test by content area can be conducted to examine the underlying domain structure of the MD HSA test. CFA is a useful statistical methodology as it can be used to evaluate whether performance on items in each test reflects a single underlying characteristic or a set of distinct characteristics defined by the reporting categories for each content area. The findings from this type of analysis are helpful as they can provide evidence as to whether the unidimensional model-based IRT used to calibrate the MD HSA items is appropriate.

Confirmatory Factor Analyses of the May 2017 Administration Data

To assess the dimensionality of the MD HSA tests, CFAs for each content area were conducted using test data from the primary forms of the May 2017 administration. The May administration was chosen for analysis because it is the largest and most representative administration of the MD HSAs. The May administration consisted of eight primary forms; data from operational items were combined across forms within the content areas of Biology and Government.

Mplus (Muthén & Muthén, 2007) was used to calculate matrices consisting of polychoric correlations between the items included in each analysis. Mplus was also used to fit specified factor models to the data. In the analysis, the input polychoric correlation matrix was used to estimate the factor loadings between the indicators (items).

Parameter estimation for CFAs was accomplished using a weighted least-square method with mean and variance adjustment (Muthén, DuToit, & Spisic, 1997). This method leads to a consistent estimator of the model parameters, and provides standard errors that are robust under model misspecification. For ordinal data, weighted least squares estimation offers an alternative to full-information maximum likelihood techniques. The latter becomes computationally too demanding for models with more than a few dimensions. Model fit can be assessed through the use of a scaled chi-square statistic. However, the degrees of freedom for the reference distribution of this statistic cannot be computed in the standard way. The correct degrees of freedom are in part determined by the data, and hence different degrees of freedom may be obtained when applying the same model to different data (Muthén, 1998-2004, p. 19-20).

Overall model fit for each CFA model by content area was examined using the scaled chi-square (χ^2) test of model fit in combination with supplemental fit indices. The Tucker-Lewis Index (TLI) compares the chi-square for the hypothesized model with that of the null or "independence" model, in which all correlations or covariances are zero. TLI values range from zero to 1.0, and values greater than 0.94 signify good fit (Hu & Bentler, 1999). The comparative fit index (CFI) and root mean square error of approximation (RMSEA) index both are based on noncentrality parameters. The CFI compares the covariance matrix predicted by the model with the observed covariance matrix, and the covariance matrix of the null model with the observed covariance matrix. A CFI value greater than 0.90 indicates acceptable model fit (Hu & Bentler, 1999). The RMSEA assesses the error in the hypothesized model predictions; values less than or equal to 0.06 indicate good fit (Hu & Bentler, 1999).

Table 3.3 shows the results of the analyses. None of the χ^2 results indicated good fit, given the criterion of $p>.05$; this was expected because sample sizes were very large. The TLI, CFI, and RMSEA fit statistics indicated that the one-factor solutions generally fit the data well in both content areas. These findings provide evidence that the tests for each content area measure a single dimension. This is a positive finding, given that IRT models assume unidimensionality.

Table 3.3 MD HSA Confirmatory Factor Analyses Fit Statistics

Content	Admin	Forms	# of Factors	# of Items	*N*	*df*	χ^{2*}	TLI	CFI	RMSEA
Biology	May	D-L	1	76	41,567	2,774	38,927	**0.98**	**0.98**	**0.018**
Government	May	D-L	1	67	40,348	2,144	42,528	**0.98**	**0.98**	**0.022**

Note: Table entries that meet or exceed the criterion are in bold.
*$p < .0005$ for all χ^2

Speededness

If more than five percent of students omitted an SR or more than 15 percent of students omitted a CR item, the item was flagged as having a high omit rate. Table 3.4 shows omit rates for each content area by administration and item type. No items were flagged for the January or May administrations. For the Summer administration, three CR item and one SR item were flagged for having high omit rate. However, cautions should be taken when interpreting results from the Summer administration, because the Summer administration was typically taken by small and nonrepresentative sample of students, such as repeat test takers.

Table 3.4 Number of MD HSA Operational Items Flagged for High Omit Rate

Content	January		May		Summer	
	Item Types		Item Types		Item Types	
	SR	CR	SR	CR	SR	CR
Biology	0	--	0	--	0	--
Government	0	0	0	0	1	3

The percentage of students who respond to the last items in a test can also be used to assess the degree to which a test is speeded. When speededness occurs, a test is measuring not only students' knowledge and skills as defined by the construct of interest but also the speed at which the knowledge and skills are demonstrated, which is a second construct. In tests of achievement, it is desirable to find that speededness is not present in a test, which provides evidence that

student scores on the test reflect only the intended construct. Evidence of speededness is provided by the finding that the omit rates at the end of a test are notably higher than those observed elsewhere in the test.

Appendix A presents the percentages of students who omitted items on the MD HSA operational forms. Across all content areas and administrations, the percentages of students who did not respond to the last ten SR items of a test were less than 3 percent per item. Omit rates for CR items on the Government tests were fairly low, ranging from 5 percent to 12 percent for the January administration, ranging from 2 percent to 6 percent for the May administration. The exception was the Summer 2017 administration, with the omit rates ranging from 13 percent to 23 percent, probably due to a very limited sample consisting of low performing students. For all item types the percentage of students who omitted items located within the last ten positions on an MD HSA test form was not greater than omit rates throughout the test.

In addition to the factor analyses and the information regarding speededness presented here and the validation documentation gathered and maintained by MSDE, other information in support of the uses and interpretations of MD HSA scores appears in the following sections:

- Section 4 provides detailed information concerning the scores that were reported for the MD HSAs and the cut scores for each content area.
- Section 5 provides information concerning the test characteristics based on classical test theory for the administrations of the MD HSAs.
- Section 6 presents information regarding student characteristics for the administrations of the MD HSAs.
- Section 7 includes documentation regarding the test analyses. Descriptions of classical item analyses and differential item functioning are included. In addition, summary tables of item *p*-value and item-total correlation distributions are provided.

Section 4. Scoring Procedures

Scale Scores

The MD HSA reporting scale ranges from 240 to 650. For Biology and Government, the scale was established in 2003 and defined so that the scale scores had a mean of 400 and a standard deviation of 40.

Students' total test scores and subscores are scale scores derived using Item Response Theory (IRT, Yen & Fitzpatrick, 2006) and item-pattern scoring procedures. Specifically, the 3-parameter logistic (3PL) model for SR items and the generalized partial credit model (GPCM) for CR items - Government test only- are used for the MD HSAs.

Item response theory expresses the probability that a student will achieve a certain score on an item (such as correct or incorrect) as a function of the item's statistical properties and the ability level (or proficiency level) of the student.

The 3PL model relates the probability that a person with ability θ will respond correctly to item *i* as follows:

$$P_i(\theta) = c_i + \frac{1 - c_i}{1 + e^{-1.7a_i(\theta - b_i)}},$$

where

a_i is the slope parameter of item *i*, characterizing its discrimination;
b_i is the location parameter of item *i*, characterizing its difficulty; and
c_i is the lower asymptote parameter of item *i*, reflecting the chance that students with very low proficiency will select the correct answer, sometimes called the "pseudo-guessing" level.

The GPCM states that the probability that a person *j* with ability θ will obtain a score of *k* on an item *i* that has *m* score categories assigned score values ranging from 0 to *m*-1 can be expressed as

$$P_{ik}(\theta_j) = \frac{\exp \sum_{v=1}^{k} \left[1.7a_i(\theta_j - b_i + d_{iv}) \right]}{\sum_{c=1}^{m_i} \exp \sum_{v=1}^{c} \left[1.7a_i(\theta_j - b_i + d_{iv}) \right]},$$

where

$P_{ik}(\theta_j)$ is the probability of test taker *j* obtaining a score of *k* on item *i*, and
d_{iv} is the parameter characterizing the relative difficulty of obtaining score *k*, and
m_i is the number of item score categories (Muraki, 1992).

There are essentially two ways of scoring a test: number-correct (NC) or item-pattern (IP) scoring. NC scoring considers how many test items a student answered correctly in determining that student's total raw score. In contrast, the IP scoring method is based on an IRT model. IP scoring takes into account not only a student's total raw score, but also *which* test items the student answered correctly, as well as the psychometric characteristics of these items.

Test items are not equal in their characteristics. For example, some items are better at discriminating between students that know the tested content and those who do not; some items are more difficult; and low-ability students are more likely to guess correctly on some test items than on others.

Two students with exactly the same total raw score will get the same test score in NC scoring. It is very possible, however, that even though they have the same total raw score, the actual items they answered correctly were different, and their different sets of correctly answered items could have different item characteristics. In such a case, the students will very likely get different reported test scores in IP scoring even though they have the same total raw score. With IP scoring, a student who correctly answers a number of more difficult items will get a higher score than one who answers the same number of easier items. This would be applicable to both total test scores and subscore category scores reported using IP scoring.

Item-pattern scoring has been found to produce smaller standard errors of measurement (SEM) than number-correct scoring. The smaller the SEM, the more confidence we have about the precision of the test results. In addition, test reliability is higher with IP scoring than with NC scoring (Yen & Candell, 1991), which means that fewer questions are needed in IP scoring than NC scoring for equivalent scoring accuracy. For these reasons, both the HSA total test scores and test subscores are reported using IP scoring.

Conditional Standard Errors of Measurement

Corresponding conditional standard errors of measurement (CSEM) were produced and are equal to the inverse of the square root of the test information function. CSEMs are standard errors at individual score points, defined as

$$CSEM(\hat{\theta}) = \frac{1}{\sqrt{I(\hat{\theta})}}$$

where $\hat{\theta}$ refers to the individual score point (location on the scale), CSEM($\hat{\theta}$) refers to the conditional standard error of measurement at the score point, and I($\hat{\theta}$) refers to the test information function value at that score point, $\hat{\theta}$. The test information function is the sum of corresponding information functions of the test items when optimal item weights are used. Item information functions depend on the item difficulty, discrimination, and guessing parameter.

Lowest and Highest Obtainable Test Scores

The maximum likelihood procedure under the 3PL model does not produce reasonable scale score estimates for students with perfect scores or zero scores. In order for all test takers to

receive scale scores, scores can be established for extreme values by following a procedure as described in Appendix 3.C of the 2004 Technical Report. This procedure is not maximum likelihood estimation but produces rational values called the lowest obtainable scale score (LOSS) and the highest obtainable scale score (HOSS).

Cut Scores

MSDE established the cut scores associated with each of the performance levels in Biology and Government in 2003.[6] One cut score was established for Biology and one was established for Government in 2005. To comply with NCLB requirements for secondary science, an Advanced cut score for Biology was established in 2008. These values are given in Table 4.1.

Table 4.1 MD HSA Cut Scores by Content Area

	Cut Score	
Content Area	Proficient	Advanced
Biology	400	452
Government	394	

Year-to-Year Scale Maintenance

The MD HSAs for Biology and Government have been preequated since 2004. In the preequated design, a pool of IRT-calibrated items expressed on the reporting scale exists for test form construction. The item parameter estimates for new forms are obtained from the bank and are used to build test forms that are parallel across administrations. Student scores are produced with the bank-obtained item parameter estimates, thereby linking scores from one administration to the other.

[6] Technical documentation on the standard-setting method used to establish the MD HSA cut scores is available on the Maryland State Department of Education website at http://archives.marylandpublicschools.org/MsDE/divisions/planningresultstest/Maryland+Standard+Setting+Technical+Reports.htm.

Section 5. Test Characteristics

This section provides a discussion of the results of analyses of test reliability and decision consistency and accuracy for all MD HSA test forms administered.

Reliability

The general concept of reliability concerns the precision of a test score. Of interest is quantifying the degree to which a score will vary from an average result obtained over many testing occasions due to random factors (Haertel, 2006). A variety of theories and methods can be used to estimate reliability.

Classical test theory defines reliability as the proportion of total score variance that is true-score variance. Several different ways of estimating this proportion exist. One estimate of reliability that is commonly used is Cronbach's alpha (Cronbach, 1951), an internal consistency measure. It is derived from analysis of the consistency of performance over items within a test and provides a lower-bound estimate of a test's reliability. Cronbach's alpha can be expressed as:

$$\alpha = \frac{n}{n-1}\left[1 - \frac{\sum_{i=1}^{n} \sigma_i^2}{\sigma_x^2}\right],$$

where n is the number of items, σ_i^2 is the variance of scores on the *i*-th item, and σ_x^2 is the variance of the total score (sum of scores on the individual items). Sample estimates are substituted for the population variances in this formula to provide reliability estimates.

The results for the reliability analyses (i.e., Cronbach's alpha) of the total test score are presented with the summary statistics in Tables 6.6 to 6.11. The tables show that the overall reliability of the MD HSAs administered during the January and May sessions ranged from 0.92 to 0.95 for the primary forms, and from 0.92 to 0.95 for the makeup forms. The overall reliability results for the Summer forms ranged from 0.85 to 0.91.

Lower reliability coefficients are sometimes seen for the smaller administrations typically taken by repeat test takers (e.g., Summer). All forms are constructed to meet the same target specifications, one of which is to include only items that have point-biserials of at least 0.10. However, when items are administered to nonrepresentative samples of students, such as repeat test takers, the point-biserials of some items may be lower in those samples, which leads to lower reliability coefficients when calculated for those administrations.

Decision Accuracy and Decision Consistency

The accuracy of decisions based on specified cut scores was assessed for reliability of classification using a computer program called *RELCLASS* (ETS proprietary software). *RELCLASS* provides two statistics that describe the reliability of classifications based on test scores (Livingston & Lewis, 1995). Specifically, information from an administration of one form is used to estimate the following:

> ***Decision accuracy***, or the extent to which test takers are classified in the same way as they would be on the basis of the average of all possible forms of a test. Decision accuracy addresses the question: How does the actual classification of test takers, based on their single-form scores, agree with the classification that would be made on the basis of their true scores, if their true scores were somehow known?
>
> ***Decision consistency***, or the extent to which test takers are classified in the same way as they would be on the basis of a single form of a test *other* than the one for which data are available. Decision consistency addresses the question: What is the agreement between the classifications based on two nonoverlapping, equally difficult forms of the test?

RELCLASS estimates decision accuracy using an estimated joint distribution of reported performance-level classifications on the current form of the exam and the performance-level classifications based on an all-forms average (true score). *RELCLASS* estimates decision consistency using an estimated joint distribution of reported performance-level classifications on the current form of the exam and performance-level classifications on the alternate (parallel) form. In each case, the proportion of performance-level classifications with exact agreement is the sum of the entries in the diagonal of the contingency table representing the joint distribution.

The results are provided in Tables 5.1 to 5.8 by content area for the January, May, and Summer 2017 forms. The tables show that decision accuracy values, which estimate the agreement between classifications based on an observable variable (scores on one form of a test) and classifications based on an unobservable variable (the test takers' true scores), ranged from 0.85 to 0.90 across all performance levels and from 0.90 to 0.93 for the Proficient and Above classifications in Biology. Decision consistency values, which estimate the agreement between classifications based on two variables (scores on the form students have taken and a parallel form of the same test that is not administered to the students), ranged from 0.81 to 0.85 across all performance levels and from 0.87 to 0.90 for the Proficient and Above classifications in Biology. In Government (January, May, and Summer forms), decision accuracy and consistency were calculated across all performance levels; decision accuracy values ranged from 0.91 to 0.93, decision consistency values ranged from 0.88 to 0.91.

Note that in all cases the decision accuracy indices are somewhat larger than the decision consistency indices. This is due to differences in the estimation procedures. The estimation procedure for decision accuracy includes a random component on one of the two variables, whereas in estimating decision consistency each variable includes a random component (Livingston & Lewis, 1995).

Table 5.1 Decision Accuracy and Consistency: MD HSA Biology January 2017 Forms

	Placement Scores	Advanced	Proficient	Basic	Category Total*
January Primary					
	452–650	.05	.00	.00	.05
Decision	400–451	.02	.14	.04	.19
Accuracy	240–399	.00	.04	.71	.75
	Estimated Proportion Correctly Classified*: Total = 0.90, Proficient & Above = 0.92				
	452–650	.05	.00	.00	.05
Decision	400–451	.03	.11	.05	.19
Consistency	240–399	.00	.06	.69	.75
	Estimated Proportion Consistently Classified*: Total = 0.85, Proficient & Above = 0.89				
January Form C					
	452–650	.05	.00	.00	.05
Decision	400–451	.02	.14	.04	.20
Accuracy	240–399	.01	.04	.70	.75
	Estimated Proportion Correctly Classified*: Total = 0.89, Proficient & Above = 0.92				
	452–650	.05	.00	.00	.05
Decision	400–451	.03	.12	.05	.20
Consistency	240–399	.01	.06	.69	.75
	Estimated Proportion Consistently Classified*: Total = 0.85, Proficient & Above = 0.89				

* Inconsistencies between cell entries and totals are due to rounding.

Table 5.2 Decision Accuracy and Consistency: MD HSA Biology May 2017 Forms

	Placement Scores	Advanced	Proficient	Basic	Category Total*
May Primary					
	452–650	.14	.02	.00	.16
Decision	400–451	.04	.41	.07	.53
Accuracy	240–399	.00	.00	.31	.31
	Estimated Proportion Correctly Classified*: Total = 0.86, Proficient & Above = 0.93				
	452–650	.13	.03	.00	.16
Decision	400–451	.06	.38	.09	.53
Consistency	240–399	.00	.01	.30	.31
	Estimated Proportion Consistently Classified*: Total = 0.81, Proficient & Above = 0.90				
May Form X					
	452–650	.14	.02	.00	.16
Decision	400–451	.05	.41	.07	.53
Accuracy	240–399	.00	.00	.31	.32
	Estimated Proportion Correctly Classified*: Total = 0.86, Proficient & Above = 0.92				
	452–650	.13	.02	.00	.16
Decision	400–451	.06	.38	.09	.53
Consistency	240–399	.00	.02	.30	.32
	Estimated Proportion Consistently Classified*: Total = 0.81, Proficient & Above = 0.89				
May Form Y					
	452–650	.14	.02	.00	.16
Decision	400–451	.04	.40	.07	.51
Accuracy	240–399	.00	.01	.32	.33
	Estimated Proportion Correctly Classified*: Total = 0.87, Proficient & Above = 0.93				
	452–650	.13	.02	.00	.16
Decision	400–451	.06	.37	.09	.51
Consistency	240–399	.00	.02	.31	.33
	Estimated Proportion Consistently Classified*: Total = 0.81, Proficient & Above = 0.90				

* Inconsistencies between cell entries and totals are due to rounding.

Table 5.3 Decision Accuracy and Consistency: MD HSA Biology Summer 2017 Forms

	Placement Scores	Advanced	Proficient	Basic	Category Total*
Summer Form P					
Decision Accuracy	452–650	.00	.00	.00	.00
	400–451	.04	.10	.05	.19
	240–399	.01	.04	.76	.81
	Estimated Proportion Correctly Classified*: Total = 0.86, Proficient & Above = 0.90				
Decision Consistency	452–650	.00	.00	.00	.00
	400–451	.05	.08	.06	.19
	240–399	.01	.06	.73	.81
	Estimated Proportion Consistently Classified*: Total = 0.82, Proficient & Above = 0.87				
Summer Form Q					
Decision Accuracy	452–650	.02	.00	.00	.02
	400–451	.05	.14	.07	.25
	240–399	.00	.03	.70	.73
	Estimated Proportion Correctly Classified*: Total = 0.85, Proficient & Above = 0.90				
Decision Consistency	452–650	.02	.00	.00	.02
	400–451	.06	.11	.08	.25
	240–399	.00	.05	.68	.73
	Estimated Proportion Consistently Classified*: Total = 0.81, Proficient & Above = 0.87				

* Inconsistencies between cell entries and totals are due to rounding.

Table 5.4 Decision Accuracy and Consistency: MD HSA Government January 2017 Forms

	Placement Scores	Proficient	Basic	Category Total*
January Form A				
Decision Accuracy	394–650	.31	.03	.34
	240–393	.04	.62	.66
	Estimated Proportion Correctly Classified*: Total = 0.92			
Decision Consistency	394–650	.29	.05	.34
	240–393	.06	.60	.66
	Estimated Proportion Consistently Classified*: Total = 0.89			
January Form C				
Decision Accuracy	394–650	.33	.04	.38
	240–395	.04	.58	.63
	Estimated Proportion Correctly Classified*: Total = 0.92			
Decision Consistency	394–650	.32	.06	.38
	240–393	.06	.56	.63
	Estimated Proportion Consistently Classified*: Total = 0.88			

* Inconsistencies between cell entries and totals are due to rounding.

Table 5.5 Decision Accuracy and Consistency: MD HSA Government May 2017 Forms

	Placement Scores	Proficient	Basic	Category Total*
May Form D				
Decision Accuracy	394–650	.63	.06	.69
	240–393	.01	.30	.31
	Estimated Proportion Correctly Classified*: Total = 0.93			
Decision Consistency	394–650	.62	.08	.69
	240–393	.02	.29	.31
	Estimated Proportion Consistently Classified*: Total = 0.91			
May Form X				
Decision Accuracy	394–650	.64	.06	.70
	240–395	.00	.29	.30
	Estimated Proportion Correctly Classified*: Total = 0.93			
Decision Consistency	394–650	.62	.08	.70
	240–393	.02	.28	.30
	Estimated Proportion Consistently Classified*: Total = 0.91			
May Form Y				
Decision Accuracy	394-650	.64	.06	.70
	240-393	.01	.29	.30
	Estimated Proportion Correctly Classified*: Total=0.93			
Decision Consistency	394-650	.63	.07	.70
	240-393	.02	.28	.30
	Estimated Proportion Consistently Classified*:Total=0.91			

* Inconsistencies between cell entries and totals are due to rounding.

Table 5.6 Decision Accuracy and Consistency: MD HSA Government Summer 2017 Forms

	Placement Scores	Proficient	Basic	Category Total*
Summer Form P				
Decision Accuracy	394–650	.20	.05	.25
	240–393	.04	.72	.75
	Estimated Proportion Correctly Classified*: Total = 0.91			
Decision Consistency	394–650	.19	.06	.25
	240–393	.06	.69	.75
	Estimated Proportion Consistently Classified*: Total = 0.88			
Summer Form Q				
Decision Accuracy	394–650	.25	.05	.30
	240–395	.03	.67	.70
	Estimated Proportion Correctly Classified*: Total = 0.92			
Decision Consistency	394–650	.23	.07	.30
	240–393	.05	.65	.70
	Estimated Proportion Consistently Classified*: Total = 0.89			

* Inconsistencies between cell entries and totals are due to rounding.

