

MARCH 2009 OHIO GRADUATION TESTS

STATISTICAL SUMMARY

This document is a summary of the March 2009 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 2009 OGT Administration for Public Grade 10 Students.

	Subject				
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	133,806	134,802	133,614	134,864	134,060
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	557	558	581	582	576
Min. Scaled Score	257	250	272	212	231
Raw Mean	29.74	28.70	32.73	29.46	31.60
Raw SD	9.11	10.18	5.97	9.05	9.85
Raw SEM	3.07	3.11	2.69	3.18	3.08
Scaled Mean	426.04	431.59	431.00	420.43	429.68
Scaled SD	25.86	33.77	24.34	30.80	33.68
Scaled SEM	8.70	10.32	10.96	10.84	10.52
Reliability	0.89	0.91	0.80	0.88	0.90

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 2009 OGT Administration for Non-Public Grade 10 Students.

	Subject				
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	12,699	12,713	12,529	12,705	12,670
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	557	558	581	582	576
Min. Scaled Score	257	250	272	212	231
Raw Mean	34.61	32.80	36.08	33.43	35.76
Raw SD	6.55	8.27	3.83	6.93	7.03
Raw SEM	2.92	3.05	2.22	3.08	2.90
Scaled Mean	439.69	444.68	445.57	433.52	442.92
Scaled SD	19.77	28.76	19.27	24.59	26.48
Scaled SEM	8.81	10.59	11.16	10.92	10.94
Reliability	0.80	0.86	0.66	0.80	0.83

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	27,578	20.6	84.8
	Accelerated	39,849	29.7	
	Proficient	46,273	34.5	
Below Proficient	Basic	11,626	8.7	15.2
	Limited	8,677	6.5	

Mathematics				
Performance Level		Number	Percent	
Proficient or Above	Advanced	50,892	37.7	82.0
	Accelerated	30,816	22.8	
	Proficient	29,045	21.5	
Below Proficient	Basic	11,714	8.7	18.0
	Limited	12,527	9.3	

Writing				
Performance Level		Number	Percent	
Proficient or Above	Advanced	4,805	3.6	90.3
	Accelerated	67,353	50.3	
	Proficient	48,843	36.5	
Below Proficient	Basic	10,143	7.6	9.7
	Limited	2,805	2.1	

Science				
Performance Level		Number	Percent	
Proficient or Above	Advanced	29,926	22.1	76.0
	Accelerated	35,001	25.9	
	Proficient	37,824	28.0	
Below Proficient	Basic	24,209	17.9	24.0
	Limited	8,235	6.1	

Table 3 (continued)

Social Studies				
Performance Level		Number	Percent	
Proficient or Above	Advanced	44,310	33.0	81.7
	Accelerated	27,595	20.5	
	Proficient	37,839	28.2	
Below Proficient	Basic	12,423	9.2	18.3
	Limited	12,224	9.1	

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

Reading				
Performance Level		Number	Percent	
Proficient or Above	Advanced	4,769	36.1	97.3
	Accelerated	5,090	38.5	
	Proficient	2,993	22.7	
Below Proficient	Basic	257	1.9	2.7
	Limited	101	0.8	

Mathematics				
Performance Level		Number	Percent	
Proficient or Above	Advanced	7,057	53.4	94.7
	Accelerated	3,318	25.1	
	Proficient	2,149	16.3	
Below Proficient	Basic	453	3.4	5.3
	Limited	244	1.8	

Writing				
Performance Level		Number	Percent	
Proficient or Above	Advanced	1,005	7.6	98.9
	Accelerated	9,689	73.3	
	Proficient	2,375	18.0	
Below Proficient	Basic	112	0.8	1.1
	Limited	31	0.2	

Table 4 (continued)

Science				
Performance Level		Number	Percent	
Proficient or Above	Advanced	4,355	33.0	92.3
	Accelerated	4,503	34.1	
	Proficient	3,338	25.3	
Below Proficient	Basic	884	6.7	7.7
	Limited	132	1.0	

