

## MARCH 2007 OHIO GRADUATION TESTS

### STATISTICAL SUMMARY

This document is a summary of the March 2007 administration of the Ohio Graduation Tests (OGT). Students attempt the tests for the first time in the spring of grade 10. Students who take the tests later in high school 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 2007 Administration for Public Grade 10 Students.**

	Subject				
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	136,958	137,709	136,399	137,709	136,998
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	549	555	560	608	626
Min. Scaled Score	260	250	276	212	231
Raw Mean	29.90	27.62	32.76	25.74	27.81
Raw SD	8.49	9.90	6.47	8.23	9.24
Raw SEM	2.40	2.21	1.71	2.18	2.07
Scaled Mean	423.29	427.32	427.92	417.47	424.48
Scaled SD	22.09	30.58	23.11	31.94	34.41
Scaled SEM	6.25	6.84	6.12	8.45	7.70
Reliability	0.92	0.95	0.93	0.93	0.95

**Table 2. Summary Statistics of the March 2007 Administration for Non-Public Grade 10 Students.**

	Subject				
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	13,670	13,678	13,656	13,667	13,629
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	549	555	560	608	626
Min. Scaled Score	260	250	276	212	231
Raw Mean	34.96	32.36	36.51	29.75	32.10
Raw SD	6.12	8.14	4.02	6.63	7.07
Raw SEM	1.73	1.82	1.06	1.75	1.58
Scaled Mean	436.52	441.50	442.00	432.97	440.01
Scaled SD	17.72	26.93	17.13	26.45	27.94
Scaled SEM	5.01	6.02	4.53	7.00	6.25
Reliability	0.92	0.95	0.93	0.93	0.95

Tables 3 and 4 present the number and percent of students 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	16,058	11.7	86.7
	Accelerated	42,238	30.8	
	Proficient	60,488	44.2	
Below proficient:	Basic	11,645	8.5	13.3
	Limited	6,529	4.8	

Mathematics				
Performance Level		Number	Percent	
Proficient or above:	Advanced	42,030	30.5	81.0
	Accelerated	31,447	22.8	
	Proficient	38,077	27.7	
Below proficient:	Basic	15,289	11.1	19.0
	Limited	10,866	7.9	

Writing				
Performance Level		Number	Percent	
Proficient or above:	Advanced	1,945	1.4	89.3
	Accelerated	71,298	52.3	
	Proficient	48,499	35.6	
Below proficient:	Basic	10,972	8.0	10.7
	Limited	3,685	2.7	

Science				
Performance Level		Number	Percent	
Proficient or above:	Advanced	30,545	22.2	72.1
	Accelerated	30,350	22.0	
	Proficient	38,329	27.8	
Below proficient:	Basic	26,628	19.3	27.9
	Limited	11,857	8.6	

**Table 3 (continued)**

Social Studies				
Performance Level		Number	Percent	
Proficient or above:	Advanced	39,105	28.5	76.0
	Accelerated	25,433	18.6	
	Proficient	39,606	28.9	
Below proficient:	Basic	16,158	11.8	24.0
	Limited	16,696	12.2	

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

Reading				
Performance Level		Number	Percent	
Proficient or above:	Advanced	3,524	25.8	98.0
	Accelerated	5,922	43.3	
	Proficient	3,954	28.9	
Below proficient:	Basic	198	1.4	2.0
	Limited	72	0.5	

Mathematics				
Performance Level		Number	Percent	
Proficient or above:	Advanced	6,486	47.4	94.7
	Accelerated	3,641	26.6	
	Proficient	2,820	20.6	
Below proficient:	Basic	534	3.9	5.3
	Limited	197	1.4	

Writing				
Performance Level		Number	Percent	
Proficient or above:	Advanced	443	3.2	98.8
	Accelerated	10,649	78.0	
	Proficient	2,401	17.6	
Below proficient:	Basic	137	1.0	1.2
	Limited	26	0.2	

