MARCH 2010 OHIO GRADUATION TESTS

STATISTICAL SUMMARY

This document is a summary of the March 2010 administration of the Ohio Graduation Tests (OGT). Students attempt the tests for the first time in the spring of tenth grade. Students who take the tests at a later time do so because they have not yet achieved proficient score(s) on one or more tests. Because these students are not representative of the population as a whole, only tenth-graders are included in this report.

Tables 1 and 2 summarize the performance of tenth-graders in public and chartered non-public schools, respectively. Community school students are included in the public totals.

Table 1. Summary Statistics of the March 2010 OGT Administration for Public Grade 10 Students.

	Subject				
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	132,391	132,717	131,827	132,910	132,454
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	545	557	573	609	581
Min. Scaled Score	260	252	267	215	227
Raw Mean	29.00	30.31	31.85	28.60	31.23
Raw SD	9.01	9.99	6.00	9.53	9.63
Raw SEM	3.21	2.89	2.72	3.25	2.93
Scaled Mean	421.80	430.86	419.91	418.83	429.61
Scaled SD	23.87	33.99	21.21	32.43	35.35
Scaled SEM	8.50	9.85	9.61	11.05	10.74
Reliability	0.87	0.92	0.79	0.88	0.91

Note: SD = standard deviation; SEM = standard error of measurement. Students who used an alternate form of the test are not included in these figures.

Table 2. Summary Statistics of the March 2010 OGT Administration for Non-Public Grade 10 Students.

	Subject				
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	12,901	12,904	12,900	12,896	12,859
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	545	557	573	609	581
Min. Scaled Score	260	252	267	215	227
Raw Mean	33.78	33.79	34.94	32.97	35.00
Raw SD	6.94	7.95	3.96	7.49	6.93
Raw SEM	3.08	2.78	2.27	3.09	2.77
Scaled Mean	434.12	442.03	431.17	433.36	442.41
Scaled SD	19.39	29.47	16.42	27.19	27.87
Scaled SEM	8.59	10.32	9.42	11.22	11.13
Reliability	0.80	0.88	0.67	0.83	0.84

Note: SD = standard deviation; SEM = standard error of measurement. Students who used an alternate form of the test are not included in these figures.

Tables 3 and 4 present the number and percent of tenth-graders at each of the five performance levels for each test for public and chartered non-public schools, respectively. Community school students are included in the public totals.

Table 3. Number and Percent of Public Grade 10 Students at Each Performance Level.

Reading				
Performance Level		Number	Percent	
Proficient or Above	Advanced	16,834	12.7	83.3
	Accelerated	36,489	27.5	
	Proficient	57,084	43.1	
Below Proficient	Basic	14,189	10.7	16.7
	Limited	7,913	6.0	

Mathematics				
Performance Level		Number	Percent	
Proficient or Above	Advanced	49,952	37.6	80.8
	Accelerated	27,616	20.8	
	Proficient	29,948	22.5	
Below Proficient	Basic	12,667	9.5	19.2
	Limited	12,822	9.6	

Writing				
Performance Level		Number	Percent	
Proficient or Above	Advanced	410	0.3	84.2
	Accelerated	48,808	37.0	
	Proficient	61,853	46.9	
Below Proficient	Basic	16,267	12.3	15.8
	Limited	4,582	3.5	

Science				
Performance Level		Number	Percent	
Proficient or Above	Advanced	29,183	21.9	72.9
	Accelerated	30,743	23.1	
	Proficient	37,195	27.9	
Below Proficient	Basic	25,829	19.4	27.1
	Limited	10,243	7.7	

Table 3 (continued)

Social Studies				
Performance Level		Number	Percent	
Proficient or Above	Advanced	45,913	34.6	79.8
	Accelerated	24,792	18.7	
	Proficient	35,097	26.5	
Below Proficient	Basic	13,732	10.4	20.2
	Limited	13,015	9.8	

Table 4. Number and Percent of Non-Public Grade 10 Students at Each Performance Level.

