

Section 1. Test Construction and Administration

Test Development

Planning

Planning for the test development process began with the creation of item development plans for each content area. ETS content leaders collaborated with their content counterparts at MSDE to create these plans. 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. Areas that contained low item counts were given priority when determining which indicators were to be addressed by the item writers. After these critical need areas were defined and addressed, the remaining numbers of items to be developed (which is determined by the requirements set forth in the RFP) were distributed among the remaining indicators in a fashion that would best ensure sufficient depth of items from which to construct operational forms for future administrations.

Test Specifications and Design

The basic test design was pre-determined by MSDE and provided to ETS in the form of the content specific “Test Specs – Test Form Matrix” document presented in Tables 1.2 to 1.6. This basic test design document provided 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 the ETS and MSDE content specialists. Construction of the operational forms was based on test blueprints as approved by MSDE.

Item Type

There were four item types that were utilized by the MHSA exam. These item types were selected response (SR), student produced response (SPR), brief constructed response (BCR), and extended constructed response (ECR). The following table shows how these item types were used on operational forms.

Table 1.1 Number of Items on Operational MHSA Forms by Item Type

Content Area	SR	SPR	BCR	ECR
Algebra	26	6	3	3
Biology	48	-	7	-
English	46	-	2	2
Geometry	26	6	2	3
Government	50	-	7	1

Item Writing

Item writers, at least 50 percent of which were Maryland educators, were contracted to develop quality test items that were aligned with Core Learning Goals. Item writers were selected based on their depth of content knowledge and familiarity with MHSA testing program. The item writers were trained on general item writing techniques as well as writing parameters that were specific to the MHSA program. Approximately one month after the initial item writer training, writers were provided a follow-up training session geared to evaluate their writing skills developed up to that point and provide constructive feedback to guide the rest of their writing assignment. Upon completion of their writing assignment, item writers submitted their items to ETS. The items that were accepted started item review and revision process. Specific requirements of writing for the MHSA program can be found in the “Guidelines for Item Writers” document.

Item Review and Revision

All items developed for this program underwent a series of editorial reviews in accordance with the following procedures:

- Items edited according to standard rules developed in conjunction with MSDE.
- Items reviewed for accuracy, organization and comprehension, style, usage, consistency and sensitivity.
- Item content reviewed so that each item measures intended Goal-Expectation-Indicator.
- Copyright and/or trademark permission has been obtained for any required materials.
- Internal reviews conducted and historical records will be maintained for all version changes.

After ETS performed required internal reviews, items were submitted to MSDE for their review. If the MSDE content specialist requested a copy, an original version of the item as submitted by the item writer was provided. Any associated stimulus material, graphic, and/or art was provided as well as information regarding the Goal-Expectation-Indicator that each question addressed.

MSDE performed a review of the items and provided feedback to ETS content specialists. These edits were incorporated into the items, then MSDE and ETS content specialists met and conducted a side-by-side review of the items. Any final edits to the items were made. The items were then prepared for Content Review Committee review. All constructed response items were also submitted to Measurement Incorporated (MI) for review.

The final round of reviews involved the Content Review Committee and Bias/Fairness Review Committee. These committees were diverse groups of Maryland educators who reviewed each item and ensured that content in each item accurately reflected what was

taught in Maryland schools and that no individual or group would be unfairly favored or disadvantaged due to the content of the items.

Upon the completion of this final round of review, MSDE and ETS content specialists again conducted a side-by-side meeting to evaluate reviews by MI, Content Review Committee, and Bias/Fairness Review Committee. The ETS content specialist then made any necessary edits to the items. The items that survived this process were ready to be placed in field test sections of operational forms.

Test Specifications

All the 2005 operational test forms were constructed from items from the Maryland item bank. The pool of items available for use in the construction of the 2005 forms included all items that had been administered, calibrated and linked to the operational scale. The MHSAs operational scale was defined in 2002 and included items administered in 2002 and 2003. Items administered prior to 2002 were not eligible for selection of the 2005 forms. In addition, items flagged for poor fit and items that had been flagged for severe differential item functioning (DIF) against one of the focal groups were excluded from the available item pool. Refer to Section 5 for a more detailed account of these analyses and flagging criteria.