Section 6. Student Characteristics

Summary Statistics

The results presented in Tables 6.1 and 6.2 are based on the combined results for students who took the tests in January, May, and Summer 2017. All results are based on the final Research files sent to MSDE. Summary statistics (count, mean and standard deviation) of scale scores in Table 6.1 are reported for all students and by content and grade. Table 6.2 reports the summary statistics of scores for content areas by the January, May, and Summer 2017 administrations.

Table 6.1 MD HSA Means and Standard Deviations for 2016-2017 Overall and by Grade

			N	Mean	*SD*
Biology	Overall		82,205	401.0	52.0
	Grade				
		4	0	*	*
		6	1	*	*
		8	248	437.0	23.6
		9	30,071	422.4	42.5
		10	33,151	405.6	44.5
		11	11,684	368.3	50.5
		12	7,050	341.5	53.7
Government	Overall		81,536	403.6	48.1
	Grade				
		4	0	*	*
		8	0	*	*
		9	23,170	413.4	43.6
		10	38,064	412.2	44.6
		11	13,874	379.8	49.1
		12	6,428	368.4	47.2

* Statistics not reported for sample size less than 50 (N < 50).

Table 6.2 MD HSA Mean Scale Scores by Administration

Content Area	January			May			Summer		
	N	Mean	*SD*	*N*	Mean	*SD*	*N*	Mean	*SD*
Biology	19,190	363.4	59.2	62,678	412.8	43.4	406	357.0	59.8
Government	17,785	378.6	47.6	62,986	411.2	45.5	883	360.7	53.2

The mean scale scores are presented for the years 2003 to 2017 by content area in Table 6.3. Table 6.4 presents the passing rates for these years.

Table 6.3 MD HSA Mean Scale Scores over Test Years

Content Area	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Biology	400.8	406.2	404.7	415.0	414.5	414.7	409.0	408.7	406.9	410.7	409.2	409.5	407.0	402.8	401.0
Government	403.5	406.5	409.3	418.5	417.1	417.1	406.3	408.6	405.6	--	414.7	417.6	412.2	405.4	403.6

Note. The current English test was not administered prior to 2006. The Government test was not administered after the May 2011 administration. Starting in January 2013, Government was reintroduced into the HSAs.

Table 6.4 MD HSA Percentage Passing Rates (Proficient + Advanced) over Test Years

Content Area	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Biology	54.3	62.0	58.4	67.8	70.1	68.4	60.0	59.1	57.9	60.9	60.0	61.4	58.2	56.4	57.9
Government	39.8	54.6	67.1	74.1	73.3	71.5	61.1	61.7	62.1	--	72.4	76.5	71.8	62.7	61.6

Note. The Government test was not administered after the May 2011 administration. Starting in January 2013, Government was reintroduced into the HSAs.

Beginning with the January 2008 administration, Biology has been used for the NCLB science component. Table 6.5 presents the percentages of Biology students classified as Basic, Proficient, and Advanced, and the percentages of students classified as Basic and Proficient for Government, in 2017.

Table 6.5 MD HSA Performance Classification Rates in 2016-2017 for Biology and Government

Content Area	Basic	Proficient	Advanced
Biology	42.1	44.7	13.2
Government	38.4	61.6	--

Note. Government data are based on January, May, and Summer 2017 administrations only.

Summary statistics for all students and for subgroups based on gender, special education programs, ethnicity, and English language proficiency are presented in Tables 6.6 through 6.11. The tables include the numbers of students tested for whom valid scores were available, mean scale scores, and standard deviations of scale scores. In addition, raw score reliabilities are provided for the overall group of test takers and for subgroups. Figures 6.1 through 6.2 show the distributions of total scale scores for each content area for the May 2017 administration.

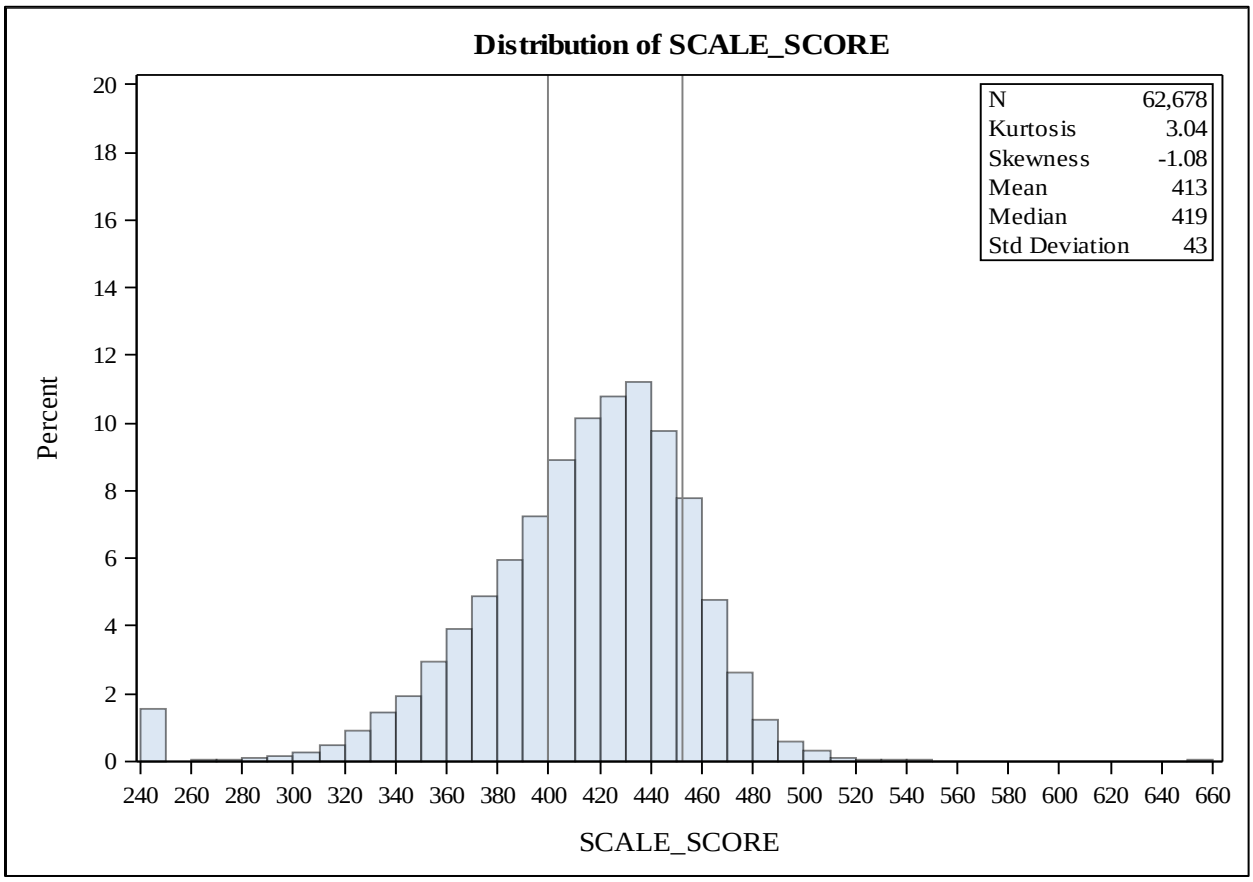


Figure 6.1 Histogram of Total Scale Scores for MD HSA May 2017 Biology

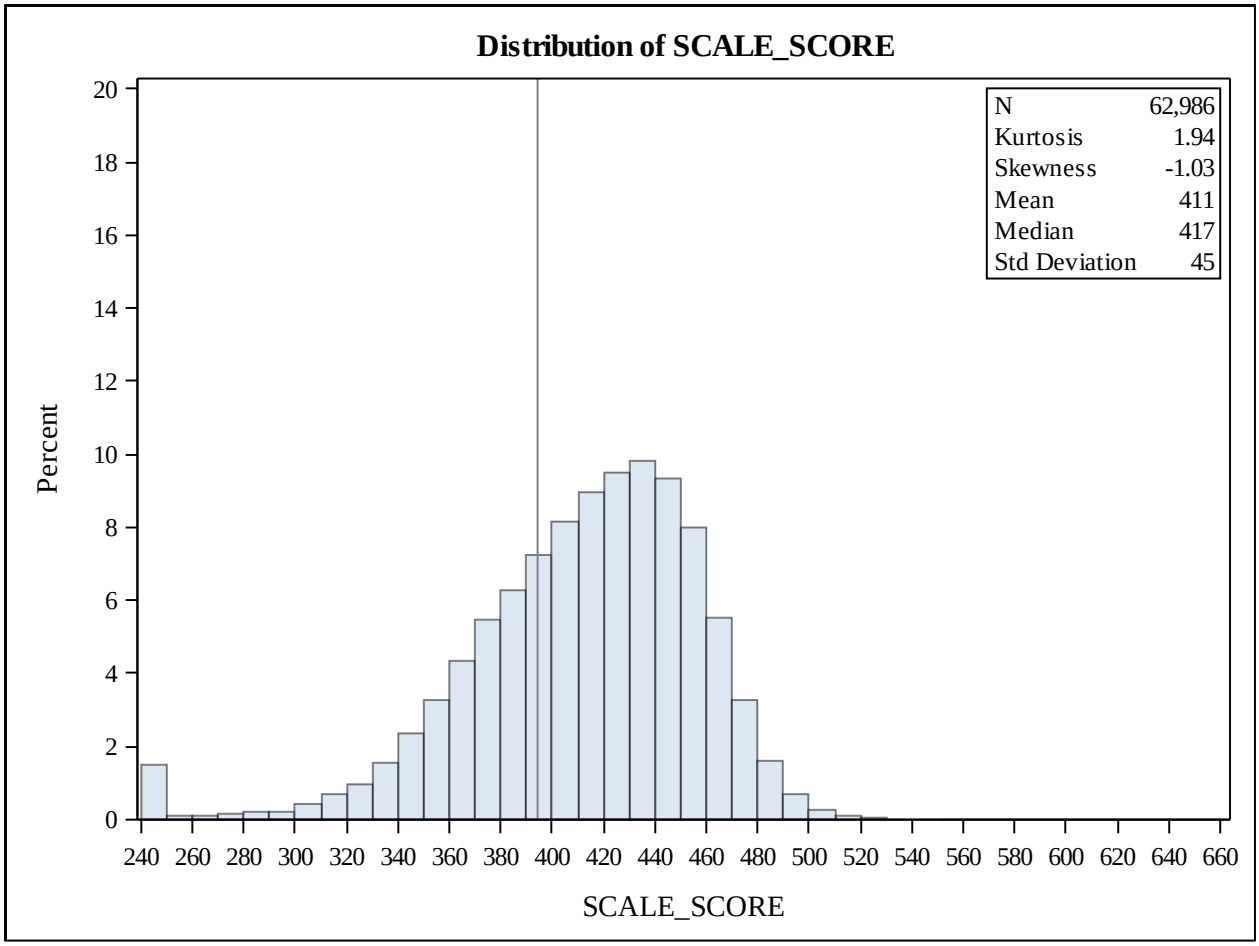


Figure 6.2 Histogram of Total Scale Scores for MD HSA May 2017 Government

Table 6.6 Summary Statistics for MD HSA Biology: January 2017 Forms

		Primary Forms A-B					Makeup Form C				
		Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha
Overall		363.3	58.9	13,406	100.0	0.92	363.7	60.0	5,784	100.0	0.92
Gender	Male	360.0	61.1	7,083	52.8	0.92	361.8	61.4	3,003	51.9	0.92
	Female	367.1	56.0	6,306	47	0.91	366	58.1	2,775	48.0	0.92
	Missing	*	*	17	0.1	*	*	*	6	0.1	*
Grade	6	*	*	0	0.0	*	*	*	0	0.0	*
	7	*	*	0	0.0	*	*	*	0	0.0	*
	8	*	*	0	0.0	*	*	*	0	0.0	*
	9	385.3	68.4	603	4.5	0.96	376.7	59.5	218	3.8	0.94
	10	393.8	57.2	3,921	29.2	0.95	395.8	57.1	1,751	30.3	0.95
	11	356.6	51.0	4,385	32.7	0.82	357.5	52.1	1,891	32.7	0.81
	12	340.6	53.6	4,462	33.3	0.75	339.5	56.3	1,917	33.1	0.78
	Missing	*	*	35	0.3	*	*	*	7	0.1	*
Special Education	Yes	335.3	53.5	3,123	23.3	0.73	335.3	57.0	1,006	17.4	0.77
	No	372.1	57.8	9,630	71.8	0.93	369.6	58.7	4,506	77.9	0.92
	Exited	350.6	56.4	112	0.8	0.82	*	*	43	0.7	*
	Exited and placed in 504[a]	*	*	30	0.2	*	*	*	4	0.1	*
	504	372.5	58.2	511	3.8	0.92	375.6	60.1	225	3.9	0.94
Ethnicity	American Indian	*	*	39	0.3	*	*	*	28	0.5	*
	Asian	384.4	60.1	337	2.5	0.95	393.1	66.8	152	2.6	0.96
	African American	345.7	53.0	6,914	51.6	0.77	346.0	54.9	3,128	54.1	0.78
	Hawaiian/ Pacific Islander	*	*	20	0.1	*	*	*	4	0.1	*
	White	395.4	59.0	3,772	28.1	0.95	397.9	56.3	1,541	26.6	0.95
	Hispanic	358.0	50.3	1,978	14.8	0.85	359.0	53.6	809	14.0	0.86
	Missing	377.0	58.8	346	2.6	0.93	378.5	63.4	122	2.1	0.94
Limited English Proficient	Yes	340.0	47.6	970	7.2	0.64	340.6	51.0	384	6.6	0.61
	No	365.0	59.6	12,197	91.0	0.92	365.2	60.6	5,289	91.4	0.92
	Exited[b]	373.5	39.1	239	1.8	0.81	372.4	38.1	111	1.9	0.71

*Statistics not reported for sample size less than 50 ($N < 50$).
[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.
[b] LEP Exited indicates students who have exited English language acquisition services.

Table 6.7 Summary Statistics for MD HSA Biology: May 2017 Forms

		Primary Forms D-H					Makeup 1 Form X					Makeup 2 Form Y				
		Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha
Overall		412.7	43.3	41,567	100.0	0.94	413.2	43.2	10,628	100.0	0.94	412.4	43.6	10,483	100.0	0.94
Gender	Male	410.9	45.4	21,355	51.4	0.95	411.1	45.9	5,279	49.7	0.94	410.6	45.8	5,312	50.7	0.95
	Female	414.7	40.9	20,193	48.6	0.94	415.3	40.3	5,349	50.3	0.94	414.2	41.2	5,170	49.3	0.94
	Missing	*	*	19	0.0	*	*	*	0	0.0	*	*	.	1	0.0	*
Grade	6	*	*	0	0.0	*	*	*	1	0.0	*	*	*	0	0.0	*
	7	*	*	0	0.0	*	*	*	0	0.0	*	*	*	0	0.0	*
	8	437.8	22.7	177	0.4	0.90	*	*	34	0.3	*	*	*	37	0.4	*
	9	423.7	40.7	20,068	48.3	0.94	423.4	41.2	4,636	43.6	0.94	424.2	41.2	4,446	42.4	0.95
	10	407.4	40.8	17,528	42.2	0.93	410.3	40.5	4,887	46.0	0.93	408.6	40.5	4,896	46.7	0.93
	11	380.8	44.9	3,357	8.1	0.91	384.9	46.6	955	9.0	0.93	384.4	45.6	1,005	9.6	0.92
	12	354.1	42.2	411	1.0	0.74	357.1	42.4	115	1.1	0.79	341.1	49.6	98	0.9	0.71
	Missing	*	*	26	0.1	*	*	*	0	0.0	*	*	*	1	0.0	*
Special Education	Yes	371.5	48.9	4,418	10.6	0.90	374.6	50.2	875	8.2	0.91	374.4	50.0	926	8.8	0.91
	No	417.8	40.0	35,156	84.6	0.94	416.9	40.8	9,275	87.3	0.94	416.1	41.2	9,065	86.5	0.94
	Exited	401.5	41.0	261	0.6	0.92	393.2	48.7	71	0.7	0.92	406.1	27.8	56	0.5	0.89
	Exited and placed in 504[a]	417.5	32.8	69	0.2	0.93	*	*	11	0.1	*	*	*	12	0.1	*
	504	416.8	36.6	1,663	4.0	0.93	415	38.3	396	3.7	0.93	416.7	41.3	424	4.0	0.94
Ethnicity	American Indian	409.7	38.0	116	0.3	0.92	*	*	21	0.2	*	*	*	19	0.2	*
	Asian	438.4	36.1	2,763	6.6	0.94	442.1	34.1	778	7.3	0.93	439.5	34.8	707	6.7	0.94
	African American	393.4	43.7	14,626	35.2	0.92	394.7	43.1	4,042	38.0	0.92	393.3	43.1	4,066	38.8	0.92
	Hawaiian/ Pacific Islander	417.6	34.5	53	0.1	0.93	*	*	13	0.1	*	*	*	14	0.1	*
	White	430.8	33.8	16,001	38.5	0.93	431.5	35.1	3,712	34.9	0.93	432.9	34.1	3,592	34.3	0.93
	Hispanic	397.9	42.6	6,329	15.2	0.93	401.1	40.6	1,660	15.6	0.92	400.2	42.0	1,688	16.1	0.93
	Missing	422.8	38.7	1,679	4	0.94	424.9	33.3	402	3.8	0.93	425.6	35.5	397	3.8	0.94
Limited English Proficient	Yes	368.2	40.9	2,296	5.5	0.83	373.1	41.1	534	5.0	0.84	369.2	40.5	562	5.4	0.83
	No	415.4	42.2	38,328	92.2	0.94	415.4	42.5	9,847	92.7	0.94	414.9	42.7	9,687	92.4	0.94
	Exited[b]	414.3	34.7	943	2.3	0.93	412.9	32.2	247	2.3	0.92	412.5	31.0	234	2.2	0.92

*Statistics not reported for sample size less than 50 ($N < 50$).
[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.
[b] LEP Exited indicates students who have exited English language acquisition services.

Table 6.8 Summary Statistics for MD HSA Biology: Summer 2017 Forms

		Primary 1 Form P					Primary 2 Form Q				
		Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha
Overall		351.6	59.7	154	100.0	0.85	360.3	59.8	252	100.0	0.87
Gender	Male	347.2	62.7	90	58.4	0.86	362.4	55.0	146	57.9	0.86
	Female	357.7	55.1	64	41.6	0.82	357.3	65.9	106	42.1	0.89
	Missing	*	*	*	*	*	*	*	0	0.0	*
Grade	6	*	*	0	0.0	*	*	*	1	0.4	*
	7	*	*	0	0.0	*	*	*	0	0.0	*
	8	*	*	0	0.0	*	*	*	0	0.0	*
	9	*	*	29	18.8	*	362.3	68.3	71	28.2	0.92
	10	353.2	54.3	65	42.2	0.79	364.5	55.6	103	40.9	0.86
	11	*	*	36	23.4	*	349.3	56.2	55	21.8	0.77
	12	*	*	24	15.6	*	*	*	23	9.1	*
	Missing	*	*	0	0.0	*	*	*	0	0.0	*
Special Education	Yes	*	*	29	18.8	*	*	*	44	17.5	*
	No	357	58.5	118	76.6	0.85	364.3	59.6	205	81.3	0.88
	Exited	*	*	0	0.0	*	*	*	2	0.8	*
	Exited and placed in 504[a]	*	*	0	0.0	*	*	*	0	0.0	*
	504	*	*	7	4.5	*	*	*	1	0.4	*
Ethnicity	American Indian	*	*	0	0.0	*	*	*	1	0.4	*
	Asian	*	*	1	0.6	*	*	*	3	1.2	*
	African American	348.3	57.9	116	75.3	0.79	354.8	58.7	188	74.6	0.83
	Hawaiian/ Pacific Islander	*	*	0	0.0	*	*	*	2	0.8	*
	White	*	*	19	12.3	*	*	*	24	9.5	*
	Hispanic	*	*	14	9.1	*	*	*	27	10.7	*
	Missing	*	*	4	2.6	*	*	*	7	2.8	*
Limited English Proficient	Yes	*	.	1	0.6	*	*	*	0	0.0	*
	No	352	59.7	153	99.4	0.85	360.3	59.8	252	100	0.87
	Exited[b]	*	*	0	0.0	*	*	*	0	0.0	*

*Statistics not reported for sample size less than 50 ($N < 50$).
[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.
[b] LEP Exited indicates students who have exited English language acquisition services.

Table 6.9 Summary Statistics for MD HSA Government: January 2017 Forms

		Primary Form A					Makeup Form C				
		Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha
Overall		377.4	48.0	12,431	100.0	0.93	381.3	45.6	5,354	100.0	0.93
Gender	Male	374	50.5	6,730	54.1	0.93	379.2	47.5	2,867	53.5	0.93
	Female	381.6	44.4	5,680	45.7	0.93	384.0	42.9	2,473	46.2	0.92
	Missing	*	*	21	0.2	*	*	*	14	0.3	*
Grade	6	*	*	0	0.0	*	*	*	0	0.0	*
	7	*	*	0	0.0	*	*	*	0	0.0	*
	8	*	*	0	0.0	*	*	*	0	0.0	*
	9	417.1	46.8	1,807	14.5	0.95	418.1	43.1	861	16.1	0.95
	10	378.8	44.6	3,114	25.1	0.92	379.9	42.1	1,202	22.5	0.90
	11	365.4	42.8	3,877	31.2	0.87	370.8	41.2	1,692	31.6	0.87
	12	369.8	45.6	3,590	28.9	0.90	374.1	43.5	1,582	29.5	0.90
	Missing	*	*	43	0.3	*	*	*	17	0.3	*
Special Education	Yes	351.3	42.5	2,969	23.9	0.81	358.4	40.7	941	17.6	0.82
	No	385.7	46.6	8,885	71.5	0.93	386.2	45.6	4,138	77.3	0.93
	Exited	368.2	49.1	103	0.8	0.91	*	*	49	0.9	*
	Exited and placed in 504[a]	*	*	15	0.1	*	*	*	6	0.1	*
	504	387.9	44.5	459	3.7	0.94	388	38.3	220	4.1	0.91
Ethnicity	American Indian	*	*	26	0.2	*	*	*	17	0.3	*
	Asian	395.9	47.1	326	2.6	0.95	399.2	53.9	135	2.5	0.96
	African American	364.4	43.1	6,156	49.5	0.86	368.0	41.0	2,804	52.4	0.85
	Hawaiian/ Pacific Islander	*	*	19	0.2	*	*	*	12	0.2	*
	White	400.9	48.2	3,640	29.3	0.95	408.1	42.8	1,434	26.8	0.95
	Hispanic	370.4	44.9	1,940	15.6	0.90	375.6	41.9	805	15.0	0.90
	Missing	384.4	47.5	324	2.6	0.93	389.1	46.3	147	2.7	0.94
Limited English Proficient	Yes	347.7	40.2	881	7.1	0.72	354.6	42.6	397	7.4	0.81
	No	379.6	48.0	11,326	91.1	0.93	383.4	45.4	4,863	90.8	0.93
	Exited[b]	386.8	28.0	224	1.8	0.85	383.3	35.7	94	1.8	0.85

*Statistics not reported for sample size less than 50 ($N < 50$).