Social Studies				
Performance Level		Number	Percent	
Proficient or Above	Advanced	6,102	46.3	95.3
	Accelerated	3,435	26.1	
	Proficient	3,022	22.9	
Below Proficient	Basic	446	3.4	4.7
	Limited	168	1.3	

Table 5 provides the raw and scaled scores associated with each performance level on each test for the March 2009 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	38.0 – 48.0	448 – 557
	Accelerated	31.5 – 37.5	429 – 447
	Proficient	19.5 – 31.0	400 – 428
	Basic	13.5 – 19.0	383 – 399
	Limited	0.0 – 13.0	257 – 382
Mathematics	Advanced	34.0 – 46.0	444 – 558
	Accelerated	26.5 – 33.5	425 – 443
	Proficient	18.0 – 26.0	400 – 424
	Basic	13.5 – 17.5	384 – 399
	Limited	0.0 – 13.0	250 – 383
Writing	Advanced	41.0 – 48.0	476 – 581
	Accelerated	33.5 – 40.5	430 – 475
	Proficient	25.0 – 33.0	400 – 429
	Basic	17.0 – 24.5	378 – 399
	Limited	0.0 – 16.5	272 – 377
Science	Advanced	37.5 – 48.0	445 – 582
	Accelerated	31.5 – 37.0	425 – 444
	Proficient	23.0 – 31.0	400 – 424
	Basic	14.0 – 22.5	371 – 399
	Limited	0.0 – 13.5	212 – 370
Social Studies	Advanced	38.0 – 48.0	446 – 576
	Accelerated	33.0 – 37.5	429 – 445
	Proficient	22.0 – 32.5	400 – 428
	Basic	16.0 – 21.5	382 – 399
	Limited	0.0 – 15.5	231 – 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	0.0-2.5	3.0-5.0	5.5-8.0	8
	Reading Process	0.0-4.5	5.0-7.0	7.5-11.0	11
	Informational, Technical, and Persuasive Text	0.0-6.5	7.0-9.0	9.5-16.0	16
	Literary Text	0.0-4.0	4.5-6.0	6.5-13.0	13
Mathematics	Number, Number Sense, and Operations	0.0-2.0	2.5-4.0	4.5-9.0	9
	Measurement	0.0-2.0	2.5-4.0	4.5-8.0	8
	Geometry and Spatial Sense	0.0-3.0	3.5-5.0	5.5-8.0	8
	Patterns, Functions, and Algebra	0.0-4.5	5.0-6.5	7.0-11.0	11
	Data Analysis and Probability	0.0-4.0	4.5-6.5	7.0-10.0	10
Writing	Writing Processes	0.0-6.5	7.0-9.0	9.5-12.0	12
	Writing Applications	0.0-9.0	10.0-11.0	12.0-24.0	24
	Writing Conventions	0.0-8.0	9.0-10.0	11.0-12.0	12
Science	Scientific Processes	0.0-5.0	5.5-7.0	7.5-12.0	12
	Earth and Space Sciences	0.0-4.0	4.5-6.5	7.0-12.0	12
	Life Sciences	0.0-5.0	5.5-7.5	8.0-12.0	12
	Physical Sciences	0.0-7.0	7.5-9.0	9.5-12.0	12

Table 6 (continued)

Subject	Content Standard	Below Prof.	Near Prof.	Above Prof.	Total Points
Social Studies	History	0.0-4.5	5.0-7.0	7.5-14.0	14
	People in Societies and Geography	0.0-5.5	6.0-8.0	8.5-12.0	12
	Economics, Government, and Citizenship	0.0-6.0	6.5-8.5	9.0-13.0	13
	Social Studies Skills and Methods	0.0-4.0	4.5-6.0	6.5-9.0	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 2009.