Each test included a mixture of selected-response (SR), as well as brief and/or extended constructed-response (BCR, ECR) items. Algebra/Data Analysis and Geometry also included student produced response (SPR) items. Each test form consisted of two sections administered within a single sitting (the two sections were separated by a short break). SR and SPR items were worth one score point and were scored against specific keys. BCR and ECR items varied in number of score points by content area. In Algebra and Geometry BCR items were worth three points and ECR items were worth four points. English BCR items were worth three points and ECR items were worth four points. The BCR and ECR items for Government were both worth four points and Biology had only BCR items, which were worth four points. Rubrics for items can be found at the following locations:

Algebra and Geometry:	http://mdk12.org/rubrics/mathematics .
Biology	http://mdk12.org/rubrics/science
English	http://mdk12.org/rubrics/english
Government	http://mdk12.org/rubrics/socialstudies

In addition, each test form was constructed to meet specific test blueprints. Tables 1.2 to 1.6 indicate distribution of items within each reporting category by item type.

Table 1.2 Algebra Blueprint

ALGEBRA/DATA ANALYSIS					
Reporting Category	Item Type				Percent of Points
	SR (4pts/ECR)	SPR (3 pts/BCR)	BCR (3 pts/BCR)	ECR (4 pts/ECR)	
Totals	26	6	3	3	
Expectation 1.1 The student will analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology.					25%
Expectation 1.2 The student will analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology.					32%
Expectation 3.1 The student will collect, organize, analyze, and present data.					22%
Expectation 3.2 The student will apply the basic concepts of statistics and probability to predict possible outcomes of real-world situations.					21%

Table 1.3 Biology Blueprint

BIOLOGY			
Reporting Category	ITEM TYPE		Percent of Points
	SR	CR	
	(1 pt/SR)	(4 pts/CR)	
Totals	48	7	
Goal 1 Skills and Processes of Biology			21%
Expectation 3.1 Structure and Function of Biological Molecules			16%
Expectation 3.2 Structure and Function of Cells and Organisms			17%
Expectation 3.3 Inheritance of Traits			17%
Expectation 3.4 Mechanism of Evolutionary Change			12%
Expectation 3.5 Interdependence of Organisms in the Biosphere			17%

Table 1.4 English Blueprint

ENGLISH				
Reporting Category	ITEM TYPE			Percent of Points
	SR	BCR	ECR	
	(1pt/SR)	(3pt/BCR)	(4pt/ECR)	
TOTALS	46	2	2	
1: Reading and Literature: Comprehension and Interpretation (RC) Includes the following indicators: 1.1.1; 1.1.2; 1.1.3; 1.2.1; 1.3.3; 3.2.2				27%
2: Reading and Literature: Making Connections and Evaluation (RE) Includes the following indicators: 1.1.4; 1.2.2; 1.2.3; 1.2.4; 1.2.5; 1.3.5; 4.1.1; 4.2.1				23%
3: Writing – Composing (WC) Includes the following indicators: 2.1.1; 2.1.4; 2.2.1; 2.2.2; 2.2.3; 2.2.5; 2.3.1; 2.3.3; 4.3.1				27%
4: Language usage and Conventions (WL) Includes the following indicators: 3.1.3; 3.1.4; 3.1.6; 3.1.8; 3.3.1; 3.3.2				23%

Table 1.5 Geometry Blueprint

GEOMETRY					
Reporting Category	ITEM TYPE				Percent of Points
	SR	SPR	BCR	ECR	
	(1pt/SR)	(1 pt/SPR)	(3 pt/BCR)	(4 pt/ECR)	
Totals	26	6	2	3	
Expectation 2.1 The student will represent and analyze two and three dimensional figures using tools and technology when appropriate.					32%
Expectation 2.2 The student will apply geometric properties and relationships to solve problems using tools and technology when appropriate.					34%
Expectation 2.3 The student will apply concepts of measurement using tools and technology when appropriate.					34%