[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.

[b] LEP Exited indicates students who have exited English language acquisition services.

Table 6.10 Summary Statistics for MD HSA Government: May 2017 Forms

		Primary Form D					Makeup 1 Form X					Makeup 2 Form Y				
		Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha
Overall		410.9	45.7	40,348	100.0	0.95	411.4	45.5	11,317	100.0	0.95	412.1	44.6	11,321	100.0	0.95
Gender	Male	408.3	48.8	20,720	51.4	0.95	408.5	48.8	5,739	50.7	0.95	409.9	47.4	5,749	50.8	0.95
	Female	413.7	42.1	19,576	48.5	0.94	414.3	41.7	5,577	49.3	0.94	414.3	41.4	5,572	49.2	0.94
	Missing	398	33.7	52	0.1	0.92	*	*	1	0.0	*	*	*	0	0.0	*
Grade	6	*	*	0	0.0	*	*	*	0	0.0	*	*	*	0	0.0	*
	7	*	*	0	0.0	*	*	*	0	0.0	*	*	*	0	0.0	*
	8	*	*	0	0.0	*	*	*	0	0.0	*	*	*	0	0.0	*
	9	413.7	42.8	13,456	33.3	0.94	413.8	42.4	3,375	29.8	0.94	413.3	42.4	3,411	30.1	0.94
	10	416.3	42.9	20,968	52.0	0.94	417.6	41.6	6,274	55.4	0.94	418.3	41.8	6,236	55.1	0.94
	11	389.3	51.3	5,182	12.8	0.95	386.7	53.0	1,444	12.8	0.95	391.1	47.8	1,454	12.8	0.94
	12	354.6	54.6	685	1.7	0.91	357.7	55.7	223	2.0	0.92	356.4	53.3	220	1.9	0.91
	Missing	396.2	32.9	57	0.1	0.91	*	*	1	0.0	*	*	*	0	0.0	*
Special Education	Yes	368.2	47.6	4,953	12.3	0.91	366.6	50.3	1,080	9.5	0.92	368.9	46.4	1,071	9.5	0.91
	No	417.1	42.2	33,414	82.8	0.94	416.4	42.3	9,708	85.8	0.94	416.9	42.0	9,691	85.6	0.94
	Exited	397.4	40.9	260	0.6	0.92	393.8	46.2	59	0.5	0.94	399.4	47.1	81	0.7	0.95
	Exited and placed in 504[a]	410.7	39.6	75	0.2	0.92	*	*	11	0.1	*	*	*	10	0.1	*
	504	415.9	39.6	1,646	4.1	0.94	411.9	41.5	459	4.1	0.94	414.1	40.3	468	4.1	0.94
Ethnicity	American Indian	408.8	35.6	112	0.3	0.93	*	*	26	0.2	*	*	*	32	0.3	*
	Asian	437.2	36.4	2,579	6.4	0.94	438.4	33.7	806	7.1	0.93	439.9	33.3	812	7.2	0.93
	African American	392.4	45.4	14,738	36.5	0.93	393.6	44.2	4,292	37.9	0.93	394.4	42.5	4,396	38.8	0.93
	Hawaiian/ Pacific Islander	*	*	46	0.1	*	*	*	19	0.2	*	*	*	10	0.1	*
	White	429.1	37.5	15,300	37.9	0.94	430.0	36.9	4,018	35.5	0.94	431.8	35.7	3,966	35	0.94
	Hispanic	395.7	46.8	5,933	14.7	0.94	396.0	48.7	1,703	15	0.94	396.0	48.6	1,664	14.7	0.94
	Missing	421.4	38.9	1,640	4.1	0.94	424.3	41.2	453	4	0.94	419.9	39.8	441	3.9	0.94
Limited English Proficient	Yes	359.4	43.5	2,300	5.7	0.85	356.0	47.6	623	5.5	0.86	355.0	47.9	586	5.2	0.85
	No	414.0	44.3	37,053	91.8	0.95	414.6	43.6	10,435	92.2	0.95	415.2	42.6	10,462	92.4	0.95
	Exited[b]	415.0	31.3	995	2.5	0.92	414.4	28.6	259	2.3	0.91	412.9	28.0	273	2.4	0.90

*Statistics not reported for sample size less than 50 ($N < 50$).
[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.
[b] LEP Exited indicates students who have exited English language acquisition services.

Table 6.11 Summary Statistics for MD HSA Government: Summer 2017 Forms

		Primary 1 Form P					Primary 2 Form Q				
		Mean	*SD*	*N*	%	Alpha	Mean	*SD*	*N*	%	Alpha
Overall		357.9	53.7	537	100.0	0.88	365	52.2	346	100.0	0.91
Gender	Male	352.8	56.5	331	61.6	0.88	359	54.8	222	64.2	0.91
	Female	366.2	47.8	206	38.4	0.88	375.5	45.7	124	35.8	0.90
	Missing	*	*	0	0.0	*	*	*	0	0.0	*
Grade	6	*	*	0	0.0	*	*	*	0	0.0	*
	7	*	*	0	0.0	*	*	*	0	0.0	*
	8	*	*	0	0.0	*	*	*	0	0.0	*
	9	354.0	56.4	205	38.2	0.89	363.3	56.0	55	15.9	0.91
	10	353.5	52.0	145	27.0	0.86	367.2	52.0	125	36.1	0.91
	11	362.0	53.0	126	23.5	0.88	360.6	52.8	99	28.6	0.90
	12	373.2	46.7	61	11.4	0.86	368.5	49.3	67	19.4	0.90
	Missing	*	*	0	0.0	*	*	*	0	0.0	*
Special Education	Yes	335.9	53.0	109	20.3	0.76	348.0	52.8	56	16.2	0.75
	No	363.6	52.9	395	73.6	0.89	368.3	51.1	286	82.7	0.91
	Exited	*	*	1	0.2	*	*	*	1	0.3	*
	Exited and placed in 504[a]	*	*	2	0.4	*	*	.*	0	0.0	*
	504	*	*	30	5.6	*	*	*	3	0.9	*
Ethnicity	American Indian	*	*	2	0.4	*	*	*	4	1.2	*
	Asian	*	*	10	1.9	*	*	*	5	1.4	*
	African American	352.2	53.4	358	66.7	0.85	362.2	50.5	194	56.1	0.88
	Hawaiian/ Pacific Islander	*	*	2	0.4	*	*	*	1	0.3	*
	White	367.7	57.9	91	16.9	0.92	369.4	52.4	80	23.1	0.92
	Hispanic	376.0	41.1	55	10.2	0.89	*	*	49	14.2	*
	Missing	*	*	19	3.5	*	*	*	13	3.8	*
Limited English Proficient	Yes	*	*	22	4.1	*	*	*	15	4.3	*
	No	357.4	54.6	506	94.2	0.88	366.3	51.7	331	95.7	0.91
	Exited[b]	*	*	9	1.7	*	*	*	0	0.0	*

*Statistics not reported for sample size less than 50 ($N < 50$).
[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.
[b] LEP Exited indicates students who have exited English language acquisition services.

Demographic Characteristics

Demographic characteristics of the students who took the January, May, and Summer MD HSAs are described in Tables 6.12 and 6.13. All demographic results are based on the final Research files delivered to MSDE.

Table 6.12 Demographic Information for 2017 MD HSA Biology

		January Primary Forms		January Makeup Form		May Primary Forms		May Makeup Forms		Summer Forms	
		N	%	*N*	%	*N*	%	*N*	%	*N*	%
Overall		13,406	100.0	5,784	100.0	41,567	100.0	21,111	100.0	406	100.0
Gender	Male	7,083	52.8	3,003	51.9	21,355	51.4	10,591	50.2	236	58.1
	Female	6,306	47.0	2,775	48.0	20,193	48.6	10,519	49.8	170	41.9
	Missing	17	0.1	6	0.1	19	0.0	1	0.0	0	0.0
Special Education	Yes	3,123	23.3	1,006	17.4	4,418	10.6	1,801	8.5	73	18.0
	No	9,630	71.8	4,506	77.9	35,156	84.6	18,340	86.9	323	79.6
	Exited	112	0.8	43	0.7	261	0.6	127	0.6	2	0.5
	Exited and placed in 504[a]	30	0.2	4	0.1	69	0.2	23	0.1	0	0.0
	504	511	3.8	225	3.9	1,663	4.0	820	3.9	8	2.0
Ethnicity	American Indian	39	0.3	28	0.5	116	0.3	40	0.2	1	0.2
	Asian	337	2.5	152	2.6	2,763	6.6	1,485	7.0	4	1.0
	African American	6,914	51.6	3,128	54.1	14,626	35.2	8,108	38.4	304	74.9
	Hawaiian/ Pacific Islander	20	0.1	4	0.1	53	0.1	27	0.1	2	0.5
	White	3,772	28.1	1,541	26.6	16,001	38.5	7,304	34.6	43	10.6
	Hispanic	1,978	14.8	809	14	6,329	15.2	3,348	15.9	41	10.1
	Missing	346	2.6	122	2.1	1,679	4.0	799	3.8	11	2.7
Limited English Proficient	Yes	970	7.2	384	6.6	2,296	5.5	1,096	5.2	1	0.2
	No	12,197	91.0	5,289	91.4	38,328	92.2	19,534	92.5	405	99.8
	Exited[b]	239	1.8	111	1.9	943	2.3	481	2.3	0	0

[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.
[b] LEP Exited indicates students who have exited English language acquisition services.

Table 6.13 Demographic Information for 2017 MD HSA Government

		January Primary Forms		January Makeup Form		May Primary Forms		May Makeup Forms		Summer Forms	
		N	%	*N*	%	*N*	%	*N*	%	*N*	%
Overall		12,431	100.0	5,354	100.0	40,348	100.0	22,638	100.0	883	100.0
Gender	Male	6,730	54.1	2,867	53.5	20,720	51.4	11,488	50.7	553	62.6
	Female	5,680	45.7	2,473	46.2	19,576	48.5	11,149	49.2	330	37.4
	Missing	21	0.2	14	0.3	52	0.1	1	0.0	0	0.0
Special Education	Yes	2,969	23.9	941	17.6	4,953	12.3	2,151	9.5	165	18.7
	No	8,885	71.5	4,138	77.3	33,414	82.8	19,399	85.7	681	77.1
	Exited	103	0.8	49	0.9	260	0.6	140	0.6	2	0.2
	Exited and placed in 504[a]	15	0.1	6	0.1	75	0.2	21	0.1	2	0.2
	504	459	3.7	220	4.1	1,646	4.1	927	4.1	33	3.7
Ethnicity	American Indian	26	0.2	17	0.3	112	0.3	58	0.3	6	0.7
	Asian	326	2.6	135	2.5	2,579	6.4	1,618	7.1	15	1.7
	African American	6,156	49.5	2,804	52.4	14,738	36.5	8,688	38.4	552	62.5
	Hawaiian/ Pacific Islander	19	0.2	12	0.2	46	0.1	29	0.1	3	0.3
	White	3,640	29.3	1,434	26.8	15,300	37.9	7,984	35.3	171	19.4
	Hispanic	1,940	15.6	805	15.0	5,933	14.7	3,367	14.9	104	11.8
	Missing	324	2.6	147	2.7	1,640	4.1	894	3.9	32	3.6
Limited English Proficient	Yes	881	7.1	397	7.4	2,300	5.7	1,209	5.3	37	4.2
	No	11,326	91.1	4,863	90.8	37,053	91.8	20,897	92.3	837	94.8
	Exited[b]	224	1.8	94	1.8	995	2.5	532	2.4	9	1.0

[a] A 504 plan is a legal document falling under the provisions of the Rehabilitation Act of 1973 that provides a program of instructional services to assist students with special needs who are in a regular education setting.
[b] LEP Exited indicates students who have exited English language acquisition services.

Section 7. Test Analyses

Due to the intact form reuse from the 2016 administration, there were no new field test items in 2017 administration. Following the receipt of the final score file from Pearson, the analyses were implemented to obtain classical item analyses and differential item functioning (DIF). Results are presented in Appendix A. All the analyses were completed using *GENASYS*, an ETS proprietary software program. The analysis procedures for each component are described in detail below. All valid records available were used as samples for the analyses, including English language learners, students with IEP or 504 plans, and students receiving accommodations. To ensure the analysis results were obtained from a motivated sample, records invalidated by the test administrator and records with no item responses to the first five items were excluded from the analysis sample.

Classical Item Analyses

Classical item analyses involve computing a set of statistics based on classical test theory for every item in each form. The statistics provide key information about the quality of the items from an empirical perspective. The statistics estimated for the MD HSA operational test items, and associated criteria used to flag items for the content specialists' review, are described below.

Classical item difficulty ("*p*-value"): This statistic indicates the mean item score expressed as a proportion of the maximum obtainable item score. For SR items, it is equivalent to the proportion of test takers in the sample that answered the item correctly. For CR items, divide the average item score by maximum score points to obtain the *p*-value. Desired *p*-values generally fall within the range of 0.25 to 0.90. Occasionally, items that fall outside this range can be justified for inclusion in an item bank based upon the quality and educational importance of the item content or the ability to measure students with very high or low achievement, especially if the students have not yet received instruction in the content.

Item-total correlation of the correct response option for SR items or the CR item score with the total raw score: This statistic describes the relationship between performance on the specific item and performance on the total test, including the item under study. It is sometimes referred to as a discrimination index. For SR items, the item-total correlation is the point-biserial correlation. For CR items, the item-total correlation is the polyserial correlation. Values less than 0.20 are generally considered to have a weaker than desired relationship, therefore these items receive careful consideration by ETS and MSDE staff before including them on future forms. Items with negative correlations can indicate there are serious problems with the item content (e.g., multiple correct answers, unusually complex content), there is an incorrect key, or students have not been taught the content.

Proportion of students choosing each response option (SR items): This statistic indicates the proportion of test takers selecting each answer choice, or option. Options not selected by any students or selected by a very low proportion of students indicate

problems with plausibility of the option. Items that do not have all answer options functioning may be discarded or revised and field tested again.

Point-biserial correlation of incorrect response option (SR items) with the total raw score: These statistics describe the relationship between selecting an incorrect response option for a specific item and performance on the total test, including the item under study. Typically, the correlation between an incorrect answer and total test performance is weak or negative. Values are typically compared and contrasted with the discrimination index. When the magnitude of a point-biserial correlation for an incorrect answer is strong relative to the correct answer, the item is carefully reviewed for content-related problems. Alternatively, positive point-biserial correlations on incorrect options may indicate that students have not had sufficient opportunity to learn the material.

Percentage of students omitting an item: This statistic is useful for identifying problems with test features, such as testing time and item/test layout. Typically, it is assumed that if students have an adequate amount of testing time, at least 95 percent of them should attempt to answer each question. When a pattern of omit percentages exceeds 5 percent for a series of SR items or 15 percent for CR items at the end of a timed section, this may indicate that there was insufficient time for students to complete all items. For individual items, if the omit percentage is greater than 5 percent for a single SR item or 15 percent for a CR item, this could be an indication of an item/test layout problem. For example, students might accidentally skip an item that follows a lengthy stem.

Frequency distribution of CR score points: Observation of the distribution of scores is useful to identify how well the item is functioning. If no students are assigned the top score point, this may indicate that the item is not functioning with respect to the scoring rubric, there are problems with the item content, or students have not been taught the content.

In addition, a series of flags was created to identify items with extreme values. Flagged items were subject to additional scrutiny prior to the inclusion of the items in the final calibrations. The following flagging criteria were applied to all operational items tested in the 2017 assessments:

- *Difficulty flag*: *p*-values less than 0.10 or greater than 0.90.
- *Discrimination flag*: Item-total correlation less than 0.10.
- *Distractor flag*: SR point-biserial correlation positive for incorrect option.
- *Omit flag*: Percentage omitted is greater than 5% for SR items.
- For CR items, divide the average item score by maximum score points to obtain the *p*-value. If this is less than 0.10 or greater than 0.90, manually flag the item.
- CR items with omit rates greater than 15% are flagged.

Differential Item Functioning

Following the classical item analyses, differential item functioning (DIF) analyses were completed. One goal of test development is to assemble a set of items that provides an estimate of student ability that is as fair and accurate as possible for all groups within the population. DIF statistics are used to identify items in which focal groups (e.g., Females, African Americans, Hispanics) of students with the same underlying level of ability have different probabilities than reference groups (e.g., Males, Whites) of answering correctly. If the item is more difficult for an identifiable focal subgroup, the item may be measuring something different from the intended construct. However, it is important to recognize that DIF-flagged items might be related to actual differences in relevant knowledge or skill (item impact) or statistical Type I error. A subsequent review by MSDE and ETS content experts is conducted to investigate the source and meaning of evident differences.

ETS used two DIF detection methods: the Mantel-Haenszel and standardization approaches. As part of the Mantel-Haenszel procedure, the statistic described by Holland & Thayer (1988), known as MH D-DIF, was used.[7] This statistic is expressed as the difference between the focal and reference group performance on an item after conditioning on total test score. Negative MH D-DIF statistics favor the reference group, and positive values favor the focal group. The classification logic used for flagging items is based on a combination of absolute differences and significance testing. Items that are not significantly different based on the MH D-DIF ($p > 0.05$) are considered to have similar performance between the two studied groups and to be functioning appropriately. For items for which the statistical test indicates significant differences ($p < 0.05$), the effect size is used to determine the direction and severity of the DIF. The male and white groups were treated as the reference groups for gender and ethnicity, respectively; the female and other race and ethnic groups were considered the focal groups.

Based on their DIF statistics, items are classified into one of three categories and assigned values of A, B, or C. Category A items contain negligible DIF, Category B items exhibit slight or moderate DIF, and Category C items have moderate to large DIF. Negative values imply that, conditional on the matching variable, the focal group has a lower mean item score than the reference group. In contrast, a positive value implies that, conditional on the matching variable, the reference group has a lower mean item score than the focal group.

---

[7] The formula for the estimate of constant odds ratio is

$$\hat{\alpha}_{MH} = \frac{\left(\sum_m \frac{R_{rm} W_{fm}}{N_m} \right)}{\left(\sum_m \frac{R_{fm} W_{rm}}{N_m} \right)},$$

where

RB_{rmB} = number in reference group at ability level *m* answering the item right,
WB_{fmB} = number in focal group at ability level *m* answering the item wrong,
RB_{fmB} = number in focal group at ability level *m* answering the item right,
WB_{rmB} = number in reference group at ability level *m* answering the item wrong,
NB_{mB} = total group at ability level *m*.

This can then be used in the following formula (Holland & Thayer, 1988):

$$MH\ D\text{-}DIF = -2.35 \ln[\hat{\alpha}_{MH}].$$

For constructed response (CR) items, the MH D-DIF statistic is not calculated; instead the standardization procedure (Dorans & Kulick, 1986) is used in conjunction with the Mantel chi-square statistic. In the standardization method, the matching variable is the total score on all items and the differences in the item score between the two comparison groups are calculated for each item. The standardized mean difference for the item is the weighted average of these differences, where the relative frequency of the focal group at each CR score serves as the weighting function.

Analogous flagging rules have been developed that are used to classify the CR items into A, B, or C DIF categories. The flagging criteria for constructed response items are:

A) If the Mantel Chi-square *p*-value > 0.05 and/or the Mantel Chi-square *p*-value < 0.05 and the Standardized Mean Difference $|SMD/SD| \leq 0.17$, the item is classified as A.

B) If the Mantel Chi-square *p*-value < 0.05 and |SMD/SD| is between 0.17 and 0.25 then the item is classified as B.

C) If the Mantel Chi-square *p*-value < 0.05 and |SMD/SD| > 0.25 then the item is classified as C.

Positive values favor the focal group and negative values favor the reference group.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 292–334.

ETS (2014). *ETS standards for quality and fairness*. Princeton, NJ: Educational Testing Service.

ETS (October, 5, 2009). *Considerations for setting new target test characteristic curves for the Maryland High School Assessments*. Princeton, NJ: Educational Testing Service.

ETS (October, 29, 2010). *Study of the comparability of online and paper forms of the May 2010 Maryland High School Assessments*. Princeton, NJ: Educational Testing Service.

Haertel, E. H. (2006). Reliability. In R. H. Brennan (Ed.) *Educational measurement* (4th edition, pp. 64–110). Westport, CT: Praeger.

Holland, P. W., & Thayer, D. T. (1988). Differential item performance and the Mantel-Haenszel procedure. In H. Wainer & H. I. Braun (Eds.), *Test validity* (pp. 129–145). Hillsdale, NJ: Erlbaum.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6(1),* 1–55.

Livingston, S. A., & Lewis, C. (1995). Estimating the consistency and accuracy of classification based on test scores. *Journal of Educational Measurement, 32*, 179–197.

Messick, S. (1989). Validity. In R.L. Linn (Ed.) *Educational measurement* (3rd edition, pp. 13–103). New York, NY: American Council on Education and Macmillan.

Muraki, E. (1992). A generalized partial credit model: application of an EM algorithm. *ETS Research Report, 92-6.* Princeton, NJ: Educational Testing Service.

Muthén, B.O. (1998–2004). *Mplus technical appendices*. Los Angeles, CA: Muthén & Muthén.

Muthén, B., du Toit, S.H.C., & Spisic, D. (1997*). Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes*. Unpublished manuscript, University of California, Los Angeles.