Reading				
Performance Level		Number	Percent	
Proficient or Above	Advanced	3,044	23.2	96.5
	Accelerated	5,248	40.0	
	Proficient	4,349	33.2	
Below Proficient	Basic	334	2.5	3.5
	Limited	130	1.0	

Mathematics				
Performance Level		Number	Percent	
Proficient or Above	Advanced	6,459	49.3	92.5
	Accelerated	3,153	24.1	
	Proficient	2,519	19.2	
Below Proficient	Basic	664	5.1	7.5
	Limited	313	2.4	

Writing				
Performance Level		Number	Percent	
Proficient or Above	Advanced	79	0.6	96.9
	Accelerated	7,870	60.1	
	Proficient	4,750	36.2	
Below Proficient	Basic	346	2.6	3.1
	Limited	59	0.5	

Table 4 (continued)

Science				
Performance Level		Number	Percent	
Proficient or Above	Advanced	4,482	34.2	89.9
	Accelerated	3,953	30.2	
	Proficient	3,341	25.5	
Below Proficient	Basic	1,150	8.8	10.1
	Limited	174	1.3	

Social Studies				
Performance Level		Number	Percent	
Proficient or Above	Advanced	6,059	46.4	93.9
	Accelerated	3,207	24.6	
	Proficient	3,006	23.0	
Below Proficient	Basic	565	4.3	6.1
	Limited	226	1.7	

Table 5 provides the raw and scaled scores associated with each performance level on each test for the March 2010 OGT administration. The scaled score required to achieve a certain performance level does not change from administration to administration, but the raw score required to achieve that scaled score may change.

Table 5. Score ranges for all subjects and all performance levels.

Subject	Performance Level	Raw Score	Scaled Score
Reading	Advanced	39.5 – 48.0	448 – 545
	Accelerated	32.5 – 39.0	429 – 447
	Proficient	20.0 – 32.0	400 – 428
	Basic	13.5 – 19.5	383 – 399
	Limited	0.0 – 13.0	260 – 382
Mathematics	Advanced	36.0 – 46.0	444 – 557
	Accelerated	30.0 – 35.5	425 – 443
	Proficient	20.5 – 29.5	400 – 424
	Basic	15.0 – 20.0	384 – 399
	Limited	0.0 – 14.5	252 – 383
Writing	Advanced	42.5 – 48.0	476 – 573
	Accelerated	35.0 – 42.0	430 – 475
	Proficient	26.5 – 34.5	400 – 429
	Basic	18.5 – 26.0	378 – 399
	Limited	0.0 – 18.0	267 – 377
Science	Advanced	37.5 – 48.0	445 – 609
	Accelerated	31.5 – 37.0	425 – 444
	Proficient	22.5 – 31.0	400 – 424
	Basic	13.5 – 22.0	371 – 399
	Limited	0.0 – 13.0	215 – 370
Social Studies	Advanced	37.0 – 48.0	446 – 581
	Accelerated	32.5 – 36.5	429 – 445
	Proficient	23.0 – 32.0	400 – 428
	Basic	16.5 – 22.5	382 – 399
	Limited	0.0 – 16.0	227 – 381

Performance levels for each content standard (subscale) on each of the five tests are presented in Table 6. A "near proficient" score represents the performance typical of a minimally proficient student. These data are provided for diagnostic purposes only; students do not "pass" or "fail" standards.

Table 6. Raw score bands for content standards.

Subject	Content Standard	Below Prof.	Near Prof.	Above Prof.	Total Points
Reading	Acquisition of Vocabulary	0.0-3.5	4.0-5.0	5.5-8.0	8
	Reading Process	0.0-4.5	5.0-6.5	7.0-10.0	10
	Informational, Technical, and Persuasive Text	0.0-6.5	7.0-9.5	10.0-18.0	18
	Literary Text	0.0-3.5	4.0-6.0	6.5-12.0	12
Mathematics	Number, Number Sense, and Operations	0.0-4.0	4.5-6.0	6.5-9.0	9
	Measurement	0.0-2.5	3.0-4.5	5.0-8.0	8
	Geometry and Spatial Sense	0.0-2.0	2.5-4.0	4.5-8.0	8
	Patterns, Functions, and Algebra	0.0-5.5	6.0-8.0	8.5-11.0	11
	Data Analysis and Probability	0.0-4.0	4.5-6.0	6.5-10.0	10
Writing	Writing Processes	0.0-6.0	6.5-8.0	8.5-12.0	12
	Writing Applications	0.0-11.0	12.0-14.0	15.0-24.0	24
	Writing Conventions	0.0-8.0	9.0-10.0	11.0-12.0	12
Science	Scientific Processes	0.0-4.5	5.0-6.5	7.0-12.0	12
	Earth and Space Sciences	0.0-5.5	6.0-8.0	8.5-12.0	12
	Life Sciences	0.0-6.0	6.5-8.5	9.0-12.0	12
	Physical Sciences	0.0-4.5	5.0-7.5	8.0-12.0	12