**Table 7. Raw Score to Scaled Score Conversion for Reading,
March 2009 OGT Administration.**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	257	16.5	392	33.0	433
0.5	286	17.0	393	33.5	434
1.0	303	17.5	394	34.0	436
1.5	313	18.0	396	34.5	437
2.0	321	18.5	397	35.0	439
2.5	327	19.0	398	35.5	440
3.0	332	19.5	400	36.0	441
3.5	336	20.0	401	36.5	443
4.0	340	20.5	402	37.0	444
4.5	344	21.0	404	37.5	446
5.0	347	21.5	405	38.0	448
5.5	350	22.0	406	38.5	449
6.0	353	22.5	407	39.0	451
6.5	356	23.0	409	39.5	453
7.0	358	23.5	410	40.0	455
7.5	360	24.0	411	40.5	457
8.0	363	24.5	412	41.0	459
8.5	365	25.0	413	41.5	461
9.0	367	25.5	415	42.0	463
9.5	369	26.0	416	42.5	465
10.0	371	26.5	417	43.0	468
10.5	373	27.0	418	43.5	471
11.0	374	27.5	419	44.0	474
11.5	376	28.0	421	44.5	478
12.0	378	28.5	422	45.0	482
12.5	380	29.0	423	45.5	487
13.0	381	29.5	424	46.0	493
13.5	383	30.0	425	46.5	500
14.0	384	30.5	427	47.0	511
14.5	386	31.0	428	47.5	528
15.0	387	31.5	429	48.0	557
15.5	389	32.0	431		
16.0	390	32.5	432		

**Table 8. Raw Score to Scaled Score Conversion for Mathematics,
March 2009 OGT Administration.**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	250	16.5	395	33.0	442
0.5	281	17.0	396	33.5	443
1.0	299	17.5	398	34.0	445
1.5	310	18.0	400	34.5	446
2.0	318	18.5	401	35.0	447
2.5	324	19.0	403	35.5	449
3.0	329	19.5	404	36.0	450
3.5	334	20.0	406	36.5	452
4.0	338	20.5	407	37.0	453
4.5	342	21.0	409	37.5	455
5.0	345	21.5	410	38.0	456
5.5	349	22.0	412	38.5	458
6.0	352	22.5	413	39.0	460
6.5	354	23.0	415	39.5	462
7.0	357	23.5	416	40.0	464
7.5	360	24.0	418	40.5	467
8.0	362	24.5	419	41.0	469
8.5	364	25.0	421	41.5	472
9.0	367	25.5	422	42.0	475
9.5	369	26.0	423	42.5	478
10.0	371	26.5	425	43.0	482
10.5	373	27.0	426	43.5	487
11.0	375	27.5	428	44.0	493
11.5	377	28.0	429	44.5	500
12.0	379	28.5	430	45.0	510
12.5	381	29.0	432	45.5	527
13.0	383	29.5	433	46.0	558
13.5	384	30.0	434		
14.0	386	30.5	435		
14.5	388	31.0	437		
15.0	390	31.5	438		
15.5	391	32.0	439		
16.0	393	32.5	441		

**Table 9. Raw Score to Scaled Score Conversion for Writing,
March 2009 OGT Administration.**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	272	16.5	376	33.0	428
0.5	296	17.0	378	33.5	431
1.0	309	17.5	379	34.0	433
1.5	317	18.0	380	34.5	435
2.0	323	18.5	382	35.0	437
2.5	328	19.0	383	35.5	440
3.0	331	19.5	384	36.0	442
3.5	335	20.0	386	36.5	445
4.0	337	20.5	387	37.0	448
4.5	340	21.0	388	37.5	451
5.0	342	21.5	390	38.0	454
5.5	344	22.0	391	38.5	457
6.0	346	22.5	393	39.0	461
6.5	348	23.0	394	39.5	464
7.0	350	23.5	396	40.0	468
7.5	352	24.0	397	40.5	472
8.0	353	24.5	399	41.0	476
8.5	355	25.0	400	41.5	480
9.0	356	25.5	402	42.0	484
9.5	358	26.0	403	42.5	488
10.0	359	26.5	405	43.0	493
10.5	361	27.0	407	43.5	497
11.0	362	27.5	408	44.0	502
11.5	363	28.0	410	44.5	507
12.0	365	28.5	412	45.0	512
12.5	366	29.0	413	45.5	517
13.0	367	29.5	415	46.0	524
13.5	369	30.0	417	46.5	531
14.0	370	30.5	419	47.0	541
14.5	371	31.0	420	47.5	557
15.0	372	31.5	422	48.0	581
15.5	374	32.0	424		
16.0	375	32.5	426		