Muthén B. O., & Muthén, L. K. (2007). *Mplus 5* [Computer program]. Los Angeles, CA: Muthén & Muthén.

Yen, W. M. (1984). Obtaining maximum likelihood trait estimates from number-correct scores for the three-parameter logistic model. *Journal of Educational Measurement, 21*, 93–111.

Yen W. M., Candell G. L. (1991). Increasing score reliability with item-pattern scoring: An empirical study in five score metrics. *Applied Measurement in Education*, 4, 209-228.

Yen, W. M., & Fitzpatrick, A. R. (2006). Item response theory. In R. L. Brennan (Ed.*), Educational measurement* (4th ed., pp. 111–153). Westport, CN: American Council on Education & Praeger.

Appendix A. MD HSA Classical Item Statistics: Operational Forms

Table A.1 Item Statistics, Operational Items: MD HSA Biology—January 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
A-B	1	O	455132	SR	0.52	0.47	-0.17	-0.28	-0.20	0.47	0.0
A-B	2	O	369410	SR	0.65	0.40	0.40	-0.24	-0.22	-0.13	0.0
A-B	3	O	79442	SR	0.26	0.41	-0.19	-0.10	0.41	-0.13	0.1
A-B	4	O	421478	SR	0.50	0.50	-0.24	-0.20	-0.24	0.50	0.1
A-B	5	O	421482	SR	0.58	0.44	-0.19	0.44	-0.25	-0.18	0.1
A-B	6	O	270991	SR	0.43	0.35	-0.13	-0.17	-0.15	0.35	0.1
A-B	7	O	270992	SR	0.54	0.39	-0.19	-0.19	-0.15	0.39	0.1
A-B	11	O	373161	SR	0.42	0.42	-0.17	-0.16	-0.20	0.42	0.1
A-B	12	O	56982	SR	0.60	0.42	-0.21	-0.22	0.42	-0.17	0.2
A-B	13	O	400667	SR	0.40	0.34	-0.15	-0.22	0.34	-0.03	0.2
A-B	14	O	400665	SR	0.36	0.25	-0.11	0.25	-0.21	-0.01	0.3
A-B	17	O	52417	SR	0.55	0.46	0.46	-0.27	-0.22	-0.13	0.3
A-B	18	O	279655	SR	0.37	0.44	-0.18	-0.21	0.44	-0.11	0.3
A-B	19	O	215942	SR	0.33	0.29	-0.13	0.09	-0.28	0.29	0.4
A-B	20	O	215944	SR	0.34	0.43	0.43	-0.21	-0.16	-0.13	0.4
A-B	21	O	394780	SR	0.40	0.24	-0.06	0.24	-0.09	-0.16	0.4
A-B	22	O	394782	SR	0.40	0.31	-0.17	0.31	-0.22	-0.01	0.5
A-B	24	O	331358	SR	0.46	0.43	-0.17	-0.21	-0.16	0.43	0.5
A-B	25	O	364188	SR	0.38	0.48	-0.13	0.48	-0.23	-0.21	0.6
A-B	26	O	364184	SR	0.43	0.44	-0.18	-0.20	0.44	-0.15	0.6
A-B	27	O	415101	SR	0.49	0.39	0.39	-0.12	-0.25	-0.15	0.6
A-B	29	O	349089	SR	0.50	0.32	0.32	-0.15	-0.17	-0.12	0.7
A-B	30	O	214560	SR	0.53	0.35	0.35	-0.18	-0.18	-0.10	0.8
A-B	31	O	214559	SR	0.24	0.32	-0.15	-0.20	0.32	0.03	0.9
A-B	32	O	68224	SR	0.30	0.24	-0.06	-0.12	0.24	-0.06	0.9
A-B	33	O	55208	SR	0.42	0.44	-0.22	0.44	-0.19	-0.14	0.9
A-B	34	O	349087	SR	0.66	0.38	-0.19	-0.20	-0.18	0.38	0.2
A-B	35	O	68130	SR	0.33	0.43	-0.09	-0.13	-0.25	0.43	0.3
A-B	37	O	52748	SR	0.34	0.43	0.43	-0.20	-0.11	-0.21	0.3
A-B	38	O	52750	SR	0.48	0.42	-0.21	0.42	-0.24	-0.09	0.3
A-B	39	O	52685	SR	0.61	0.44	-0.27	0.44	-0.20	-0.15	0.3
A-B	40	O	52757	SR	0.51	0.46	0.46	-0.22	-0.20	-0.20	0.3
A-B	43	O	421473	SR	0.32	0.36	0.36	-0.16	-0.14	-0.12	0.4
A-B	44	O	421552	SR	0.38	0.33	0.33	-0.19	-0.13	-0.06	0.4
A-B	45	O	55086	SR	0.26	0.14	0.03	0.14	-0.27	0.08	0.3
A-B	46	O	55083	SR	0.58	0.47	-0.21	-0.26	0.47	-0.19	0.4
A-B	47	O	270995	SR	0.25	0.28	0.01	0.28	-0.20	-0.13	0.4
A-B	48	O	369450	SR	0.25	0.39	-0.14	-0.05	-0.21	0.39	0.4
A-B	49	O	68145	SR	0.30	0.39	0.39	-0.20	-0.03	-0.18	0.4
A-B	53	O	68195	SR	0.38	0.40	-0.20	-0.25	0.40	0.04	0.4
A-B	54	O	369413	SR	0.24	0.20	-0.02	-0.06	-0.10	0.20	0.4
A-B	55	O	369393	SR	0.27	0.22	-0.08	0.22	-0.15	0.01	0.4

Table A.1 Item Statistics, Operational Items: MD HSA Biology—January 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
A-B	56	O	369391	SR	0.34	0.30	-0.12	-0.20	0.30	0.00	0.4
A-B	57	O	60535	SR	0.26	0.29	0.05	0.29	-0.22	-0.10	0.4
A-B	58	O	64739	SR	0.46	0.37	-0.12	-0.22	0.37	-0.12	0.5
A-B	59	O	55100	SR	0.46	0.43	-0.13	0.43	-0.23	-0.20	0.4
A-B	60	O	55160	SR	0.55	0.43	0.43	-0.21	-0.20	-0.17	0.4
A-B	63	O	421464	SR	0.37	0.45	-0.12	-0.21	-0.18	0.45	0.5
A-B	64	O	421499	SR	0.48	0.41	-0.14	0.41	-0.22	-0.17	0.6
A-B	65	O	363171	SR	0.54	0.45	-0.23	-0.28	0.45	-0.10	0.5
A-B	66	O	338754	SR	0.34	0.40	-0.20	-0.13	0.40	-0.11	0.6
A-B	67	O	279649	SR	0.59	0.26	-0.10	0.26	-0.20	-0.09	0.4
A-B	68	O	79485	SR	0.44	0.32	-0.13	0.32	-0.13	-0.15	0.5
A-B	69	O	271001	SR	0.27	0.19	0.19	-0.14	0.00	-0.07	0.5
A-B	70	O	270999	SR	0.28	0.45	0.45	-0.23	-0.19	-0.02	0.4
A-B	71	O	400661	SR	0.32	0.38	-0.07	-0.18	-0.15	0.38	0.4
A-B	72	O	400662	SR	0.59	0.44	-0.17	0.44	-0.24	-0.20	0.5
A-B	75	O	282451	SR	0.47	0.40	-0.11	0.40	-0.25	-0.15	0.4
A-B	76	O	65107	SR	0.42	0.37	-0.20	-0.19	0.37	-0.06	0.5
A-B	77	O	68150	SR	0.30	0.29	-0.20	-0.16	0.29	0.02	0.5
A-B	78	O	323283	SR	0.21	0.19	-0.03	-0.15	0.01	0.19	0.6
A-B	79	O	323286	SR	0.49	0.43	-0.11	-0.24	0.43	-0.21	0.6
A-B	80	O	256491	SR	0.31	0.36	0.36	-0.07	-0.18	-0.15	0.6
A-B	81	O	256493	SR	0.31	0.36	-0.15	0.36	-0.16	-0.07	0.5
A-B	83	O	64734	SR	0.28	0.35	-0.06	-0.18	-0.11	0.35	0.5
A-B	85	O	214531	SR	0.16	0.33	0.10	-0.28	-0.06	0.33	0.6
A-B	86	O	67603	SR	0.49	0.38	0.38	-0.23	-0.12	-0.14	0.6
A-B	90	O	279630	SR	0.29	0.15	0.15	-0.11	-0.20	0.18	0.5
A-B	92	O	455122	SR	0.45	0.51	-0.23	-0.24	0.51	-0.16	0.6
A-B	93	O	392442	SR	0.34	-0.01	-0.19	-0.01	-0.05	0.21	0.6
A-B	94	O	279545	SR	0.29	0.46	0.46	-0.04	-0.22	-0.23	0.6
A-B	95	O	279547	SR	0.25	0.39	-0.12	-0.19	-0.08	0.39	0.6
A-B	96	O	392472	SR	0.29	0.35	-0.28	0.35	-0.12	-0.02	0.6
A-B	97	O	338767	SR	0.52	0.47	0.47	-0.24	-0.23	-0.15	0.6
A-B	98	O	136136	SR	0.37	0.43	-0.04	-0.21	-0.24	0.43	0.6
A-B	99	O	136138	SR	0.61	0.47	-0.22	-0.24	0.47	-0.21	0.7
				Mean	0.40	0.37	-0.01	-0.04	-0.04	0.01	0.4
				SD	0.12	0.10	0.24	0.25	0.25	0.22	0.2

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.2 Item Statistics, Operational Items: MD HSA Biology—January 2017 Makeup

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
C	1	O	455114	SR	0.57	0.46	-0.16	-0.27	-0.23	0.46	0.0
C	2	O	369410	SR	0.65	0.40	0.40	-0.24	-0.22	-0.13	0.0
C	3	O	79442	SR	0.26	0.41	-0.19	-0.10	0.41	-0.13	0.1
C	4	O	421478	SR	0.50	0.50	-0.24	-0.20	-0.24	0.50	0.1
C	5	O	421482	SR	0.58	0.44	-0.19	0.44	-0.25	-0.18	0.1
C	6	O	270991	SR	0.43	0.35	-0.13	-0.17	-0.15	0.35	0.1
C	7	O	270992	SR	0.54	0.39	-0.19	-0.19	-0.15	0.39	0.1
C	11	O	52405	SR	0.24	0.34	0.34	-0.05	-0.15	-0.14	0.1
C	12	O	349104	SR	0.32	0.32	-0.18	-0.13	-0.04	0.32	0.1
C	13	O	400667	SR	0.40	0.34	-0.15	-0.22	0.34	-0.03	0.2
C	14	O	400665	SR	0.36	0.25	-0.11	0.25	-0.21	-0.01	0.3
C	17	O	52404	SR	0.56	0.41	-0.16	0.41	-0.22	-0.19	0.3
C	18	O	279655	SR	0.37	0.44	-0.18	-0.21	0.44	-0.11	0.3
C	19	O	215956	SR	0.32	0.18	-0.07	0.01	0.18	-0.17	0.3
C	20	O	215944	SR	0.34	0.43	0.43	-0.21	-0.16	-0.13	0.4
C	21	O	394780	SR	0.40	0.24	-0.06	0.24	-0.09	-0.16	0.4
C	22	O	394782	SR	0.40	0.31	-0.17	0.31	-0.22	-0.01	0.5
C	24	O	279651	SR	0.46	0.42	-0.16	-0.21	0.42	-0.16	0.4
C	25	O	364188	SR	0.38	0.48	-0.13	0.48	-0.23	-0.21	0.6
C	26	O	364184	SR	0.43	0.44	-0.18	-0.20	0.44	-0.15	0.6
C	27	O	415101	SR	0.49	0.39	0.39	-0.12	-0.25	-0.15	0.6
C	29	O	349108	SR	0.33	0.29	-0.17	0.29	-0.08	-0.06	0.6
C	30	O	214556	SR	0.37	0.47	-0.24	-0.15	0.47	-0.15	0.8
C	31	O	214559	SR	0.24	0.32	-0.15	-0.20	0.32	0.03	0.9
C	32	O	133060	SR	0.49	0.37	-0.21	-0.12	0.37	-0.17	0.8
C	33	O	68110	SR	0.64	0.40	0.40	-0.23	-0.20	-0.14	0.8
C	34	O	349087	SR	0.66	0.38	-0.19	-0.20	-0.18	0.38	0.2
C	35	O	68130	SR	0.33	0.43	-0.09	-0.13	-0.25	0.43	0.3
C	37	O	52748	SR	0.34	0.43	0.43	-0.20	-0.11	-0.21	0.3
C	38	O	52749	SR	0.57	0.46	0.46	-0.21	-0.23	-0.20	0.3
C	39	O	57173	SR	0.31	0.28	-0.09	-0.04	-0.19	0.28	0.3
C	40	O	52757	SR	0.51	0.46	0.46	-0.22	-0.20	-0.20	0.3
C	43	O	421473	SR	0.32	0.36	0.36	-0.16	-0.14	-0.12	0.4
C	44	O	421552	SR	0.38	0.33	0.33	-0.19	-0.13	-0.06	0.4
C	45	O	55086	SR	0.26	0.14	0.03	0.14	-0.27	0.08	0.3
C	46	O	55085	SR	0.36	0.33	0.33	-0.26	-0.06	-0.07	0.3
C	47	O	52705	SR	0.57	0.48	-0.19	-0.23	-0.25	0.48	0.3
C	48	O	52513	SR	0.32	0.39	-0.15	-0.09	-0.21	0.39	0.3
C	49	O	68145	SR	0.30	0.39	0.39	-0.20	-0.03	-0.18	0.4
C	53	O	68195	SR	0.38	0.40	-0.20	-0.25	0.40	0.04	0.4
C	54	O	108509	SR	0.31	0.25	0.12	-0.17	-0.23	0.25	0.3
C	55	O	369392	SR	0.27	0.40	0.40	-0.15	-0.14	-0.12	0.4

Table A.2 Item Statistics, Operational Items: MD HSA Biology—January 2017 Makeup

C	56	O	369391	SR	0.34	0.30	-0.12	-0.20	0.30	0.00	0.4
C	57	O	53511	SR	0.30	0.28	-0.08	0.28	-0.15	-0.08	0.4
C	58	O	64739	SR	0.46	0.37	-0.12	-0.22	0.37	-0.12	0.5
C	59	O	55100	SR	0.46	0.43	-0.13	0.43	-0.23	-0.20	0.4
C	60	O	55160	SR	0.55	0.43	0.43	-0.21	-0.20	-0.17	0.4
C	63	O	421464	SR	0.37	0.45	-0.12	-0.21	-0.18	0.45	0.5
C	64	O	421499	SR	0.48	0.41	-0.14	0.41	-0.22	-0.17	0.6
C	65	O	363171	SR	0.54	0.45	-0.23	-0.28	0.45	-0.10	0.5
C	66	O	57044	SR	0.25	0.52	-0.12	-0.20	-0.22	0.52	0.6
C	67	O	352586	SR	0.68	0.34	-0.26	0.34	-0.14	-0.08	0.3
C	68	O	392450	SR	0.30	0.33	-0.10	-0.24	0.33	0.04	0.3
C	69	O	271000	SR	0.46	0.36	-0.17	0.36	-0.21	-0.06	0.3
C	70	O	270999	SR	0.28	0.45	0.45	-0.23	-0.19	-0.02	0.4
C	71	O	400661	SR	0.32	0.38	-0.07	-0.18	-0.15	0.38	0.4
C	72	O	400663	SR	0.32	0.44	0.44	-0.18	-0.16	-0.15	0.3
C	75	O	282451	SR	0.47	0.40	-0.11	0.40	-0.25	-0.15	0.4
C	76	O	392459	SR	0.35	0.36	-0.16	-0.13	0.36	-0.11	0.3
C	77	O	68150	SR	0.30	0.29	-0.20	-0.16	0.29	0.02	0.5
C	78	O	323283	SR	0.21	0.19	-0.03	-0.15	0.01	0.19	0.6
C	79	O	323284	SR	0.42	0.32	-0.05	0.32	-0.25	-0.10	0.3
C	80	O	256492	SR	0.45	0.45	-0.18	-0.19	0.45	-0.21	0.4
C	81	O	256493	SR	0.31	0.36	-0.15	0.36	-0.16	-0.07	0.5
C	83	O	417626	SR	0.55	0.41	-0.20	0.41	-0.21	-0.15	0.3
C	85	O	65126	SR	0.42	0.49	0.49	-0.22	-0.21	-0.18	0.3
C	86	O	392481	SR	0.45	0.48	-0.18	-0.21	-0.23	0.48	0.3
C	90	O	279630	SR	0.29	0.15	0.15	-0.11	-0.20	0.18	0.5
C	92	O	455122	SR	0.45	0.51	-0.23	-0.24	0.51	-0.16	0.6
C	93	O	392442	SR	0.34	-0.01	-0.19	-0.01	-0.05	0.21	0.6
C	94	O	279545	SR	0.29	0.46	0.46	-0.04	-0.22	-0.23	0.6
C	95	O	279547	SR	0.25	0.39	-0.12	-0.19	-0.08	0.39	0.6
C	96	O	392472	SR	0.29	0.35	-0.28	0.35	-0.12	-0.02	0.6
C	97	O	271053	SR	0.47	0.40	-0.20	0.40	-0.20	-0.10	0.4
C	98	O	136136	SR	0.37	0.43	-0.04	-0.21	-0.24	0.43	0.6
C	99	O	136138	SR	0.61	0.47	-0.22	-0.24	0.47	-0.21	0.7
Mean					0.40	0.38	-0.01	-0.05	-0.04	0.01	0.4
SD					0.12	0.09	0.25	0.24	0.25	0.23	0.2

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.3 Item Statistics, Operational Items: MD HSA Government—January 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
A-B	6	L	60432	CR	0.28	0.72					5.3
A-B	17	L	68743	CR	0.20	0.79					8.2
A-B	44	L	108464	CR	0.20	0.70					9.3
A-B	66	L	64946	CR	0.19	0.75					11.4
A-B	76	L	50980	CR	0.25	0.76					11.5
Mean (CR)					0.23	0.74					9.2
SD (CR)					0.04	0.04					2.6
A-B	1	L	363253	SR	0.55	0.44	-0.16	-0.24	-0.21	0.44	0.1
A-B	2	O	68103	SR	0.30	0.29	0.29	-0.15	-0.20	-0.02	0.1
A-B	4	L	55572	SR	0.33	0.28	-0.04	0.28	-0.22	-0.06	0.1
A-B	5	O	339086	SR	0.42	0.37	-0.22	-0.22	-0.06	0.37	0.1
A-B	7	O	214483	SR	0.27	0.37	-0.12	-0.13	0.37	-0.14	0.2
A-B	8	L	296497	SR	0.58	0.44	-0.22	-0.20	-0.22	0.44	0.2
A-B	9	L	296498	SR	0.74	0.43	0.43	-0.27	-0.18	-0.22	0.2
A-B	10	O	324395	SR	0.67	0.41	-0.20	-0.24	0.41	-0.17	0.2
A-B	11	L	52191	SR	0.63	0.49	-0.23	-0.25	-0.24	0.49	0.3
A-B	12	L	51210	SR	0.79	0.41	0.41	-0.22	-0.24	-0.17	0.3
A-B	14	O	68754	SR	0.55	0.48	-0.21	-0.22	-0.24	0.48	0.4
A-B	15	O	50868	SR	0.59	0.41	-0.17	0.41	-0.22	-0.20	0.4
A-B	16	O	256352	SR	0.57	0.47	-0.20	-0.25	-0.23	0.47	0.4
A-B	19	O	261569	SR	0.44	0.28	-0.11	0.28	-0.18	-0.03	0.7
A-B	20	O	132972	SR	0.28	0.28	-0.19	-0.10	0.28	0.00	0.7
A-B	21	L	271811	SR	0.48	0.36	-0.18	0.36	-0.24	-0.09	0.8
A-B	22	O	51125	SR	0.41	0.30	-0.14	-0.15	0.30	-0.06	0.9
A-B	24	L	79721	SR	0.30	0.23	0.03	-0.17	0.23	-0.11	1.0
A-B	25	L	348540	SR	0.38	0.43	0.43	-0.17	-0.19	-0.15	1.2
A-B	27	O	51765	SR	0.35	0.50	-0.19	0.50	-0.19	-0.19	1.3
A-B	28	O	282260	SR	0.67	0.42	0.42	-0.22	-0.22	-0.17	1.3
A-B	29	O	68617	SR	0.57	0.38	-0.17	-0.24	0.38	-0.12	0.4
A-B	30	L	348480	SR	0.44	0.42	-0.17	0.42	-0.17	-0.18	0.4
A-B	31	O	348506	SR	0.36	0.26	0.02	-0.21	0.26	-0.12	0.4
A-B	32	L	264004	SR	0.45	0.41	-0.19	0.41	-0.18	-0.14	0.4
A-B	33	L	79603	SR	0.29	0.25	-0.04	0.25	-0.15	-0.06	0.5
A-B	36	L	108473	SR	0.43	0.40	-0.19	-0.10	0.40	-0.21	0.5
A-B	37	L	108435	SR	0.59	0.45	-0.25	-0.15	-0.23	0.45	0.5
A-B	38	L	263982	SR	0.24	0.14	0.25	-0.26	-0.15	0.14	0.5
A-B	39	O	108350	SR	0.38	0.48	-0.17	-0.18	-0.23	0.48	0.5
A-B	41	L	51764	SR	0.47	0.38	-0.26	0.38	-0.11	-0.14	0.5
A-B	42	L	381728	SR	0.66	0.34	-0.16	0.34	-0.17	-0.16	0.5
A-B	43	L	297151	SR	0.63	0.49	0.49	-0.28	-0.25	-0.16	0.6