Table 6 (continued)

Subject	Content Standard	Below Prof.	Near Prof.	Above Prof.	Total Points
Social Studies	History	0.0-5.5	6.0-8.0	8.5-14.0	14
	People in Societies and Geography	0.0-5.5	6.0-7.5	8.0-12.0	12
	Economics, Government, and Citizenship	0.0-5.0	5.5-7.5	8.0-13.0	13
	Social Studies Skills and Methods	0.0-5.0	5.5-7.0	7.5-9.0	9

Concordance between Raw Scores and Cut Scores

Tables 7-11 provide the concordance between raw scores and scaled scores for all five tests administered in March 2010.

Table 7. Raw Score to Scaled Score Conversion for Reading, March 2010 OGT Administration.

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	260	16.5	391	33.0	430
0.5	289	17.0	393	33.5	431
1.0	305	17.5	394	34.0	433
1.5	316	18.0	395	34.5	434
2.0	323	18.5	397	35.0	435
2.5	329	19.0	398	35.5	436
3.0	334	19.5	399	36.0	438
3.5	338	**20.0**	**401**	36.5	439
4.0	342	20.5	402	37.0	440
4.5	345	21.0	403	37.5	442
5.0	349	21.5	404	38.0	443
5.5	351	22.0	405	38.5	445
6.0	354	22.5	407	39.0	446
6.5	357	23.0	408	**39.5**	**448**
7.0	359	23.5	409	40.0	450
7.5	361	24.0	410	40.5	451
8.0	364	24.5	411	41.0	453
8.5	366	25.0	412	41.5	455
9.0	368	25.5	413	42.0	457
9.5	370	26.0	414	42.5	460
10.0	371	26.5	416	43.0	462
10.5	373	27.0	417	43.5	465
11.0	375	27.5	418	44.0	468
11.5	377	28.0	419	44.5	471
12.0	378	28.5	420	45.0	475
12.5	380	29.0	421	45.5	479
13.0	381	29.5	422	46.0	484
13.5	**383**	30.0	423	46.5	491
14.0	384	30.5	424	47.0	501
14.5	386	31.0	426	47.5	517
15.0	387	31.5	427	48.0	545
15.5	389	32.0	428		
16.0	390	**32.5**	**429**		

Table 8. Raw Score to Scaled Score Conversion for Mathematics, March 2010 OGT Administration.

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	252	16.5	389	33.0	434
0.5	283	17.0	391	33.5	435
1.0	301	17.5	392	34.0	437
1.5	312	18.0	394	34.5	439
2.0	320	18.5	395	35.0	440
2.5	326	19.0	396	35.5	442
3.0	331	19.5	398	**36.0**	**444**
3.5	336	20.0	399	36.5	446
4.0	339	**20.5**	**400**	37.0	448
4.5	343	21.0	401	37.5	450
5.0	346	21.5	403	38.0	452
5.5	349	22.0	404	38.5	454
6.0	352	22.5	405	39.0	456
6.5	354	23.0	407	39.5	459
7.0	357	23.5	408	40.0	461
7.5	359	24.0	409	40.5	464
8.0	361	24.5	410	41.0	467
8.5	363	25.0	412	41.5	470
9.0	365	25.5	413	42.0	474
9.5	367	26.0	414	42.5	478
10.0	369	26.5	416	43.0	482
10.5	371	27.0	417	43.5	487
11.0	373	27.5	418	44.0	492
11.5	374	28.0	420	44.5	500
12.0	376	28.5	421	45.0	510
12.5	378	29.0	422	45.5	527
13.0	379	29.5	424	46.0	557
13.5	381	**30.0**	**425**		
14.0	382	30.5	426		
14.5	383	31.0	428		
15.0	**385**	31.5	429		
15.5	387	32.0	431		
16.0	388	32.5	432		

Table 9. Raw Score to Scaled Score Conversion for Writing, March 2010 OGT Administration.