**Table 10. Raw Score to Scaled Score Conversion for Science,
March 2009 OGT Administration.**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	212	16.5	379	33.0	430
0.5	249	17.0	381	33.5	431
1.0	271	17.5	383	34.0	433
1.5	285	18.0	384	34.5	435
2.0	294	18.5	386	35.0	436
2.5	302	19.0	388	35.5	438
3.0	308	19.5	389	36.0	440
3.5	313	20.0	391	36.5	441
4.0	318	20.5	392	37.0	443
4.5	323	21.0	394	37.5	445
5.0	326	21.5	395	38.0	447
5.5	330	22.0	397	38.5	449
6.0	333	22.5	398	39.0	451
6.5	337	23.0	400	39.5	453
7.0	340	23.5	401	40.0	456
7.5	342	24.0	403	40.5	458
8.0	345	24.5	404	41.0	460
8.5	348	25.0	406	41.5	463
9.0	350	25.5	407	42.0	466
9.5	352	26.0	409	42.5	469
10.0	355	26.5	410	43.0	472
10.5	357	27.0	412	43.5	475
11.0	359	27.5	413	44.0	479
11.5	361	28.0	415	44.5	484
12.0	363	28.5	416	45.0	489
12.5	365	29.0	418	45.5	495
13.0	367	29.5	419	46.0	502
13.5	369	30.0	420	46.5	511
14.0	371	30.5	422	47.0	523
14.5	373	31.0	424	47.5	545
15.0	374	31.5	425	48.0	582
15.5	376	32.0	427		
16.0	378	32.5	428		

**Table 11. Raw Score to Scaled Score Conversion for Social Studies,
March 2009 OGT Administration.**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	231	16.5	384	33.0	430
0.5	266	17.0	385	33.5	431
1.0	286	17.5	387	34.0	433
1.5	299	18.0	388	34.5	434
2.0	307	18.5	390	35.0	436
2.5	314	19.0	391	35.5	438
3.0	320	19.5	393	36.0	439
3.5	325	20.0	394	36.5	441
4.0	329	20.5	395	37.0	443
4.5	333	21.0	397	37.5	445
5.0	337	21.5	398	38.0	446
5.5	340	22.0	400	38.5	448
6.0	343	22.5	401	39.0	450
6.5	346	23.0	402	39.5	453
7.0	349	23.5	403	40.0	455
7.5	351	24.0	405	40.5	457
8.0	353	24.5	406	41.0	460
8.5	356	25.0	407	41.5	462
9.0	358	25.5	409	42.0	465
9.5	360	26.0	410	42.5	468
10.0	362	26.5	411	43.0	471
10.5	364	27.0	413	43.5	475
11.0	366	27.5	414	44.0	479
11.5	368	28.0	415	44.5	483
12.0	370	28.5	417	45.0	488
12.5	371	29.0	418	45.5	494
13.0	373	29.5	420	46.0	500
13.5	375	30.0	421	46.5	509
14.0	376	30.5	422	47.0	521
14.5	378	31.0	424	47.5	542
15.0	379	31.5	425	48.0	576
15.5	381	32.0	427		
16.0	383	32.5	428		

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 2009 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 2009 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 2009 difficulty value so that the mean item difficulties from the March 2009 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 2009 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.