Table A.3 Item Statistics, Operational Items: MD HSA Government—January 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
A-B	47	L	64968	SR	0.45	0.34	0.34	-0.22	-0.05	-0.14	0.6
A-B	48	L	296514	SR	0.38	0.43	-0.02	0.43	-0.29	-0.22	0.6
A-B	49	L	296515	SR	0.33	0.23	-0.13	0.05	-0.20	0.23	0.7
A-B	50	L	257004	SR	0.26	0.36	-0.15	-0.03	0.36	-0.17	0.7
A-B	52	O	52270	SR	0.37	0.40	0.40	-0.24	-0.08	-0.14	0.8
A-B	53	L	297126	SR	0.24	0.16	0.04	0.16	-0.06	-0.12	0.8
A-B	54	L	297125	SR	0.29	0.23	0.23	-0.06	-0.13	-0.05	0.8
A-B	55	O	60461	SR	0.36	0.27	0.27	-0.20	-0.16	0.04	0.9
A-B	56	O	79672	SR	0.32	0.38	-0.05	-0.13	-0.21	0.38	0.9
A-B	57	L	64803	SR	0.36	0.45	0.45	-0.27	-0.18	-0.03	0.7
A-B	58	L	297429	SR	0.59	0.37	-0.25	-0.09	0.37	-0.15	0.8
A-B	59	L	296523	SR	0.25	0.32	0.01	-0.12	-0.19	0.32	0.8
A-B	60	L	296581	SR	0.65	0.37	-0.16	0.37	-0.24	-0.11	0.7
A-B	63	O	257173	SR	0.52	0.41	-0.12	-0.26	0.41	-0.20	0.8
A-B	64	O	321097	SR	0.63	0.47	-0.19	0.47	-0.28	-0.19	0.8
A-B	65	L	64818	SR	0.37	0.41	-0.08	-0.20	0.41	-0.19	0.9
A-B	67	L	52280	SR	0.57	0.35	-0.15	0.35	-0.25	-0.07	0.8
A-B	68	O	79656	SR	0.26	0.30	-0.22	0.30	-0.20	0.07	0.8
A-B	69	O	132975	SR	0.28	0.34	0.34	-0.08	-0.13	-0.16	0.8
A-B	70	L	339047	SR	0.48	0.43	-0.21	-0.17	0.43	-0.16	0.8
A-B	71	L	133463	SR	0.40	0.24	-0.01	0.24	-0.17	-0.11	0.8
A-B	72	O	283284	SR	0.28	0.20	0.02	-0.16	0.20	-0.04	0.8
A-B	73	L	79545	SR	0.39	0.48	-0.23	-0.21	-0.13	0.48	0.8
A-B	74	O	108441	SR	0.54	0.52	0.52	-0.28	-0.21	-0.21	0.8
A-B	75	L	79736	SR	0.49	0.44	-0.23	0.44	-0.21	-0.13	0.8
A-B	78	L	51202	SR	0.23	0.38	-0.08	-0.10	-0.16	0.38	0.9
A-B	79	L	297439	SR	0.43	0.31	-0.18	-0.16	0.31	-0.02	0.9
A-B	80	O	50978	SR	0.58	0.47	-0.26	-0.21	0.47	-0.18	0.9
A-B	81	O	108446	SR	0.44	0.51	-0.18	-0.21	0.51	-0.24	1.0
Mean (SR)					0.44	0.37	-0.03	-0.03	-0.04	-0.01	0.6
SD (SR)					0.14	0.09	0.24	0.26	0.25	0.23	0.3

Note: Tabled item position number is based on Form A and varies somewhat on Form B.
Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.4 Item Statistics, Operational Items: MD HSA Government—January 2017 Makeup 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
C	6	L	60432	CR	0.28	0.72					5.3
C	17	L	68743	CR	0.20	0.79					8.2
C	44	L	108464	CR	0.20	0.70					9.3
C	66	L	64946	CR	0.19	0.75					11.4
C	76	L	50980	CR	0.25	0.76					11.5
Mean (CR)					0.23	0.74					9.2
SD (CR)					0.04	0.04					2.6
C	1	L	363253	SR	0.55	0.44	-0.16	-0.24	-0.21	0.44	0.1
C	2	O	331402	SR	0.67	0.36	-0.17	-0.21	0.36	-0.18	0.1
C	4	L	55572	SR	0.33	0.28	-0.04	0.28	-0.22	-0.06	0.1
C	5	O	256350	SR	0.72	0.42	0.42	-0.20	-0.24	-0.21	0.1
C	7	O	51766	SR	0.40	0.37	-0.08	-0.27	0.37	-0.08	0.2
C	8	L	296497	SR	0.58	0.44	-0.22	-0.20	-0.22	0.44	0.2
C	9	L	296498	SR	0.74	0.43	0.43	-0.27	-0.18	-0.22	0.2
C	10	O	256993	SR	0.70	0.41	0.41	-0.23	-0.24	-0.16	0.3
C	11	L	52191	SR	0.63	0.49	-0.23	-0.25	-0.24	0.49	0.3
C	12	L	51210	SR	0.79	0.41	0.41	-0.22	-0.24	-0.17	0.3
C	14	O	214491	SR	0.61	0.44	-0.25	0.44	-0.23	-0.12	0.4
C	15	O	79734	SR	0.46	0.36	-0.23	-0.14	0.36	-0.10	0.4
C	16	O	108355	SR	0.64	0.51	0.51	-0.27	-0.25	-0.21	0.5
C	19	O	68504	SR	0.68	0.46	0.46	-0.27	-0.23	-0.19	0.7
C	20	O	133474	SR	0.28	0.12	0.07	-0.18	0.12	-0.12	0.7
C	21	L	271811	SR	0.48	0.36	-0.18	0.36	-0.24	-0.09	0.8
C	22	O	348539	SR	0.21	0.28	-0.12	-0.06	-0.08	0.28	0.7
C	24	L	79721	SR	0.30	0.23	0.03	-0.17	0.23	-0.11	1.0
C	25	L	348540	SR	0.38	0.43	0.43	-0.17	-0.19	-0.15	1.2
C	27	O	51134	SR	0.32	0.47	-0.22	-0.14	-0.14	0.47	1.3
C	28	O	68760	SR	0.19	0.33	0.33	-0.16	-0.04	-0.11	1.3
C	29	O	108422	SR	0.38	0.36	-0.22	0.36	-0.14	-0.05	0.4
C	30	L	348480	SR	0.44	0.42	-0.17	0.42	-0.17	-0.18	0.4
C	31	O	279775	SR	0.50	0.25	-0.18	-0.05	0.25	-0.11	0.4
C	32	L	264004	SR	0.45	0.41	-0.19	0.41	-0.18	-0.14	0.4
C	33	L	79603	SR	0.29	0.25	-0.04	0.25	-0.15	-0.06	0.5
C	36	L	108473	SR	0.43	0.40	-0.19	-0.10	0.40	-0.21	0.5
C	37	L	108435	SR	0.59	0.45	-0.25	-0.15	-0.23	0.45	0.5
C	38	L	263982	SR	0.24	0.14	0.25	-0.26	-0.15	0.14	0.5
C	39	O	214581	SR	0.34	0.39	-0.11	-0.17	0.39	-0.16	0.5
C	41	L	51764	SR	0.47	0.38	-0.26	0.38	-0.11	-0.14	0.5

Table A.4 Item Statistics, Operational Items: MD HSA Government—January 2017 Makeup 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
C	42	L	381728	SR	0.66	0.34	-0.16	0.34	-0.17	-0.16	0.5
C	43	L	297151	SR	0.63	0.49	0.49	-0.28	-0.25	-0.16	0.6
C	47	L	64968	SR	0.45	0.34	0.34	-0.22	-0.05	-0.14	0.6
C	48	L	296514	SR	0.38	0.43	-0.02	0.43	-0.29	-0.22	0.6
C	49	L	296515	SR	0.33	0.23	-0.13	0.05	-0.20	0.23	0.7
C	50	L	257004	SR	0.26	0.36	-0.15	-0.03	0.36	-0.17	0.7
C	52	O	261606	SR	0.72	0.47	0.47	-0.21	-0.27	-0.22	0.8
C	53	L	297126	SR	0.24	0.16	0.04	0.16	-0.06	-0.12	0.8
C	54	L	297125	SR	0.29	0.23	0.23	-0.06	-0.13	-0.05	0.8
C	55	O	58409	SR	0.29	0.32	-0.22	-0.04	-0.07	0.32	0.9
C	56	O	79569	SR	0.38	0.34	-0.23	0.34	-0.11	-0.08	0.9
C	57	L	64803	SR	0.36	0.45	0.45	-0.27	-0.18	-0.03	0.7
C	58	L	297429	SR	0.59	0.37	-0.25	-0.09	0.37	-0.15	0.8
C	59	L	296523	SR	0.25	0.32	0.01	-0.12	-0.19	0.32	0.8
C	60	L	296581	SR	0.65	0.37	-0.16	0.37	-0.24	-0.11	0.7
C	63	O	348484	SR	0.65	0.54	-0.23	-0.26	-0.28	0.54	0.8
C	64	O	214492	SR	0.33	0.26	-0.21	-0.17	0.26	0.08	0.9
C	65	L	64818	SR	0.37	0.41	-0.08	-0.20	0.41	-0.19	0.9
C	67	L	52280	SR	0.57	0.35	-0.15	0.35	-0.25	-0.07	0.8
C	68	O	50910	SR	0.36	0.41	0.41	-0.06	-0.25	-0.15	0.8
C	69	O	79703	SR	0.60	0.50	-0.19	-0.23	-0.27	0.50	0.7
C	70	L	339047	SR	0.48	0.43	-0.21	-0.17	0.43	-0.16	0.8
C	71	L	133463	SR	0.40	0.24	-0.01	0.24	-0.17	-0.11	0.8
C	72	O	60460	SR	0.29	0.36	-0.07	-0.16	0.36	-0.14	0.9
C	73	L	79545	SR	0.39	0.48	-0.23	-0.21	-0.13	0.48	0.8
C	74	O	339080	SR	0.39	0.37	-0.07	-0.16	0.37	-0.19	0.8
C	75	L	79736	SR	0.49	0.44	-0.23	0.44	-0.21	-0.13	0.8
C	78	L	51202	SR	0.23	0.38	-0.08	-0.10	-0.16	0.38	0.9
C	79	L	297439	SR	0.43	0.31	-0.18	-0.16	0.31	-0.02	0.9
C	80	O	339084	SR	0.43	0.32	-0.06	-0.24	0.32	-0.06	1.0
C	81	O	256354	SR	0.43	0.43	-0.12	-0.18	-0.22	0.43	1.1
Mean (SR)					0.45	0.37	-0.01	-0.04	-0.05	0.00	0.6
SD (SR)					0.16	0.09	0.25	0.24	0.24	0.24	0.3

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.5 Item Statistics, Operational Items: MD HSA Biology—May 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
D-F	1	L	192081	SR	0.83	0.42	-0.19	0.42	-0.22	-0.28	0.0
D-F	2	O	392441	SR	0.55	0.47	0.47	-0.28	-0.22	-0.16	0.1
D-F	3	O	57054	SR	0.57	0.51	-0.24	-0.17	0.51	-0.36	0.1
D-F	5	L	414805	SR	0.79	0.43	-0.16	-0.29	-0.24	0.43	0.1
D-F	6	L	414807	SR	0.79	0.46	0.46	-0.21	-0.31	-0.21	0.1
D-F	7	L	332049	SR	0.7	0.48	-0.22	0.48	-0.28	-0.23	0.1
D-F	8	L	332048	SR	0.67	0.48	-0.24	-0.28	-0.21	0.48	0.1
D-F	9	O	263105	SR	0.55	0.42	0.42	-0.25	-0.20	-0.17	0.1
D-F	10	O	320466	SR	0.67	0.31	0.31	-0.09	-0.26	-0.11	0.1
D-F	13	L	349137	SR	0.59	0.57	0.57	-0.28	-0.31	-0.22	0.2
D-F	14	L	349136	SR	0.23	0.31	0.10	-0.29	-0.15	0.31	0.2
D-F	15	L	338789	SR	0.57	0.39	-0.25	0.39	-0.22	-0.21	0.1
D-F	16	O	271115	SR	0.62	0.45	-0.22	-0.26	0.45	-0.22	0.1
D-F	19	L	394901	SR	0.43	0.30	0.30	-0.18	-0.22	0.01	0.3
D-F	20	L	394898	SR	0.43	0.36	-0.18	-0.11	0.36	-0.24	0.2
D-F	21	O	352583	SR	0.68	0.51	-0.28	-0.29	-0.20	0.51	0.2
D-F	23	L	332083	SR	0.62	0.50	-0.25	-0.33	0.50	-0.12	0.3
D-F	24	O	332082	SR	0.44	0.53	0.53	-0.26	-0.22	-0.19	0.4
D-F	25	L	133027	SR	0.5	0.40	-0.15	0.40	-0.14	-0.24	0.4
D-F	26	L	133026	SR	0.59	0.42	-0.26	0.42	-0.24	-0.09	0.5
D-F	27	O	393882	SR	0.52	0.58	-0.23	-0.28	-0.31	0.58	0.5
D-F	28	L	108513	SR	0.73	0.51	-0.22	-0.27	-0.29	0.51	0.5
D-F	30	L	136107	SR	0.61	0.28	-0.22	0.28	-0.14	-0.09	0.7
D-F	31	L	136108	SR	0.36	0.37	0.37	-0.01	-0.26	-0.24	0.7
D-F	32	L	364194	SR	0.4	0.38	-0.11	-0.07	0.38	-0.30	0.8
D-F	33	O	68220	SR	0.71	0.50	0.50	-0.35	-0.19	-0.22	0.8
D-F	34	L	271116	SR	0.9	0.33	0.33	-0.20	-0.23	-0.12	0.1
D-F	35	O	415111	SR	0.47	0.38	0.38	-0.32	0.01	-0.13	0.2
D-F	36	L	363012	SR	0.77	0.59	-0.26	-0.41	-0.25	0.59	0.1
D-F	37	O	323299	SR	0.62	0.48	-0.18	0.48	-0.29	-0.24	0.2
D-F	38	L	323300	SR	0.78	0.53	-0.28	-0.33	0.53	-0.21	0.2
D-F	39	O	65064	SR	0.46	0.49	0.49	-0.33	-0.13	-0.16	0.2
D-F	41	L	364216	SR	0.48	0.39	0.01	0.39	-0.28	-0.24	0.2
D-F	42	L	364215	SR	0.54	0.55	-0.25	-0.24	-0.30	0.55	0.2
D-F	43	O	52557	SR	0.58	0.49	-0.16	-0.19	-0.32	0.49	0.2
D-F	44	L	279612	SR	0.57	0.53	-0.29	-0.25	0.53	-0.22	0.2
D-F	48	L	79475	SR	0.31	0.34	-0.17	-0.16	-0.05	0.34	0.2
D-F	49	L	393880	SR	0.3	0.24	-0.21	-0.29	0.24	0.11	0.2
D-F	50	L	79424	SR	0.76	0.43	-0.15	0.43	-0.31	-0.20	0.2
D-F	52	L	271075	SR	0.5	0.55	-0.26	-0.32	0.55	-0.19	0.2
D-F	53	O	271076	SR	0.4	0.30	0.30	0.03	-0.17	-0.25	0.3
D-F	56	O	416420	SR	0.35	0.18	-0.10	-0.13	0.18	0.02	0.2
D-F	57	O	65061	SR	0.57	0.45	0.45	-0.19	-0.28	-0.22	0.2

Table A.5 Item Statistics, Operational Items: MD HSA Biology—May 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
D-F	58	O	331318	SR	0.47	0.37	0.00	-0.29	-0.20	0.37	0.3
D-F	59	L	331315	SR	0.44	0.40	-0.14	-0.22	0.40	-0.15	0.3
D-F	60	O	423683	SR	0.74	0.52	-0.20	-0.29	0.52	-0.30	0.4
D-F	61	L	444362	SR	0.69	0.56	-0.22	-0.32	-0.29	0.56	0.4
D-F	63	L	271135	SR	0.45	0.47	-0.24	-0.24	-0.12	0.47	0.4
D-F	64	O	271137	SR	0.49	0.48	-0.13	0.48	-0.30	-0.23	0.4
D-F	65	O	67692	SR	0.52	0.48	-0.20	0.48	-0.26	-0.21	0.4
D-F	66	L	279640	SR	0.71	0.51	0.51	-0.29	-0.30	-0.17	0.5
D-F	67	L	67562	SR	0.6	0.28	-0.19	-0.07	0.28	-0.15	0.2
D-F	68	O	366630	SR	0.67	0.44	-0.29	-0.23	-0.16	0.44	0.3
D-F	70	O	260079	SR	0.53	0.58	-0.29	-0.19	-0.30	0.58	0.3
D-F	71	L	349067	SR	0.42	0.25	-0.24	0.03	0.25	-0.20	0.3
D-F	72	L	349068	SR	0.69	0.45	-0.22	0.45	-0.28	-0.19	0.3
D-F	73	L	364136	SR	0.4	0.39	-0.10	-0.18	-0.18	0.39	0.3
D-F	74	O	364228	SR	0.58	0.51	-0.30	-0.27	0.51	-0.15	0.3
D-F	75	L	79407	SR	0.77	0.59	0.59	-0.29	-0.39	-0.23	0.3
D-F	76	O	65062	SR	0.81	0.39	-0.30	-0.23	0.39	-0.13	0.3
D-F	80	L	352876	SR	0.48	0.31	-0.17	-0.10	0.31	-0.20	0.3
D-F	82	L	64743	SR	0.83	0.41	0.41	-0.30	-0.19	-0.14	0.3
D-F	83	L	64745	SR	0.69	0.49	-0.32	0.49	-0.29	-0.11	0.3
D-F	84	O	332028	SR	0.73	0.47	-0.27	0.47	-0.24	-0.24	0.3
D-F	85	L	332030	SR	0.63	0.48	0.48	-0.27	-0.33	-0.08	0.3
D-F	87	L	364153	SR	0.48	0.44	-0.06	-0.30	-0.34	0.44	0.3
D-F	88	O	79480	SR	0.72	0.38	-0.23	0.38	-0.25	-0.11	0.3
D-F	89	O	400671	SR	0.47	0.44	-0.18	0.44	-0.24	-0.13	0.4
D-F	90	L	400673	SR	0.66	0.51	-0.26	-0.29	0.51	-0.20	0.4
D-F	91	L	65089	SR	0.46	0.35	-0.11	0.35	-0.16	-0.17	0.3
D-F	92	L	65123	SR	0.75	0.27	-0.13	0.27	-0.20	-0.18	0.3
D-F	95	L	449650	SR	0.34	0.33	0.04	-0.21	-0.21	0.33	0.4
D-F	96	O	449648	SR	0.69	0.56	-0.30	0.56	-0.28	-0.28	0.4
D-F	97	L	214538	SR	0.69	0.53	-0.26	-0.33	0.53	-0.21	0.4
D-F	98	O	392461	SR	0.62	0.55	0.55	-0.25	-0.28	-0.33	0.4
D-F	99	L	414811	SR	0.67	0.47	-0.22	-0.32	-0.18	0.47	0.4
Mean					0.58	0.44	-0.04	-0.07	-0.07	-0.02	0.3
SD					0.15	0.09	0.29	0.30	0.30	0.29	0.2

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.6 Item Statistics, Operational Items: MD HSA Biology—May 2017 Makeup 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
X	1	L	192081	SR	0.83	0.42	-0.19	0.42	-0.22	-0.28	0.0
X	2	O	392441	SR	0.55	0.47	0.47	-0.28	-0.22	-0.16	0.1
X	3	O	279641	SR	0.74	0.31	-0.21	0.31	-0.17	-0.14	0.0
X	5	L	414805	SR	0.79	0.43	-0.16	-0.29	-0.24	0.43	0.1
X	6	L	414807	SR	0.79	0.46	0.46	-0.21	-0.31	-0.21	0.1
X	7	L	332049	SR	0.7	0.48	-0.22	0.48	-0.28	-0.23	0.1
X	8	L	332048	SR	0.67	0.48	-0.24	-0.28	-0.21	0.48	0.1
X	9	O	263105	SR	0.55	0.42	0.42	-0.25	-0.20	-0.17	0.1
X	10	O	271127	SR	0.73	0.38	-0.21	0.38	-0.15	-0.24	0.1
X	13	L	349137	SR	0.59	0.57	0.57	-0.28	-0.31	-0.22	0.2
X	14	L	349136	SR	0.23	0.31	0.10	-0.29	-0.15	0.31	0.2
X	15	L	338789	SR	0.57	0.39	-0.25	0.39	-0.22	-0.21	0.1
X	16	O	271115	SR	0.62	0.45	-0.22	-0.26	0.45	-0.22	0.1
X	19	L	394901	SR	0.43	0.30	0.30	-0.18	-0.22	0.01	0.3
X	20	L	394898	SR	0.43	0.36	-0.18	-0.11	0.36	-0.24	0.2
X	21	O	288201	SR	0.62	0.50	-0.23	0.50	-0.23	-0.27	0.3
X	23	L	332083	SR	0.62	0.50	-0.25	-0.33	0.50	-0.12	0.3
X	24	O	332081	SR	0.51	0.38	-0.18	0.38	-0.18	-0.16	0.4
X	25	L	133027	SR	0.5	0.40	-0.15	0.40	-0.14	-0.24	0.4
X	26	L	133026	SR	0.59	0.42	-0.26	0.42	-0.24	-0.09	0.5
X	27	O	393882	SR	0.52	0.58	-0.23	-0.28	-0.31	0.58	0.5
X	28	L	108513	SR	0.73	0.51	-0.22	-0.27	-0.29	0.51	0.5
X	30	L	136107	SR	0.61	0.28	-0.22	0.28	-0.14	-0.09	0.7
X	31	L	136108	SR	0.36	0.37	0.37	-0.01	-0.26	-0.24	0.7
X	32	L	364194	SR	0.4	0.38	-0.11	-0.07	0.38	-0.30	0.8
X	33	O	223409	SR	0.72	0.35	0.35	-0.22	-0.16	-0.16	0.9
X	34	L	271116	SR	0.9	0.33	0.33	-0.20	-0.23	-0.12	0.1
X	35	O	415111	SR	0.47	0.38	0.38	-0.32	0.01	-0.13	0.2
X	36	L	363012	SR	0.77	0.59	-0.26	-0.41	-0.25	0.59	0.1
X	37	O	323298	SR	0.56	0.40	0.40	-0.09	-0.26	-0.20	0.2
X	38	L	323300	SR	0.78	0.53	-0.28	-0.33	0.53	-0.21	0.2
X	39	O	392449	SR	0.37	0.62	-0.19	-0.32	-0.23	0.62	0.2
X	41	L	364216	SR	0.48	0.39	0.01	0.39	-0.28	-0.24	0.2
X	42	L	364215	SR	0.54	0.55	-0.25	-0.24	-0.30	0.55	0.2
X	43	O	68295	SR	0.55	0.49	-0.16	-0.27	-0.27	0.49	0.2
X	44	L	279612	SR	0.57	0.53	-0.29	-0.25	0.53	-0.22	0.2
X	48	L	79475	SR	0.31	0.34	-0.17	-0.16	-0.05	0.34	0.2
X	49	L	393880	SR	0.3	0.24	-0.21	-0.29	0.24	0.11	0.2
X	50	L	79424	SR	0.76	0.43	-0.15	0.43	-0.31	-0.20	0.2
X	52	L	271075	SR	0.5	0.55	-0.26	-0.32	0.55	-0.19	0.2
X	53	O	271076	SR	0.4	0.30	0.30	0.03	-0.17	-0.25	0.3
X	56	O	416420	SR	0.35	0.18	-0.10	-0.13	0.18	0.02	0.2