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	267	16.5	373	33.0	421
0.5	291	17.0	374	33.5	423
1.0	305	17.5	376	34.0	425
1.5	313	18.0	377	34.5	427
2.0	319	**18.5**	**378**	**35.0**	**430**
2.5	324	19.0	379	35.5	431
3.0	328	19.5	381	36.0	434
3.5	331	20.0	382	36.5	436
4.0	334	20.5	383	37.0	438
4.5	337	21.0	385	37.5	441
5.0	339	21.5	386	38.0	444
5.5	341	22.0	387	38.5	446
6.0	343	22.5	389	39.0	449
6.5	345	23.0	390	39.5	453
7.0	347	23.5	392	40.0	456
7.5	349	24.0	393	40.5	460
8.0	350	24.5	394	41.0	463
8.5	352	25.0	396	41.5	467
9.0	353	25.5	397	42.0	471
9.5	355	26.0	399	**42.5**	**476**
10.0	356	**26.5**	**400**	43.0	480
10.5	358	27.0	402	43.5	485
11.0	359	27.5	403	44.0	490
11.5	360	28.0	405	44.5	496
12.0	362	28.5	406	45.0	501
12.5	363	29.0	408	45.5	508
13.0	364	29.5	409	46.0	514
13.5	365	30.0	411	46.5	522
14.0	367	30.5	413	47.0	533
14.5	368	31.0	414	47.5	548
15.0	369	31.5	416	48.0	573
15.5	370	32.0	418		
16.0	372	32.5	419		

Table 10. Raw Score to Scaled Score Conversion for Science, March 2010 OGT Administration.

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	215	16.5	382	33.0	429
0.5	252	17.0	383	33.5	431
1.0	274	17.5	385	34.0	432
1.5	287	18.0	386	34.5	434
2.0	297	18.5	388	35.0	436
2.5	305	19.0	390	35.5	437
3.0	311	19.5	391	36.0	439
3.5	316	20.0	393	36.5	441
4.0	321	20.5	394	37.0	443
4.5	325	21.0	395	**37.5**	**446**
5.0	329	21.5	397	38.0	448
5.5	333	22.0	398	38.5	450
6.0	336	**22.5**	**400**	39.0	453
6.5	339	23.0	401	39.5	455
7.0	342	23.5	403	40.0	458
7.5	345	24.0	404	40.5	461
8.0	348	24.5	405	41.0	464
8.5	350	25.0	407	41.5	468
9.0	353	25.5	408	42.0	471
9.5	355	26.0	409	42.5	475
10.0	357	26.5	411	43.0	480
10.5	360	27.0	412	43.5	484
11.0	362	27.5	413	44.0	490
11.5	364	28.0	415	44.5	495
12.0	366	28.5	416	45.0	502
12.5	368	29.0	417	45.5	510
13.0	370	29.5	419	46.0	519
13.5	**371**	30.0	420	46.5	530
14.0	373	30.5	422	47.0	546
14.5	375	31.0	423	47.5	570
15.0	377	**31.5**	**425**	48.0	609
15.5	378	32.0	426		
16.0	380	32.5	427		

Table 11. Raw Score to Scaled Score Conversion for Social Studies, March 2010 OGT Administration.

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	227	**16.5**	**382**	33.0	431
0.5	262	17.0	383	33.5	433
1.0	283	17.5	384	34.0	435
1.5	295	18.0	386	34.5	436
2.0	304	18.5	387	35.0	438
2.5	311	19.0	389	35.5	440
3.0	317	19.5	390	36.0	442
3.5	322	20.0	392	36.5	444
4.0	326	20.5	393	**37.0**	**446**
4.5	330	21.0	395	37.5	448
5.0	334	21.5	396	38.0	451
5.5	337	22.0	397	38.5	453
6.0	340	22.5	399	39.0	455
6.5	343	**23.0**	**400**	39.5	458
7.0	346	23.5	402	40.0	460
7.5	348	24.0	403	40.5	463
8.0	351	24.5	404	41.0	465
8.5	353	25.0	406	41.5	468
9.0	355	25.5	407	42.0	471
9.5	357	26.0	409	42.5	474
10.0	359	26.5	410	43.0	477
10.5	361	27.0	412	43.5	481
11.0	363	27.5	413	44.0	485
11.5	365	28.0	415	44.5	489
12.0	367	28.5	416	45.0	494
12.5	369	29.0	418	45.5	500
13.0	370	29.5	419	46.0	506
13.5	372	30.0	421	46.5	515
14.0	374	30.5	423	47.0	527
14.5	375	31.0	424	47.5	546
15.0	377	31.5	426	48.0	581
15.5	378	32.0	428		
16.0	380	**32.5**	**429**		