Table 1.6 Government Blueprint

GOVERNMENT				
Reporting Category	ITEM TYPE			Percent of Points
	SR (1 pt/SR)	BCR (4 pt/BCR)	ECR (4 pt/ECR)	
Totals	50	7	1	
Expectation 1.1 The student will demonstrate understanding of the structure and functions of government and politics in the United States				26-31%
Expectation 1.2 The student will evaluate how the United States government has maintained a balance between protecting rights and maintaining order.				23-28%
Goal 2 The student will demonstrate an understanding of the history, diversity, and commonality of the peoples of the nation and world, the reality of human interdependence, and the need for global cooperation, through a perspective that is both historical and multicultural.				15%
Goal 3 The student will demonstrate an understanding of geographic concepts and processes to examine the role of culture, technology, and the environment in the location and distribution of human activities throughout history.				13%
Goal 4 The student will demonstrate an understanding of the historical development and current status of economic principles, institutions, and processes needed to be effective citizens, consumers, and workers.				18%

Item Selection and Form Design

In order to conserve the item pool, the operational set of items consisted of both a common set of items shared across forms within an administration and also a unique set of items. Approximately 60% of the total form was common across each of the operational test sections within each of the January and May forms. The balance of the forms consisted of different mixtures of items depending on the form. The guidelines used to construct the forms are listed in Tables 1.7 and 1.9. The exact composition of the forms varied slightly based on available items in the pool.

Table 1.7. Form Construction Specifications – January 05 Administration

Primary Week Form A	Primary Week Form B	Make-Up #1 Form C	Make-Up #2 Form D
Common set – 60%	Common set – 60%	Common set – 60%	Common set – 60%
Unique Items from the pool – 40% (same as items in Form B)	Unique Items from the pool – 40% (same as items in Form A)	Half of the items from primary week’s 40% – 20%	Other half of items from primary week’s 40% items – 20%
		Unique items from the pool – 20%	Unique items from the pool – 20%
Field Test Section – unique items	Field Test Section – unique items	Field Test Section – same as Form A	Field Test Section – same as Form A

Table 1.8. Form Construction Specifications – May 05 Administration

Primary Week Forms E -K	Make-Up #1 Form X	Make-Up #2 Form Y
Common Set –60%	Common Set –60%	Common Set – 60%
Items from the pool – 40% (the same for Forms E – *)	Half of items from primary week’s 40% items – 20%	Other half of items from primary week’s 40% items – 20%
	Unique items from the pool – 20%	Unique items from the pool – 20%
Field Test Section – unique sets of items for Forms E through K	Field Test Section – same as Form E	Field Test Section – same as Form E

Table 1.9. Form Construction Specifications – 2005 Summer Administration

Primary Week #1 Form L	Primary Week #2 Form M
Common Set –60%	Common Set –60%
Unique Items from the pool – 40%	Unique Items from the pool – 40%
Field Test Section – items repeated from May 05 forms	Field Test Section – items repeated from May 05 forms

In addition to the operational items, embedded field test items were included with each version of the test form, resulting in several versions of the operational form that differed only by the included field test items. These items consisted of either newly written items or previously administered items that had poor item statistics and/or had been revised. Items eligible for re-field testing included items from the 2000-2001 administration years. These items were judged to be acceptable from a content perspective, but had p-values less than 0.25, item-total correlations of less than 0.15, collapsed score levels for constructed response items (i.e., very few responses in the top score levels), very high omit rates or SR items with one best answer, but with positive point-biserials on one or more distractors. For the administration, different versions of the forms were spiraled at the student level.

Forms were constructed using the test construction software associated with the customer item bank. The goal was to match the conditional standard error curve (CSEM) and test characteristic curves (TCC) with the “target” form defined as the base form used to set the operational scale in 2002. The information function, standard error curve, and test characteristic curve were graphical displays based on the item parameters associated with the items selected and were inter-related – that is, changes to the set of items selected will result in changes in all three displays.

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

1. For each administration, all operational forms were constructed simultaneously in order to provide the best opportunity to construct parallel forms.
2. First the common set of items was selected. Then items that matched the test blueprint were selected to match the target test characteristic and standard error curves.
3. During the test construction procedure test developers were careful to ensure that the item selections met all content specifications, including matching items to the test blueprint, distribution of keys, removal of clueing or clang, etc.
4. After the operational forms were selected, the field test sets were constructed. Field test sets did not need to meet any psychometric criteria, but were selected such that the items could be completed within a 30-minute time frame. Field test sets consisted of a set of multiple choice items, a combination of brief constructed

response items and multiple choice items, or an extended constructed response item. The field test items were embedded throughout the set of operational items.