Table A.6 Item Statistics, Operational Items: MD HSA Biology—May 2017 Makeup 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
X	57	O	65061	SR	0.57	0.45	0.45	-0.19	-0.28	-0.22	0.2
X	58	O	331318	SR	0.47	0.37	0.00	-0.29	-0.20	0.37	0.3
X	59	L	331315	SR	0.44	0.40	-0.14	-0.22	0.40	-0.15	0.3
X	60	O	423681	SR	0.7	0.50	-0.23	-0.29	0.50	-0.23	0.4
X	61	L	444362	SR	0.69	0.56	-0.22	-0.32	-0.29	0.56	0.4
X	63	L	271135	SR	0.45	0.47	-0.24	-0.24	-0.12	0.47	0.4
X	64	O	271136	SR	0.54	0.39	-0.15	-0.23	0.39	-0.15	0.5
X	65	O	271099	SR	0.56	0.47	-0.26	-0.24	-0.23	0.47	0.5
X	66	L	279640	SR	0.71	0.51	0.51	-0.29	-0.30	-0.17	0.5
X	67	L	67562	SR	0.6	0.28	-0.19	-0.07	0.28	-0.15	0.2
X	68	O	364150	SR	0.65	0.34	-0.21	0.34	-0.21	-0.20	0.3
X	70	O	260079	SR	0.53	0.58	-0.29	-0.19	-0.30	0.58	0.3
X	71	L	349067	SR	0.42	0.25	-0.24	0.03	0.25	-0.20	0.3
X	72	L	349068	SR	0.69	0.45	-0.22	0.45	-0.28	-0.19	0.3
X	73	L	364136	SR	0.4	0.39	-0.10	-0.18	-0.18	0.39	0.3
X	74	O	364228	SR	0.58	0.51	-0.30	-0.27	0.51	-0.15	0.3
X	75	L	79407	SR	0.77	0.59	0.59	-0.29	-0.39	-0.23	0.3
X	76	O	65062	SR	0.81	0.39	-0.30	-0.23	0.39	-0.13	0.3
X	80	L	352876	SR	0.48	0.31	-0.17	-0.10	0.31	-0.20	0.3
X	82	L	64743	SR	0.83	0.41	0.41	-0.30	-0.19	-0.14	0.3
X	83	L	64745	SR	0.69	0.49	-0.32	0.49	-0.29	-0.11	0.3
X	84	O	332028	SR	0.73	0.47	-0.27	0.47	-0.24	-0.24	0.3
X	85	L	332030	SR	0.63	0.48	0.48	-0.27	-0.33	-0.08	0.3
X	87	L	364153	SR	0.48	0.44	-0.06	-0.30	-0.34	0.44	0.3
X	88	O	67860	SR	0.8	0.43	-0.21	0.43	-0.25	-0.21	0.3
X	89	O	400670	SR	0.7	0.57	0.57	-0.35	-0.32	-0.16	0.4
X	90	L	400673	SR	0.66	0.51	-0.26	-0.29	0.51	-0.20	0.4
X	91	L	65089	SR	0.46	0.35	-0.11	0.35	-0.16	-0.17	0.3
X	92	L	65123	SR	0.75	0.27	-0.13	0.27	-0.20	-0.18	0.3
X	95	L	449650	SR	0.34	0.33	0.04	-0.21	-0.21	0.33	0.4
X	96	O	449648	SR	0.69	0.56	-0.30	0.56	-0.28	-0.28	0.4
X	97	L	214538	SR	0.69	0.53	-0.26	-0.33	0.53	-0.21	0.4
X	98	O	279584	SR	0.64	0.54	0.54	-0.24	-0.28	-0.28	0.4
X	99	L	414811	SR	0.67	0.47	-0.22	-0.32	-0.18	0.47	0.4
Mean					0.59	0.43	-0.04	-0.07	-0.07	-0.02	0.3
SD					0.15	0.10	0.29	0.30	0.29	0.30	0.2

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.7 Item Statistics, Operational Items: MD HSA Biology—May 2017 Makeup 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Y	1	L	192081	SR	0.83	0.42	-0.19	0.42	-0.22	-0.28	0.0
Y	2	O	393868	SR	0.74	0.43	-0.21	-0.32	0.43	-0.16	0.1
Y	3	O	57054	SR	0.57	0.51	-0.24	-0.17	0.51	-0.36	0.1
Y	5	L	414805	SR	0.79	0.43	-0.16	-0.29	-0.24	0.43	0.1
Y	6	L	414807	SR	0.79	0.46	0.46	-0.21	-0.31	-0.21	0.1
Y	7	L	332049	SR	0.7	0.48	-0.22	0.48	-0.28	-0.23	0.1
Y	8	L	332048	SR	0.67	0.48	-0.24	-0.28	-0.21	0.48	0.1
Y	9	O	353194	SR	0.53	0.43	0.43	-0.25	-0.25	-0.16	0.1
Y	10	O	320466	SR	0.67	0.31	0.31	-0.09	-0.26	-0.11	0.1
Y	13	L	349137	SR	0.59	0.57	0.57	-0.28	-0.31	-0.22	0.2
Y	14	L	349136	SR	0.23	0.31	0.10	-0.29	-0.15	0.31	0.2
Y	15	L	338789	SR	0.57	0.39	-0.25	0.39	-0.22	-0.21	0.1
Y	16	O	271101	SR	0.73	0.36	-0.22	-0.13	0.36	-0.20	0.2
Y	19	L	394901	SR	0.43	0.30	0.30	-0.18	-0.22	0.01	0.3
Y	20	L	394898	SR	0.43	0.36	-0.18	-0.11	0.36	-0.24	0.2
Y	21	O	352583	SR	0.68	0.51	-0.28	-0.29	-0.20	0.51	0.2
Y	23	L	332083	SR	0.62	0.50	-0.25	-0.33	0.50	-0.12	0.3
Y	24	O	332082	SR	0.44	0.53	0.53	-0.26	-0.22	-0.19	0.4
Y	25	L	133027	SR	0.5	0.40	-0.15	0.40	-0.14	-0.24	0.4
Y	26	L	133026	SR	0.59	0.42	-0.26	0.42	-0.24	-0.09	0.5
Y	27	O	108552	SR	0.43	0.43	0.43	-0.29	-0.15	-0.08	0.8
Y	28	L	108513	SR	0.73	0.51	-0.22	-0.27	-0.29	0.51	0.5
Y	30	L	136107	SR	0.61	0.28	-0.22	0.28	-0.14	-0.09	0.7
Y	31	L	136108	SR	0.36	0.37	0.37	-0.01	-0.26	-0.24	0.7
Y	32	L	364194	SR	0.4	0.38	-0.11	-0.07	0.38	-0.30	0.8
Y	33	O	68220	SR	0.71	0.50	0.50	-0.35	-0.19	-0.22	0.8
Y	34	L	271116	SR	0.9	0.33	0.33	-0.20	-0.23	-0.12	0.1
Y	35	O	322177	SR	0.32	0.47	-0.18	-0.31	-0.10	0.47	0.1
Y	36	L	363012	SR	0.77	0.59	-0.26	-0.41	-0.25	0.59	0.1
Y	37	O	323299	SR	0.62	0.48	-0.18	0.48	-0.29	-0.24	0.2
Y	38	L	323300	SR	0.78	0.53	-0.28	-0.33	0.53	-0.21	0.2
Y	39	O	65064	SR	0.46	0.49	0.49	-0.33	-0.13	-0.16	0.2
Y	41	O	364213	SR	0.27	0.40	0.00	-0.31	0.40	-0.08	0.2
Y	42	L	364215	SR	0.54	0.55	-0.25	-0.24	-0.30	0.55	0.2
Y	43	O	52557	SR	0.58	0.49	-0.16	-0.19	-0.32	0.49	0.2
Y	44	L	279612	SR	0.57	0.53	-0.29	-0.25	0.53	-0.22	0.2
Y	48	L	79475	SR	0.31	0.34	-0.17	-0.16	-0.05	0.34	0.2
Y	49	L	393880	SR	0.3	0.24	-0.21	-0.29	0.24	0.11	0.2
Y	50	L	79424	SR	0.76	0.43	-0.15	0.43	-0.31	-0.20	0.2
Y	52	L	271075	SR	0.5	0.55	-0.26	-0.32	0.55	-0.19	0.2
Y	53	O	271073	SR	0.43	0.46	0.46	-0.14	-0.33	-0.13	0.2
Y	56	O	241127	SR	0.38	0.20	-0.10	0.20	-0.03	-0.12	0.3

Table A.7 Item Statistics, Operational Items: MD HSA Biology—May 2017 Makeup 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Y	57	O	57103	SR	0.52	0.51	-0.17	-0.30	-0.29	0.51	0.3
Y	58	O	331317	SR	0.55	0.46	-0.13	0.46	-0.27	-0.21	0.4
Y	59	L	331315	SR	0.44	0.40	-0.14	-0.22	0.40	-0.15	0.3
Y	60	O	423683	SR	0.74	0.52	-0.20	-0.29	0.52	-0.30	0.4
Y	61	L	444362	SR	0.69	0.56	-0.22	-0.32	-0.29	0.56	0.4
Y	63	L	271135	SR	0.45	0.47	-0.24	-0.24	-0.12	0.47	0.4
Y	64	O	271137	SR	0.49	0.48	-0.13	0.48	-0.30	-0.23	0.4
Y	65	O	67692	SR	0.52	0.48	-0.20	0.48	-0.26	-0.21	0.4
Y	66	L	279640	SR	0.71	0.51	0.51	-0.29	-0.30	-0.17	0.5
Y	67	L	67562	SR	0.6	0.28	-0.19	-0.07	0.28	-0.15	0.2
Y	68	O	366630	SR	0.67	0.44	-0.29	-0.23	-0.16	0.44	0.3
Y	70	O	67611	SR	0.53	0.56	-0.27	-0.20	-0.29	0.56	0.3
Y	71	L	349067	SR	0.42	0.25	-0.24	0.03	0.25	-0.20	0.3
Y	72	L	349068	SR	0.69	0.45	-0.22	0.45	-0.28	-0.19	0.3
Y	73	L	364136	SR	0.4	0.39	-0.10	-0.18	-0.18	0.39	0.3
Y	74	O	364135	SR	0.52	0.34	0.34	-0.12	-0.21	-0.16	0.3
Y	75	L	79407	SR	0.77	0.59	0.59	-0.29	-0.39	-0.23	0.3
Y	76	O	65054	SR	0.83	0.50	-0.26	0.50	-0.32	-0.21	0.3
Y	80	L	352876	SR	0.48	0.31	-0.17	-0.10	0.31	-0.20	0.3
Y	82	L	64743	SR	0.83	0.41	0.41	-0.30	-0.19	-0.14	0.3
Y	83	L	64745	SR	0.69	0.49	-0.32	0.49	-0.29	-0.11	0.3
Y	84	O	332031	SR	0.73	0.53	-0.25	-0.31	0.53	-0.24	0.3
Y	85	L	332030	SR	0.63	0.48	0.48	-0.27	-0.33	-0.08	0.3
Y	87	L	364153	SR	0.48	0.44	-0.06	-0.30	-0.34	0.44	0.3
Y	88	O	79480	SR	0.72	0.38	-0.23	0.38	-0.25	-0.11	0.3
Y	89	O	400671	SR	0.47	0.44	-0.18	0.44	-0.24	-0.13	0.4
Y	90	L	400673	SR	0.66	0.51	-0.26	-0.29	0.51	-0.20	0.4
Y	91	L	65089	SR	0.46	0.35	-0.11	0.35	-0.16	-0.17	0.3
Y	92	L	65123	SR	0.75	0.27	-0.13	0.27	-0.20	-0.18	0.3
Y	95	L	449650	SR	0.34	0.33	0.04	-0.21	-0.21	0.33	0.4
Y	96	O	449649	SR	0.7	0.46	-0.16	-0.28	0.46	-0.23	0.3
Y	97	L	214538	SR	0.69	0.53	-0.26	-0.33	0.53	-0.21	0.4
Y	98	O	392461	SR	0.62	0.55	0.55	-0.25	-0.28	-0.33	0.4
Y	99	L	414811	SR	0.67	0.47	-0.22	-0.32	-0.18	0.47	0.4
Mean					0.58	0.44	-0.04	-0.08	-0.06	-0.02	0.3
SD					0.15	0.09	0.29	0.30	0.31	0.29	0.2

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.8 Item Statistics, Operational Items: MD HSA Government—May 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
D-F	6	L	65163	CR	0.40	0.70					2.2
D-F	17	L	51141	CR	0.40	0.80					4.8
D-F	44	L	79613	CR	0.32	0.84					5.8
D-F	66	L	51254	CR	0.36	0.79					5.9
D-F	76	L	51031	CR	0.38	0.80					6.0
Mean (CR)					0.37	0.79					4.9
SD (CR)					0.03	0.05					1.6
D-F	1	O	348508	SR	0.68	0.49	0.49	-0.28	-0.18	-0.28	0.1
D-F	2	L	79617	SR	0.39	0.30	0.30	-0.27	0.05	-0.24	0.1
D-F	4	L	51130	SR	0.5	0.21	-0.12	0.00	0.21	-0.22	0.1
D-F	5	L	68734	SR	0.74	0.50	-0.26	0.50	-0.29	-0.24	0.1
D-F	7	O	68552	SR	0.55	0.45	0.45	-0.17	-0.12	-0.31	0.1
D-F	8	O	79669	SR	0.58	0.51	0.51	-0.32	-0.22	-0.19	0.1
D-F	9	L	55632	SR	0.82	0.46	-0.23	-0.33	0.46	-0.16	0.1
D-F	10	L	256341	SR	0.63	0.37	-0.25	-0.23	0.37	-0.09	0.1
D-F	11	O	279792	SR	0.54	0.24	-0.08	-0.14	-0.13	0.24	0.2
D-F	12	O	108482	SR	0.6	0.34	0.34	-0.14	-0.21	-0.14	0.3
D-F	14	L	324388	SR	0.75	0.49	-0.28	0.49	-0.25	-0.24	0.2
D-F	15	L	348449	SR	0.71	0.40	-0.21	0.40	-0.20	-0.19	0.2
D-F	16	O	51139	SR	0.72	0.36	-0.14	-0.24	0.36	-0.18	0.2
D-F	19	L	79743	SR	0.6	0.29	0.29	-0.17	-0.18	-0.06	0.4
D-F	20	O	79654	SR	0.42	0.21	-0.01	0.21	-0.23	-0.09	0.5
D-F	21	O	279785	SR	0.51	0.32	-0.24	-0.25	0.32	-0.01	0.5
D-F	22	L	68620	SR	0.7	0.54	-0.31	-0.24	0.54	-0.25	0.6
D-F	24	L	68555	SR	0.79	0.55	0.55	-0.32	-0.29	-0.24	0.7
D-F	25	O	257168	SR	0.48	0.44	-0.06	-0.35	0.44	-0.20	0.8
D-F	27	L	51802	SR	0.24	0.12	0.12	-0.16	0.05	0.01	1.0
D-F	28	O	256360	SR	0.49	0.38	-0.25	-0.13	0.38	-0.09	1.1
D-F	29	L	58098	SR	0.75	0.50	-0.22	-0.32	-0.26	0.50	0.2
D-F	30	L	68769	SR	0.57	0.24	0.07	-0.29	0.24	-0.22	0.2
D-F	31	O	68701	SR	0.75	0.49	-0.27	-0.24	-0.27	0.49	0.2
D-F	32	O	51115	SR	0.72	0.55	-0.23	-0.28	-0.33	0.55	0.2
D-F	33	O	79646	SR	0.54	0.42	-0.24	0.42	-0.29	0.00	0.2
D-F	36	O	55686	SR	0.58	0.53	-0.25	-0.19	-0.30	0.53	0.2
D-F	37	L	51171	SR	0.64	0.46	-0.25	-0.20	-0.29	0.46	0.2
D-F	38	L	51170	SR	0.87	0.45	-0.22	0.45	-0.28	-0.23	0.2
D-F	39	L	51721	SR	0.33	0.17	-0.03	0.17	-0.09	-0.07	0.3
D-F	41	L	283273	SR	0.64	0.59	-0.33	-0.30	-0.27	0.59	0.2
D-F	42	O	51723	SR	0.52	0.41	0.41	-0.21	-0.23	-0.10	0.3
D-F	43	O	214482	SR	0.67	0.53	-0.10	-0.33	-0.32	0.53	0.3
D-F	45	L	321094	SR	0.86	0.44	-0.28	0.44	-0.26	-0.17	0.3
D-F	48	O	363261	SR	0.76	0.61	-0.28	-0.35	-0.31	0.61	0.4

Table A.8 Item Statistics, Operational Items: MD HSA Government—May 2017 Primary

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
D-F	49	L	52249	SR	0.38	0.21	-0.22	0.21	-0.04	-0.08	0.4
D-F	50	L	52250	SR	0.53	0.49	-0.20	0.49	-0.27	-0.23	0.5
D-F	52	L	133485	SR	0.74	0.59	-0.26	-0.29	-0.35	0.59	0.5
D-F	53	L	64807	SR	0.64	0.40	-0.23	-0.30	0.40	-0.09	0.6
D-F	54	L	79547	SR	0.64	0.57	-0.17	-0.29	-0.36	0.57	0.6
D-F	55	O	108348	SR	0.39	0.47	-0.19	-0.31	-0.13	0.47	0.6
D-F	56	L	68778	SR	0.49	0.50	0.50	-0.20	-0.24	-0.20	0.7
D-F	57	L	368636	SR	0.59	0.45	-0.21	0.45	-0.23	-0.19	0.3
D-F	58	O	331390	SR	0.35	0.34	-0.03	0.34	-0.22	-0.28	0.3
D-F	59	O	348487	SR	0.69	0.55	0.55	-0.27	-0.31	-0.26	0.3
D-F	60	L	68790	SR	0.35	0.31	-0.01	-0.20	0.31	-0.24	0.4
D-F	63	L	68089	SR	0.56	0.40	-0.28	-0.16	0.40	-0.19	0.3
D-F	64	O	370206	SR	0.74	0.59	-0.30	0.59	-0.37	-0.24	0.4
D-F	65	O	283282	SR	0.55	0.17	-0.07	0.17	-0.07	-0.10	0.4
D-F	67	L	65210	SR	0.4	0.27	-0.03	-0.08	-0.23	0.27	0.4
D-F	68	L	51200	SR	0.72	0.55	-0.31	0.55	-0.29	-0.24	0.4
D-F	69	L	108406	SR	0.75	0.42	-0.23	0.42	-0.27	-0.12	0.4
D-F	70	L	214509	SR	0.53	0.52	0.52	-0.20	-0.25	-0.26	0.4
D-F	71	O	79570	SR	0.75	0.56	-0.30	-0.30	0.56	-0.26	0.4
D-F	72	O	50840	SR	0.53	0.51	-0.27	0.51	-0.21	-0.21	0.4
D-F	73	O	68086	SR	0.39	0.41	-0.16	-0.16	-0.17	0.41	0.4
D-F	74	L	296489	SR	0.8	0.44	-0.25	-0.28	0.44	-0.17	0.4
D-F	75	L	296488	SR	0.88	0.47	-0.26	-0.28	0.47	-0.22	0.4
D-F	78	L	339036	SR	0.7	0.59	0.59	-0.32	-0.29	-0.27	0.5
D-F	79	O	215825	SR	0.62	0.57	0.57	-0.22	-0.31	-0.29	0.5
D-F	80	L	261568	SR	0.65	0.46	-0.27	0.46	-0.25	-0.14	0.5
D-F	81	L	108368	SR	0.45	0.50	0.50	-0.21	-0.28	-0.14	0.6
Mean (SR)					0.60	0.43	-0.04	-0.05	-0.08	-0.03	0.4
SD (SR)					0.15	0.12	0.30	0.31	0.29	0.29	0.2