Equating and Scaling: The Conversion of Raw Scores to Scaled Scores

Ohio uses the Rasch model (a one-parameter logistic model) for computing item difficulties and student abilities. This model is used because of its widespread acceptance, its relative simplicity, and the commercial availability of software for implementing it. The model measures each student's ability and each item's difficulty, and places all students and items on the same scale. Both ability and difficulty are measured in log-odds units, or logits. When student ability and item difficulty are equal, the probability of a correct response is 50%.

Pre-Equating and Test Form Construction

Equating is a process by which test forms composed of different items are calibrated to the same performance standards. Because each test form is made up of items that have been field-tested, items can be selected so that the new form is approximately equal to previous forms in overall difficulty.

Common Item Post-Equating

Following the administration of the March 2010 OGT, operational item difficulty values were obtained using data from an early return sample of grade 10 students. This sample was selected to be statistically representative of the Ohio student population.

For the reading, mathematics, science, and social studies tests, calibration and equating proceeded through a series of steps. First, the March 2010 operational difficulty values were computed from the early return data and compared to the reference values in the item bank. Because field-test difficulty estimates for all operational items were available, all operational items could potentially serve as anchor items in the equating process. The mean difference between the current and the bank difficulties of the anchor items is called the equating constant, or EQK. Second, the equating constant was added to each March 2010 difficulty value so that the mean item difficulties from the March 2010 administration and from the bank were equal. Next, the adjusted current values were subtracted from the bank values to identify the item with the largest absolute difference between the two values. If the absolute value of the difference was greater than 0.3 logits, the item was eliminated as an anchor item. This procedure was repeated until the largest difference between the adjusted current value and the bank value was less than 0.3 logits. This procedure ensured that the items used to anchor the operational test to the reference scale were stable.

The writing tests are not post-equated. Scaling is based on item bank data. The summer and fall OGT administrations are also not post-equated.

Scaling

Ohio's performance standards are expressed as scaled scores. Scaled scores are constant across different forms of the same test, while raw scores may reflect minor differences in the difficulty of different test forms. A scaled score of 430 on the March 2010 administration represents the same level of performance as a scaled score of 430 on any other administration of the same test, but the raw score corresponding to a 430 may vary slightly from administration to administration.

After the equating process was complete, Rasch ability estimates, or theta scores, were computed for each possible raw score. The Rasch ability estimates were then converted to the appropriate scale by a linear transformation. In all cases, the proficient standard is equal to a scaled score of 400. The advanced, accelerated, and basic standards are also constant across different forms of the same test, but are not constant across different tests.

The Ohio Rounding Rule

Raw scores are reported to the nearest half-point, but scaled scores are reported as whole numbers. In general, scaled scores are rounded to the nearest whole number; e.g., 417.848 would be reported as 418. Occasional exceptions must be made at the cut points used to mark the performance standards for each test so that the scaled score associated with each possible raw score is placed in the correct performance level.

Ohio uses a rounding rule to match the raw score closest to the performance standard with the associated scaled cut score for that standard. For example, if a raw score of 21.0 is associated with a scaled score of 399.437, and this is the closest scaled score to the proficient performance standard of 400, the scaled score associated with 21.0 is reported as 400 rather than 399.

If the closest scaled score exceeds the standard, the rounded scaled score is not changed. For example, if a raw score of 22.0 produces a scaled score of 398.126 and a raw score of 22.5 produces a scaled score of 401.246, the raw cut would be 22.5 and the associated scaled score would be reported as 401.