Note: Tabled item position number is based on Form D and varies somewhat on Forms E-N.
Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.9 Item Statistics, Operational Items: MD HSA Government—May 2017 Makeup 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
X	6	L	65163	CR	0.40	0.70					2.2
X	17	L	51141	CR	0.40	0.80					4.8
X	44	L	79613	CR	0.32	0.84					5.8
X	66	L	51254	CR	0.36	0.79					5.9
X	76	L	51031	CR	0.38	0.80					6.0
Mean (CR)					0.37	0.79					4.9
SD (CR)					0.03	0.05					1.6
X	1	O	58423	SR	0.57	0.43	0.43	-0.22	-0.27	-0.16	0.0
X	2	L	79617	SR	0.39	0.30	0.30	-0.27	0.05	-0.24	0.1
X	4	L	51130	SR	0.50	0.21	-0.12	0.00	0.21	-0.22	0.1
X	5	L	68734	SR	0.74	0.50	-0.26	0.50	-0.29	-0.24	0.1
X	7	O	58147	SR	0.60	0.57	0.57	-0.23	-0.33	-0.27	0.1
X	8	O	79669	SR	0.58	0.51	0.51	-0.32	-0.22	-0.19	0.1
X	9	L	55632	SR	0.82	0.46	-0.23	-0.33	0.46	-0.16	0.1
X	10	L	256341	SR	0.63	0.37	-0.25	-0.23	0.37	-0.09	0.1
X	11	O	279792	SR	0.54	0.24	-0.08	-0.14	-0.13	0.24	0.2
X	12	O	214515	SR	0.43	0.25	-0.06	0.25	-0.20	-0.09	0.2
X	14	L	324388	SR	0.75	0.49	-0.28	0.49	-0.25	-0.24	0.2
X	15	L	348449	SR	0.71	0.40	-0.21	0.40	-0.20	-0.19	0.2
X	16	O	51139	SR	0.72	0.36	-0.14	-0.24	0.36	-0.18	0.2
X	19	L	79743	SR	0.60	0.29	0.29	-0.17	-0.18	-0.06	0.4
X	20	O	79654	SR	0.42	0.21	-0.01	0.21	-0.23	-0.09	0.5
X	21	O	321080	SR	0.48	0.53	-0.15	-0.34	0.53	-0.18	0.4
X	22	L	68620	SR	0.70	0.54	-0.31	-0.24	0.54	-0.25	0.6
X	24	L	68555	SR	0.79	0.55	0.55	-0.32	-0.29	-0.24	0.7
X	25	O	257168	SR	0.48	0.44	-0.06	-0.35	0.44	-0.20	0.8
X	27	L	51802	SR	0.24	0.12	0.12	-0.16	0.05	0.01	1.0
X	28	O	133476	SR	0.71	0.50	0.50	-0.19	-0.30	-0.26	0.9
X	29	L	58098	SR	0.75	0.50	-0.22	-0.32	-0.26	0.50	0.2
X	30	L	68769	SR	0.57	0.24	0.07	-0.29	0.24	-0.22	0.2
X	31	O	68750	SR	0.53	0.36	-0.05	-0.29	-0.21	0.36	0.2
X	32	O	51115	SR	0.72	0.55	-0.23	-0.28	-0.33	0.55	0.2
X	33	O	256342	SR	0.43	0.34	0.34	-0.06	-0.26	-0.10	0.2
X	36	O	55686	SR	0.58	0.53	-0.25	-0.19	-0.30	0.53	0.2
X	37	L	51171	SR	0.64	0.46	-0.25	-0.20	-0.29	0.46	0.2
X	38	L	51170	SR	0.87	0.45	-0.22	0.45	-0.28	-0.23	0.2
X	39	L	51721	SR	0.33	0.17	-0.03	0.17	-0.09	-0.07	0.3
X	41	L	283273	SR	0.64	0.59	-0.33	-0.30	-0.27	0.59	0.2
X	42	O	68638	SR	0.48	0.30	0.30	-0.25	-0.11	-0.02	0.3
X	43	O	214482	SR	0.67	0.53	-0.10	-0.33	-0.32	0.53	0.3
X	45	L	321094	SR	0.86	0.44	-0.28	0.44	-0.26	-0.17	0.3
X	48	O	64813	SR	0.60	0.48	0.48	-0.33	-0.14	-0.23	0.4

Table A.9 Item Statistics, Operational Items: MD HSA Government—May 2017 Makeup 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
X	49	L	52249	SR	0.38	0.21	-0.22	0.21	-0.04	-0.08	0.4
X	50	L	52250	SR	0.53	0.49	-0.20	0.49	-0.27	-0.23	0.5
X	52	L	133485	SR	0.74	0.59	-0.26	-0.29	-0.35	0.59	0.5
X	53	L	64807	SR	0.64	0.40	-0.23	-0.30	0.40	-0.09	0.6
X	54	L	79547	SR	0.64	0.57	-0.17	-0.29	-0.36	0.57	0.6
X	55	O	51042	SR	0.43	0.40	-0.16	-0.08	-0.25	0.40	0.6
X	56	L	68778	SR	0.49	0.50	0.50	-0.20	-0.24	-0.20	0.7
X	57	L	368636	SR	0.59	0.45	-0.21	0.45	-0.23	-0.19	0.3
X	58	O	79662	SR	0.58	0.45	-0.24	-0.16	-0.28	0.45	0.2
X	59	O	348487	SR	0.69	0.55	0.55	-0.27	-0.31	-0.26	0.3
X	60	L	68790	SR	0.35	0.31	-0.01	-0.20	0.31	-0.24	0.4
X	63	L	68089	SR	0.56	0.40	-0.28	-0.16	0.40	-0.19	0.3
X	64	O	370206	SR	0.74	0.59	-0.30	0.59	-0.37	-0.24	0.4
X	65	O	283282	SR	0.55	0.17	-0.07	0.17	-0.07	-0.10	0.4
X	67	L	65210	SR	0.40	0.27	-0.03	-0.08	-0.23	0.27	0.4
X	68	L	51200	SR	0.72	0.55	-0.31	0.55	-0.29	-0.24	0.4
X	69	L	108406	SR	0.75	0.42	-0.23	0.42	-0.27	-0.12	0.4
X	70	L	214509	SR	0.53	0.52	0.52	-0.20	-0.25	-0.26	0.4
X	71	O	79570	SR	0.75	0.56	-0.30	-0.30	0.56	-0.26	0.4
X	72	O	214481	SR	0.52	0.50	-0.26	0.50	-0.27	-0.20	0.4
X	73	O	271834	SR	0.44	0.42	-0.19	-0.09	-0.25	0.42	0.4
X	74	L	296489	SR	0.80	0.44	-0.25	-0.28	0.44	-0.17	0.4
X	75	L	296488	SR	0.88	0.47	-0.26	-0.28	0.47	-0.22	0.4
X	78	L	339036	SR	0.70	0.59	0.59	-0.32	-0.29	-0.27	0.5
X	79	O	215825	SR	0.62	0.57	0.57	-0.22	-0.31	-0.29	0.5
X	80	L	261568	SR	0.65	0.46	-0.27	0.46	-0.25	-0.14	0.5
X	81	L	108368	SR	0.45	0.50	0.50	-0.21	-0.28	-0.14	0.6
Mean (SR)					0.60	0.43	-0.01	-0.06	-0.09	-0.04	0.4
SD (SR)					0.14	0.12	0.31	0.30	0.29	0.28	0.2

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.10 Item Statistics, Operational Items: MD HSA Government—May 2017 Makeup 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Y	6	L	65163	CR	0.40	0.70					2.2
Y	17	L	51141	CR	0.40	0.80					4.8
Y	44	L	79613	CR	0.32	0.84					5.8
Y	66	L	51254	CR	0.36	0.79					5.9
Y	76	L	51031	CR	0.38	0.80					6.0
Mean (CR)					0.37	0.79					4.9
SD (CR)					0.03	0.05					1.6
Y	1	O	348508	SR	0.68	0.49	0.49	-0.28	-0.18	-0.28	0.1
Y	2	L	79617	SR	0.39	0.30	0.30	-0.27	0.05	-0.24	0.1
Y	4	L	51130	SR	0.50	0.21	-0.12	0.00	0.21	-0.22	0.1
Y	5	L	68734	SR	0.74	0.50	-0.26	0.50	-0.29	-0.24	0.1
Y	7	O	68552	SR	0.55	0.45	0.45	-0.17	-0.12	-0.31	0.1
Y	8	O	79668	SR	0.55	0.42	-0.18	-0.14	-0.27	0.42	0.1
Y	9	L	55632	SR	0.82	0.46	-0.23	-0.33	0.46	-0.16	0.1
Y	10	L	256341	SR	0.63	0.37	-0.25	-0.23	0.37	-0.09	0.1
Y	11	O	68558	SR	0.59	0.51	-0.28	-0.22	-0.23	0.51	0.1
Y	12	O	108482	SR	0.60	0.34	0.34	-0.14	-0.21	-0.14	0.3
Y	14	L	324388	SR	0.75	0.49	-0.28	0.49	-0.25	-0.24	0.2
Y	15	L	348449	SR	0.71	0.40	-0.21	0.40	-0.20	-0.19	0.2
Y	16	O	296476	SR	0.86	0.41	-0.21	-0.23	0.41	-0.23	0.3
Y	19	L	79743	SR	0.60	0.29	0.29	-0.17	-0.18	-0.06	0.4
Y	20	O	241960	SR	0.55	0.40	-0.17	-0.17	-0.21	0.40	0.5
Y	21	O	279785	SR	0.51	0.32	-0.24	-0.25	0.32	-0.01	0.5
Y	22	L	68620	SR	0.70	0.54	-0.31	-0.24	0.54	-0.25	0.6
Y	24	L	68555	SR	0.79	0.55	0.55	-0.32	-0.29	-0.24	0.7
Y	25	O	302857	SR	0.36	0.39	-0.17	-0.07	-0.23	0.39	0.9
Y	27	L	51802	SR	0.24	0.12	0.12	-0.16	0.05	0.01	1.0
Y	28	O	256360	SR	0.49	0.38	-0.25	-0.13	0.38	-0.09	1.1
Y	29	L	58098	SR	0.75	0.50	-0.22	-0.32	-0.26	0.50	0.2
Y	30	L	68769	SR	0.57	0.24	0.07	-0.29	0.24	-0.22	0.2
Y	31	O	68701	SR	0.75	0.49	-0.27	-0.24	-0.27	0.49	0.2
Y	32	O	55666	SR	0.63	0.53	-0.26	-0.31	-0.23	0.53	0.1
Y	33	O	79646	SR	0.54	0.42	-0.24	0.42	-0.29	0.00	0.2
Y	36	O	58396	SR	0.60	0.51	-0.29	0.51	-0.24	-0.22	0.1
Y	37	L	51171	SR	0.64	0.46	-0.25	-0.20	-0.29	0.46	0.2
Y	38	L	51170	SR	0.87	0.45	-0.22	0.45	-0.28	-0.23	0.2
Y	39	L	51721	SR	0.33	0.17	-0.03	0.17	-0.09	-0.07	0.3
Y	41	L	283273	SR	0.64	0.59	-0.33	-0.30	-0.27	0.59	0.2
Y	42	O	51723	SR	0.52	0.41	0.41	-0.21	-0.23	-0.10	0.3
Y	43	O	215822	SR	0.88	0.52	0.52	-0.28	-0.33	-0.24	0.1
Y	45	L	321094	SR	0.86	0.44	-0.28	0.44	-0.26	-0.17	0.3

Table A.10 Item Statistics, Operational Items: MD HSA Government—May 2017 Makeup 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Y	48	O	363261	SR	0.76	0.61	-0.28	-0.35	-0.31	0.61	0.4
Y	49	L	52249	SR	0.38	0.21	-0.22	0.21	-0.04	-0.08	0.4
Y	50	L	52250	SR	0.53	0.49	-0.20	0.49	-0.27	-0.23	0.5
Y	52	L	133485	SR	0.74	0.59	-0.26	-0.29	-0.35	0.59	0.5
Y	53	L	64807	SR	0.64	0.40	-0.23	-0.30	0.40	-0.09	0.6
Y	54	L	79547	SR	0.64	0.57	-0.17	-0.29	-0.36	0.57	0.6
Y	55	O	108348	SR	0.39	0.47	-0.19	-0.31	-0.13	0.47	0.6
Y	56	L	68778	SR	0.49	0.50	0.50	-0.20	-0.24	-0.20	0.7
Y	57	L	368636	SR	0.59	0.45	-0.21	0.45	-0.23	-0.19	0.3
Y	58	O	331390	SR	0.35	0.34	-0.03	0.34	-0.22	-0.28	0.3
Y	59	O	370239	SR	0.53	0.46	-0.26	0.46	-0.24	-0.17	0.2
Y	60	L	68790	SR	0.35	0.31	-0.01	-0.20	0.31	-0.24	0.4
Y	63	L	68089	SR	0.56	0.40	-0.28	-0.16	0.40	-0.19	0.3
Y	64	O	60448	SR	0.67	0.60	-0.27	-0.31	-0.33	0.60	0.3
Y	65	O	283281	SR	0.43	0.33	-0.12	0.33	-0.20	-0.08	0.2
Y	67	L	65210	SR	0.40	0.27	-0.03	-0.08	-0.23	0.27	0.4
Y	68	L	51200	SR	0.72	0.55	-0.31	0.55	-0.29	-0.24	0.4
Y	69	L	108406	SR	0.75	0.42	-0.23	0.42	-0.27	-0.12	0.4
Y	70	L	214509	SR	0.53	0.52	0.52	-0.20	-0.25	-0.26	0.4
Y	71	O	108347	SR	0.75	0.48	-0.27	0.48	-0.23	-0.26	0.3
Y	72	O	50840	SR	0.53	0.51	-0.27	0.51	-0.21	-0.21	0.4
Y	73	O	68086	SR	0.39	0.41	-0.16	-0.16	-0.17	0.41	0.4
Y	74	L	296489	SR	0.80	0.44	-0.25	-0.28	0.44	-0.17	0.4
Y	75	L	296488	SR	0.88	0.47	-0.26	-0.28	0.47	-0.22	0.4
Y	78	L	339036	SR	0.70	0.59	0.59	-0.32	-0.29	-0.27	0.5
Y	79	O	214582	SR	0.60	0.54	0.54	-0.35	-0.23	-0.19	0.4
Y	80	L	261568	SR	0.65	0.46	-0.27	0.46	-0.25	-0.14	0.5
Y	81	L	108368	SR	0.45	0.50	0.50	-0.21	-0.28	-0.14	0.6
Mean (SR)					0.60	0.43	-0.07	-0.03	-0.10	-0.01	0.3
SD (SR)					0.16	0.11	0.29	0.32	0.26	0.31	0.2

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.11 Item Statistics, Operational Items: MD HSA Biology—Summer 2017 Primary 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
P	1	O	108519	SR	0.49	0.24	-0.09	0.24	-0.11	-0.13	0.0
P	2	L	133059	SR	0.41	0.28	-0.11	0.28	-0.25	0.01	0.2
P	3	O	133419	SR	0.40	0.50	0.50	-0.24	-0.25	-0.12	0.0
P	4	L	133445	SR	0.34	0.28	-0.06	-0.12	-0.16	0.28	0.2
P	5	O	68216	SR	0.53	0.32	0.32	-0.21	-0.05	-0.14	0.6
P	6	L	349118	SR	0.39	0.28	-0.09	0.28	-0.17	-0.07	0.5
P	9	L	52593	SR	0.46	0.26	0.26	-0.22	-0.10	-0.01	0.2
P	10	L	52594	SR	0.47	0.37	-0.17	-0.26	0.37	-0.02	0.2
P	11	O	323349	SR	0.55	0.26	0.00	-0.14	-0.20	0.26	0.6
P	12	O	395769	SR	0.22	0.05	0.05	0.32	-0.21	-0.27	0.6
P	13	L	338790	SR	0.53	0.38	-0.20	0.38	-0.14	-0.19	0.5
P	14	L	338796	SR	0.54	0.36	-0.16	-0.14	-0.18	0.36	0.2
P	16	L	54995	SR	0.40	0.12	-0.09	0.12	-0.05	0.01	0.2
P	17	L	57018	SR	0.42	0.38	-0.21	0.38	-0.18	-0.09	0.5
P	18	L	363006	SR	0.29	0.16	-0.15	0.01	0.16	-0.03	0.5
P	19	L	133015	SR	0.41	0.32	0.00	-0.17	-0.25	0.32	0.5
P	20	L	133016	SR	0.26	0.32	-0.14	-0.17	-0.02	0.32	1.0
P	23	O	398165	SR	0.19	0.11	-0.08	-0.08	0.08	0.11	0.6
P	24	L	398166	SR	0.53	0.42	-0.14	-0.16	0.42	-0.23	1.2
P	27	O	392471	SR	0.31	0.19	0.19	-0.10	-0.15	0.09	0.6
P	28	O	214535	SR	0.36	0.12	-0.22	-0.12	0.12	0.14	1.3
P	29	O	331336	SR	0.31	0.21	0.21	-0.23	0.06	-0.04	1.3
P	30	L	331338	SR	0.18	0.13	-0.09	0.04	-0.05	0.13	1.5
P	31	O	395754	SR	0.36	0.13	0.03	0.13	-0.17	0.02	1.3
P	32	L	395752	SR	0.59	0.35	0.35	-0.20	-0.16	-0.12	1.5
P	33	O	67672	SR	0.40	0.43	0.43	-0.24	-0.15	-0.13	1.3
P	34	L	108599	SR	0.45	0.35	-0.20	-0.17	0.35	-0.03	0.5
P	35	L	79418	SR	0.50	0.30	0.30	-0.17	-0.20	-0.02	0.5
P	36	O	108637	SR	0.35	0.19	0.07	0.19	-0.14	-0.15	0.6
P	37	L	108630	SR	0.28	0.31	-0.17	-0.16	0.00	0.31	0.5
P	38	L	271097	SR	0.35	0.35	-0.05	-0.11	-0.23	0.35	0.5
P	39	O	271143	SR	0.29	0.16	-0.04	-0.13	0.16	0.05	0.6
P	43	O	67660	SR	0.37	0.50	-0.26	-0.17	-0.14	0.50	0.6
P	45	L	214533	SR	0.36	0.42	-0.16	-0.10	-0.21	0.42	0.5
P	46	L	52683	SR	0.33	0.13	-0.12	0.13	-0.21	0.14	0.5
P	47	L	52684	SR	0.17	0.32	-0.04	-0.20	-0.02	0.32	0.7
P	48	L	94193	SR	0.29	0.10	-0.08	0.02	0.10	-0.04	0.5
P	50	O	79429	SR	0.28	0.24	0.24	-0.07	-0.10	-0.04	0.6
P	51	O	52687	SR	0.32	0.40	-0.18	0.40	-0.17	-0.05	1.3
P	52	L	55066	SR	0.34	0.38	-0.04	-0.22	-0.14	0.38	0.7
P	53	L	296119	SR	0.33	0.44	0.44	-0.13	-0.24	-0.08	0.7

Table A.11 Item Statistics, Operational Items: MD HSA Biology—Summer 2017 Primary 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
P	54	L	296120	SR	0.48	0.39	-0.09	0.39	-0.22	-0.16	1.0
P	55	L	279652	SR	0.45	0.23	-0.06	0.23	-0.08	-0.11	0.7
P	57	L	286698	SR	0.28	-0.01	0.07	-0.10	-0.01	0.07	0.7
P	58	L	286699	SR	0.22	0.24	0.24	0.03	-0.18	-0.13	0.7
P	59	L	369425	SR	0.39	0.33	0.33	-0.20	-0.23	0.08	0.7
P	60	O	338761	SR	0.32	0.44	-0.05	-0.17	-0.23	0.44	1.3
P	63	O	64987	SR	0.19	0.24	-0.08	0.06	-0.15	0.24	1.3
P	64	O	57123	SR	0.48	0.16	-0.02	-0.09	0.16	-0.03	1.3
P	65	L	398053	SR	0.29	0.37	0.37	-0.18	-0.11	-0.09	1.0
P	66	L	398077	SR	0.39	0.38	0.38	-0.17	-0.17	-0.08	0.7
P	67	O	363170	SR	0.40	0.32	-0.09	-0.10	0.32	-0.16	0.6
P	68	O	68247	SR	0.58	0.38	0.38	-0.21	-0.20	-0.03	1.3
P	69	O	256517	SR	0.56	0.52	-0.16	0.52	-0.26	-0.23	1.3
P	70	L	256515	SR	0.28	0.33	-0.03	-0.10	-0.19	0.33	0.7
P	72	O	322198	SR	0.53	0.20	-0.11	0.20	-0.06	-0.04	1.3
P	73	O	394751	SR	0.29	0.27	0.27	-0.06	-0.19	0.02	1.3
P	74	L	394754	SR	0.36	0.28	-0.05	-0.12	0.28	-0.11	0.7
P	76	L	323338	SR	0.40	0.26	-0.01	-0.23	0.26	-0.05	0.7
P	77	O	65063	SR	0.30	0.20	0.20	0.02	-0.04	-0.13	1.3
P	78	L	322143	SR	0.35	0.41	0.01	-0.23	-0.19	0.41	1.0
P	79	L	322141	SR	0.35	0.24	-0.04	0.24	-0.07	-0.15	0.7
P	80	O	392661	SR	0.33	0.32	0.32	-0.20	-0.07	-0.01	1.3
P	81	L	64992	SR	0.22	0.17	0.09	-0.13	0.17	-0.14	0.7
P	85	L	373090	SR	0.25	0.17	0.01	-0.10	0.17	-0.05	1.0
P	86	L	373088	SR	0.13	0.15	0.11	-0.04	-0.13	0.15	1.2
P	87	L	395761	SR	0.41	0.27	-0.04	-0.13	0.27	-0.11	1.0
P	88	O	395893	SR	0.32	0.46	-0.03	-0.23	-0.18	0.46	1.3
P	89	O	57113	SR	0.42	0.31	0.31	-0.10	-0.12	-0.10	1.3
P	90	O	338782	SR	0.41	0.37	0.37	-0.02	-0.22	-0.18	1.3
P	92	O	392436	SR	0.38	0.06	0.16	0.06	-0.06	-0.08	1.3
P	95	L	263129	SR	0.35	0.38	-0.14	-0.11	-0.15	0.38	1.2
P	96	L	263130	SR	0.32	0.16	-0.02	0.16	-0.07	-0.03	1.0
P	97	L	349142	SR	0.63	0.35	-0.12	-0.19	0.35	-0.16	1.2
P	98	L	394903	SR	0.56	0.38	-0.13	0.38	-0.23	-0.12	1.0
P	99	L	223404	SR	0.62	0.27	-0.12	-0.09	0.27	-0.14	1.0
Mean					0.38	0.28	0.03	-0.03	-0.06	0.03	0.8
SD					0.11	0.11	0.19	0.19	0.18	0.20	0.4

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.12 Item Statistics, Operational Items: MD HSA Biology—Summer 2017 Primary 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Q	1	O	363011	SR	0.57	0.35	-0.20	0.35	-0.20	-0.06	0.0
Q	2	L	133059	SR	0.41	0.28	-0.11	0.28	-0.25	0.01	0.2
Q	3	O	133444	SR	0.55	0.31	0.31	-0.26	-0.12	-0.06	0.0
Q	4	L	133445	SR	0.34	0.28	-0.06	-0.12	-0.16	0.28	0.2
Q	5	O	133420	SR	0.41	0.47	-0.30	-0.19	-0.10	0.47	0.0
Q	6	L	349118	SR	0.39	0.28	-0.09	0.28	-0.17	-0.07	0.5
Q	9	L	52593	SR	0.46	0.26	0.26	-0.22	-0.10	-0.01	0.2
Q	10	L	52594	SR	0.47	0.37	-0.17	-0.26	0.37	-0.02	0.2
Q	11	O	133055	SR	0.46	0.46	0.46	-0.23	-0.27	-0.15	0.0
Q	12	O	223413	SR	0.36	0.20	-0.09	0.20	-0.17	0.05	0.0
Q	13	L	338790	SR	0.53	0.38	-0.20	0.38	-0.14	-0.19	0.5
Q	14	L	338796	SR	0.54	0.36	-0.16	-0.14	-0.18	0.36	0.2
Q	16	L	54995	SR	0.40	0.12	-0.09	0.12	-0.05	0.01	0.2
Q	17	L	57018	SR	0.42	0.38	-0.21	0.38	-0.18	-0.09	0.5
Q	18	L	363006	SR	0.29	0.16	-0.15	0.01	0.16	-0.03	0.5
Q	19	L	133015	SR	0.41	0.32	0.00	-0.17	-0.25	0.32	0.5
Q	20	L	133016	SR	0.26	0.32	-0.14	-0.17	-0.02	0.32	1.0
Q	23	O	398163	SR	0.24	0.43	-0.07	-0.17	-0.15	0.43	1.2
Q	24	L	398166	SR	0.53	0.42	-0.14	-0.16	0.42	-0.23	1.2
Q	27	O	108554	SR	0.14	0.15	0.15	-0.14	0.01	0.03	1.2
Q	28	O	68285	SR	0.46	0.30	-0.02	0.30	-0.19	-0.14	1.6
Q	29	O	331337	SR	0.39	0.37	-0.19	-0.12	0.37	-0.15	1.6
Q	30	L	331338	SR	0.18	0.13	-0.09	0.04	-0.05	0.13	1.5
Q	31	O	395755	SR	0.49	0.18	-0.12	0.18	-0.11	0.01	1.6
Q	32	L	395752	SR	0.59	0.35	0.35	-0.20	-0.16	-0.12	1.5
Q	33	O	392444	SR	0.51	0.31	-0.13	-0.19	0.31	-0.08	1.6
Q	34	L	108599	SR	0.45	0.35	-0.20	-0.17	0.35	-0.03	0.5
Q	35	L	79418	SR	0.50	0.30	0.30	-0.17	-0.20	-0.02	0.5
Q	36	O	108634	SR	0.53	0.42	0.42	-0.26	-0.17	-0.09	1.2
Q	37	L	108630	SR	0.28	0.31	-0.17	-0.16	0.00	0.31	0.5
Q	38	L	271097	SR	0.35	0.35	-0.05	-0.11	-0.23	0.35	0.5
Q	39	O	271098	SR	0.28	0.07	-0.02	-0.05	0.07	0.01	0.4
Q	43	O	331351	SR	0.62	0.31	-0.17	0.31	-0.20	-0.04	0.4
Q	45	L	214533	SR	0.36	0.42	-0.16	-0.10	-0.21	0.42	0.5
Q	46	L	52683	SR	0.33	0.13	-0.12	0.13	-0.21	0.14	0.5
Q	47	L	52684	SR	0.17	0.32	-0.04	-0.20	-0.02	0.32	0.7
Q	48	L	94193	SR	0.29	0.10	-0.08	0.02	0.10	-0.04	0.5
Q	50	O	297095	SR	0.35	0.06	-0.10	0.06	-0.22	0.30	0.4
Q	51	O	68236	SR	0.21	0.38	0.04	-0.25	-0.14	0.38	0.8
Q	52	L	55066	SR	0.34	0.38	-0.04	-0.22	-0.14	0.38	0.7
Q	53	L	296119	SR	0.33	0.44	0.44	-0.13	-0.24	-0.08	0.7

Table A.12 Item Statistics, Operational Items: MD HSA Biology—Summer 2017 Primary 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Q	54	L	296120	SR	0.48	0.39	-0.09	0.39	-0.22	-0.16	1.0
Q	55	L	279652	SR	0.45	0.23	-0.06	0.23	-0.08	-0.11	0.7
Q	57	L	286698	SR	0.28	-0.01	0.07	-0.10	-0.01	0.07	0.7
Q	58	L	286699	SR	0.22	0.24	0.24	0.03	-0.18	-0.13	0.7
Q	59	L	369425	SR	0.39	0.33	0.33	-0.20	-0.23	0.08	0.7
Q	60	O	338733	SR	0.46	0.33	-0.16	-0.15	0.33	-0.12	0.4
Q	63	O	392489	SR	0.38	0.49	-0.26	-0.23	-0.08	0.49	0.4
Q	64	O	369420	SR	0.44	0.33	-0.07	-0.23	0.33	-0.08	0.4
Q	65	L	398053	SR	0.29	0.37	0.37	-0.18	-0.11	-0.09	1.0
Q	66	L	398077	SR	0.39	0.38	0.38	-0.17	-0.17	-0.08	0.7
Q	67	O	65082	SR	0.58	0.41	0.41	-0.33	-0.13	-0.04	0.4
Q	68	O	331365	SR	0.40	0.27	-0.10	0.27	-0.12	-0.10	0.4
Q	69	O	256549	SR	0.31	0.36	0.36	-0.24	-0.08	-0.03	0.4
Q	70	L	256515	SR	0.28	0.33	-0.03	-0.10	-0.19	0.33	0.7
Q	72	O	142012	SR	0.50	0.20	-0.18	0.20	-0.22	0.15	0.4
Q	73	O	394750	SR	0.35	0.47	0.47	-0.16	-0.28	-0.08	0.4
Q	74	L	394754	SR	0.36	0.28	-0.05	-0.12	0.28	-0.11	0.7
Q	76	L	323338	SR	0.40	0.26	-0.01	-0.23	0.26	-0.05	0.7
Q	77	O	271155	SR	0.54	0.38	0.38	-0.19	-0.27	-0.04	0.4
Q	78	L	322143	SR	0.35	0.41	0.01	-0.23	-0.19	0.41	1.0
Q	79	L	322141	SR	0.35	0.24	-0.04	0.24	-0.07	-0.15	0.7
Q	80	O	65048	SR	0.40	0.30	0.30	-0.05	-0.21	-0.11	0.4
Q	81	L	64992	SR	0.22	0.17	0.09	-0.13	0.17	-0.14	0.7
Q	85	L	373090	SR	0.25	0.17	0.01	-0.10	0.17	-0.05	1.0
Q	86	L	373088	SR	0.13	0.15	0.11	-0.04	-0.13	0.15	1.2
Q	87	L	395761	SR	0.41	0.27	-0.04	-0.13	0.27	-0.11	1.0
Q	88	O	395757	SR	0.38	0.35	-0.15	-0.18	0.35	-0.05	0.8
Q	89	O	55031	SR	0.26	0.51	-0.13	-0.18	-0.19	0.51	0.8
Q	90	O	369417	SR	0.46	0.46	0.46	-0.22	-0.17	-0.18	0.8
Q	92	O	288369	SR	0.34	0.17	-0.04	0.17	-0.19	0.08	0.8
Q	95	L	263129	SR	0.35	0.38	-0.14	-0.11	-0.15	0.38	1.2
Q	96	L	263130	SR	0.32	0.16	-0.02	0.16	-0.07	-0.03	1.0
Q	97	L	349142	SR	0.63	0.35	-0.12	-0.19	0.35	-0.16	1.2
Q	98	L	394903	SR	0.56	0.38	-0.13	0.38	-0.23	-0.12	1.0
Q	99	L	223404	SR	0.62	0.27	-0.12	-0.09	0.27	-0.14	1.0
Mean					0.39	0.30	0.01	-0.05	-0.05	0.05	0.7
SD					0.12	0.11	0.21	0.20	0.20	0.20	0.4

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.13 Item Statistics, Operational Items: MD HSA Government–Summer 2017 Primary 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
P	12	O	135594	CR	0.20	0.74					13.8
P	22	O	137292	CR	0.20	0.64					17.0
P	31	O	52254	CR	0.17	0.67					14.7
P	39	O	51740	CR	0.22	0.74					15.4
P	63	O	64789	CR	0.12	0.69					22.9
Mean (CR)					0.18	0.70					16.8
SD (CR)					0.04	0.04					3.6
P	1	O	279839	SR	0.52	0.20	0.20	-0.19	-0.12	0.05	0.1
P	2	O	51206	SR	0.50	0.36	0.36	-0.25	-0.16	-0.07	0.0
P	3	O	108433	SR	0.29	0.18	-0.01	0.18	-0.19	-0.03	0.3
P	4	O	132969	SR	0.18	0.23	-0.05	0.23	-0.03	-0.17	0.0
P	5	O	279802	SR	0.28	0.23	0.23	-0.04	-0.19	0.00	0.3
P	6	O	279832	SR	0.36	0.30	0.30	-0.14	-0.16	-0.06	0.0
P	7	O	68618	SR	0.56	0.36	-0.15	-0.18	-0.18	0.36	0.1
P	8	O	108447	SR	0.37	0.25	0.25	-0.18	-0.12	-0.03	0.2
P	9	O	353530	SR	0.45	0.28	0.28	-0.18	-0.12	-0.07	0.1
P	10	O	324399	SR	0.50	0.43	-0.15	-0.22	-0.24	0.43	0.1
P	13	O	51245	SR	0.27	0.25	-0.08	0.25	-0.23	0.04	0.6
P	14	O	348514	SR	0.53	0.36	-0.19	-0.21	0.36	-0.13	0.6
P	15	O	296494	SR	0.39	0.17	-0.08	-0.08	-0.03	0.17	0.7
P	16	O	296493	SR	0.44	0.20	-0.04	0.20	-0.20	0.00	0.5
P	17	O	133469	SR	0.22	0.18	-0.19	0.18	-0.12	0.13	0.8
P	18	O	324701	SR	0.41	0.28	-0.10	-0.12	-0.11	0.28	0.7
P	20	O	223265	SR	0.47	0.39	0.39	-0.16	-0.17	-0.17	1.1
P	21	O	271833	SR	0.24	0.00	-0.16	0.00	0.07	0.12	1.4
P	24	O	55531	SR	0.28	0.18	0.18	-0.17	-0.13	0.10	1.9
P	25	O	324406	SR	0.66	0.35	0.35	-0.25	-0.21	-0.08	3.2
P	26	O	51168	SR	0.45	0.45	-0.18	-0.21	-0.17	0.45	0.6
P	27	O	283103	SR	0.66	0.44	-0.22	-0.25	0.44	-0.16	0.6
P	28	O	331431	SR	0.35	0.12	-0.06	-0.13	0.12	0.07	0.7
P	29	O	108437	SR	0.34	0.42	0.42	-0.26	-0.13	-0.11	0.6
P	30	O	283083	SR	0.59	0.37	-0.18	-0.16	0.37	-0.17	0.7
P	32	O	279811	SR	0.28	0.07	-0.04	0.05	0.07	-0.09	0.9
P	33	O	68739	SR	0.39	0.32	-0.04	-0.19	-0.12	0.32	1.1
P	34	O	364295	SR	0.27	0.33	-0.14	0.00	-0.19	0.33	1.0
P	35	O	68753	SR	0.48	0.43	0.43	-0.16	-0.18	-0.21	1.1
P	37	O	283115	SR	0.51	0.38	-0.21	-0.20	0.38	-0.06	1.1
P	38	O	257016	SR	0.30	0.20	0.20	-0.15	-0.13	0.09	1.3
P	40	O	279745	SR	0.46	0.27	-0.05	0.27	-0.22	-0.02	1.5
P	41	O	256411	SR	0.26	0.03	0.17	-0.08	0.03	-0.10	0.9
P	43	O	331398	SR	0.50	0.31	-0.12	0.31	-0.17	-0.08	1.5

Table A.13 Item Statistics, Operational Items: MD HSA Government–Summer 2017 Primary 1

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
P	44	O	331397	SR	0.29	0.31	0.31	-0.04	-0.15	-0.10	1.6
P	45	O	381710	SR	0.18	0.17	-0.15	0.08	-0.10	0.17	1.6
P	47	O	282265	SR	0.53	0.47	-0.30	0.47	-0.22	-0.07	1.5
P	48	O	52202	SR	0.40	0.39	-0.10	-0.18	0.39	-0.16	1.7
P	50	O	370282	SR	0.37	0.29	0.02	-0.18	0.29	-0.14	1.7
P	51	O	51183	SR	0.28	0.27	0.27	0.04	-0.19	-0.07	2.2
P	53	O	261601	SR	0.46	0.29	-0.08	-0.15	0.29	-0.12	2.0
P	54	O	64814	SR	0.51	0.41	0.41	-0.24	-0.18	-0.09	1.0
P	55	O	363239	SR	0.35	0.44	-0.14	-0.17	-0.16	0.44	1.0
P	56	O	51244	SR	0.57	0.37	-0.08	-0.23	0.37	-0.18	1.2
P	58	O	296472	SR	0.31	0.18	0.00	-0.08	0.18	-0.07	1.4
P	59	O	296471	SR	0.46	0.24	0.05	0.24	-0.23	-0.13	1.5
P	60	O	257018	SR	0.51	0.41	-0.15	-0.19	0.41	-0.19	1.7
P	61	O	321084	SR	0.30	0.30	-0.17	-0.06	-0.07	0.30	1.3
P	62	O	79579	SR	0.31	0.23	-0.06	-0.03	0.23	-0.13	1.3
P	64	O	283117	SR	0.24	0.21	-0.02	-0.10	-0.03	0.21	1.5
P	65	O	296500	SR	0.40	0.35	0.35	-0.21	-0.21	0.00	1.5
P	67	O	271798	SR	0.37	0.22	-0.10	-0.05	0.22	-0.08	1.5
P	68	O	55591	SR	0.47	0.52	-0.18	-0.22	-0.21	0.52	1.7
P	69	O	348537	SR	0.27	0.23	-0.02	-0.05	-0.11	0.23	2.2
P	71	O	282261	SR	0.28	0.45	-0.17	-0.11	-0.17	0.45	1.5
P	72	O	51029	SR	0.45	0.44	-0.14	-0.18	-0.18	0.44	1.5
P	74	O	296499	SR	0.45	0.24	0.24	-0.15	-0.14	0.02	1.5
P	75	O	279842	SR	0.28	0.35	0.01	-0.18	-0.16	0.35	1.8
P	77	O	256996	SR	0.34	0.35	0.35	-0.13	-0.14	-0.08	1.9
P	78	O	279843	SR	0.36	0.40	0.40	-0.24	-0.08	-0.06	2.2
P	80	O	51752	SR	0.30	0.38	-0.12	-0.13	-0.11	0.38	2.2
P	81	O	261592	SR	0.35	0.32	-0.19	0.32	0.01	-0.15	2.5
Mean					0.39	0.30	0.02	-0.08	-0.04	0.05	1.2
SD					0.11	0.11	0.21	0.17	0.20	0.21	0.7

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.

Table A.14 Item Statistics, Operational Items: MD HSA Government–Summer 2017 Primary 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Q	12	O	135594	CR	0.20	0.74					13.8
Q	22	O	137292	CR	0.20	0.64					17.0
Q	31	O	52254	CR	0.17	0.67					14.7
Q	39	O	51740	CR	0.22	0.74					15.4
Q	63	O	64789	CR	0.12	0.69					22.9
Mean (CR)					0.18	0.70					16.8
SD (CR)					0.04	0.04					3.6
Q	1	O	279839	SR	0.52	0.20	0.20	-0.19	-0.12	0.05	0.1
Q	2	O	283062	SR	0.41	0.37	-0.17	-0.17	-0.12	0.37	0.6
Q	3	O	108433	SR	0.29	0.18	-0.01	0.18	-0.19	-0.03	0.3
Q	4	O	108401	SR	0.37	0.29	-0.20	0.29	-0.11	-0.03	0.6
Q	5	O	279802	SR	0.28	0.23	0.23	-0.04	-0.19	0.00	0.3
Q	6	O	283116	SR	0.42	0.29	-0.15	0.29	-0.18	-0.08	0.3
Q	7	O	68618	SR	0.56	0.36	-0.15	-0.18	-0.18	0.36	0.1
Q	8	O	79698	SR	0.48	0.31	-0.22	-0.19	0.31	0.02	0.0
Q	9	O	353530	SR	0.45	0.28	0.28	-0.18	-0.12	-0.07	0.1
Q	10	O	324399	SR	0.50	0.43	-0.15	-0.22	-0.24	0.43	0.1
Q	13	O	353531	SR	0.31	0.37	0.37	-0.17	-0.17	-0.06	0.6
Q	14	O	283277	SR	0.23	0.11	-0.19	0.11	-0.12	0.21	0.9
Q	15	O	296494	SR	0.39	0.17	-0.08	-0.08	-0.03	0.17	0.7
Q	16	O	296493	SR	0.44	0.20	-0.04	0.20	-0.20	0.00	0.5
Q	17	O	133469	SR	0.22	0.18	-0.19	0.18	-0.12	0.13	0.8
Q	18	O	324701	SR	0.41	0.28	-0.10	-0.12	-0.11	0.28	0.7
Q	20	O	108398	SR	0.35	0.42	0.42	-0.09	-0.16	-0.22	2.0
Q	21	O	271833	SR	0.24	0.00	-0.16	0.00	0.07	0.12	1.4
Q	24	O	51798	SR	0.44	0.34	-0.21	0.34	-0.17	-0.13	5.2
Q	25	O	324406	SR	0.66	0.35	0.35	-0.25	-0.21	-0.08	3.2
Q	26	O	256412	SR	0.43	0.50	-0.23	-0.19	-0.23	0.50	0.3
Q	27	O	283103	SR	0.66	0.44	-0.22	-0.25	0.44	-0.16	0.6
Q	28	O	331411	SR	0.40	0.38	-0.10	0.38	-0.18	-0.19	0.3
Q	29	O	108437	SR	0.34	0.42	0.42	-0.26	-0.13	-0.11	0.6
Q	30	O	283083	SR	0.59	0.37	-0.18	-0.16	0.37	-0.17	0.7
Q	32	O	279811	SR	0.28	0.07	-0.04	0.05	0.07	-0.09	0.9
Q	33	O	108456	SR	0.41	0.38	-0.03	0.38	-0.30	-0.11	0.9
Q	34	O	364295	SR	0.27	0.33	-0.14	0.00	-0.19	0.33	1.0
Q	35	O	283082	SR	0.41	0.40	0.40	-0.10	-0.23	-0.14	1.4
Q	37	O	68709	SR	0.34	0.41	-0.07	-0.25	0.41	-0.08	1.7
Q	38	O	214577	SR	0.69	0.40	0.40	-0.20	-0.18	-0.16	2.0
Q	40	O	279745	SR	0.46	0.27	-0.05	0.27	-0.22	-0.02	1.5
Q	41	O	133480	SR	0.32	0.32	-0.12	0.32	-0.13	-0.07	1.7
Q	43	O	331398	SR	0.50	0.31	-0.12	0.31	-0.17	-0.08	1.5
Q	44	O	331397	SR	0.29	0.31	0.31	-0.04	-0.15	-0.10	1.6

Table A.14 Item Statistics, Operational Items: MD HSA Government–Summer 2017 Primary 2

Form	Pos_No	Anchor Status	ItemID	Item Type	P_Val	R_ITT	P_BIS1	P_BIS2	P_BIS3	P_BIS4	%Omits
Q	45	O	381710	SR	0.18	0.17	-0.15	0.08	-0.10	0.17	1.6
Q	47	O	339021	SR	0.36	0.24	-0.06	-0.12	0.24	-0.06	2.6
Q	48	O	52202	SR	0.40	0.39	-0.10	-0.18	0.39	-0.16	1.7
Q	50	O	339045	SR	0.32	0.25	-0.06	-0.13	0.25	-0.04	2.3
Q	51	O	263993	SR	0.40	0.32	-0.03	-0.21	0.32	-0.14	2.3
Q	53	O	261601	SR	0.46	0.29	-0.08	-0.15	0.29	-0.12	2.0
Q	54	O	64814	SR	0.51	0.41	0.41	-0.24	-0.18	-0.09	1.0
Q	55	O	363239	SR	0.35	0.44	-0.14	-0.17	-0.16	0.44	1.0
Q	56	O	51244	SR	0.57	0.37	-0.08	-0.23	0.37	-0.18	1.2
Q	58	O	296472	SR	0.31	0.18	0.00	-0.08	0.18	-0.07	1.4
Q	59	O	296471	SR	0.46	0.24	0.05	0.24	-0.23	-0.13	1.5
Q	60	O	51020	SR	0.47	0.38	-0.10	-0.22	0.38	-0.16	0.9
Q	61	O	65192	SR	0.36	0.09	-0.11	0.13	-0.09	0.09	1.2
Q	62	O	64821	SR	0.55	0.45	0.45	-0.27	-0.18	-0.14	1.2
Q	64	O	387362	SR	0.31	0.54	-0.18	-0.26	-0.14	0.54	1.2
Q	65	O	296500	SR	0.40	0.35	0.35	-0.21	-0.21	0.00	1.5
Q	67	O	271798	SR	0.37	0.22	-0.10	-0.05	0.22	-0.08	1.5
Q	68	O	79611	SR	0.46	0.47	-0.13	-0.21	-0.24	0.47	1.2
Q	69	O	79551	SR	0.43	0.40	-0.15	0.40	-0.16	-0.17	1.4
Q	71	O	282261	SR	0.28	0.45	-0.17	-0.11	-0.17	0.45	1.5
Q	72	O	279763	SR	0.43	0.30	-0.11	-0.23	0.30	-0.02	1.4
Q	74	O	296499	SR	0.45	0.24	0.24	-0.15	-0.14	0.02	1.5
Q	75	O	279842	SR	0.28	0.35	0.01	-0.18	-0.16	0.35	1.8
Q	77	O	256996	SR	0.34	0.35	0.35	-0.13	-0.14	-0.08	1.9
Q	78	O	132977	SR	0.55	0.34	-0.17	-0.11	0.34	-0.16	2.0
Q	80	O	51752	SR	0.30	0.38	-0.12	-0.13	-0.11	0.38	2.2
Q	81	O	261592	SR	0.35	0.32	-0.19	0.32	0.01	-0.15	2.5
Mean					0.40	0.32	-0.01	-0.04	-0.04	0.03	1.3
SD					0.11	0.11	0.21	0.20	0.22	0.21	0.9

Note: Anchor Status: L= item is common across all forms in this administration, O = item is in 1 or more but not all forms in this administration; P_Val = *p*-value, R_ITT = item-total correlation, P_BIS1—P_BIS4 = option-total correlation, %Omits = percentage of omitted responses.