**Table 4 (continued)**

Science				
Performance Level		Number	Percent	
Proficient or above:	Advanced	4,832	35.4	90.1
	Accelerated	4,016	29.4	
	Proficient	3,462	25.3	
Below proficient:	Basic	1,180	8.6	9.9
	Limited	177	1.3	

Social Studies				
Performance Level		Number	Percent	
Proficient or above:	Advanced	5,947	43.6	92.5
	Accelerated	3,243	23.8	
	Proficient	3,418	25.1	
Below proficient:	Basic	699	5.1	7.5
	Limited	322	2.4	

Table 5 provides the raw and scaled scores associated with each performance level on each test for the March 2007 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 – 549
	Accelerated	33.0 – 39.0	429 – 447
	Proficient	20.0 – 32.5	400 – 428
	Basic	13.0 – 19.5	383 – 399
	Limited	0.0 – 12.5	260 – 382
Mathematics	Advanced	34.5 – 46.0	444 – 555
	Accelerated	27.5 – 34.0	425 – 443
	Proficient	17.5 – 27.0	400 – 424
	Basic	13.0 – 17.0	384 – 399
	Limited	0.0 – 12.5	250 – 383
Writing	Advanced	43.0 – 48.0	476 – 560
	Accelerated	34.0 – 42.5	430 – 475
	Proficient	25.0 – 33.5	400 – 429
	Basic	17.0 – 24.5	378 – 399
	Limited	0.0 – 16.5	276 – 377
Science	Advanced	33.0 – 48.0	445 – 608
	Accelerated	28.0 – 32.5	425 – 444
	Proficient	21.0 – 27.5	400 – 424
	Basic	13.5 – 20.5	371 – 399
	Limited	0.0 – 13.0	212 – 370
Social Studies	Advanced	34.5 – 48.0	446 – 626
	Accelerated	30.0 – 34.0	429 – 445
	Proficient	21.0 – 29.5	400 – 428
	Basic	15.5 – 20.5	382 – 399
	Limited	0.0 – 15.0	231 – 381

Performance levels for each content standard (subscale) on each of the five tests are presented in Table 6. A score “at” the band, or mid-range, represents the level of 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 Band	At Band	Above Band	Total Points
Reading	Acquisition of Vocabulary	0.0-3.0	3.5-5.0	5.5-8.0	8
	Reading Process	0.0-4.0	4.5-6.0	6.5-10.0	10
	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	6.5-14.0	14
Mathematics	Number, Number Sense, and Operations	0.0-3.0	3.5-4.5	5.0-8.0	8
	Measurement	0.0-1.5	2.0-3.0	3.5-7.0	7
	Geometry and Spatial Sense	0.0-2.5	3.0-4.0	4.5-8.0	8
	Patterns, Functions, and Algebra	0.0-2.5	3.0-4.5	5.0-12.0	12
	Data Analysis and Probability	0.0-5.5	6.0-7.5	8.0-11.0	11
Writing	Writing Processes	0.0-6.0	6.5-7.5	8.0-12.0	12
	Writing Applications	0.0-10.0	10.5-11.5	12.0-24.0	24
	Writing Conventions	0.0-8.0	8.5-9.5	10.0-12.0	12
Science	Science and Technology	0.0-3.0	3.5-4.5	5.0-12.0	12
	Earth and Space Sciences	0.0-5.0	5.5-7.0	7.5-12.0	12
	Life Sciences	0.0-5.5	6.0-7.5	8.0-12.0	12
	Physical Sciences	0.0-5.5	6.0-7.5	8.0-12.0	12

**Table 6 (continued)**

Subject	Content Standard	Below Band	At Band	Above Band	Total Points
Social Studies	History	0.0-4.0	4.5-6.0	6.5-14.0	14
	People in Societies and Geography	0.0-6.5	7.0-8.0	8.5-12.0	12
	Economics, Government, and Citizenship	0.0-4.5	5.0-6.5	7.0-13.0	13
	Skills and Methods	0.0-4.5	5.0-6.0	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 in the March 2007 administration of the OGT.

**Table 7. Raw Score to Scaled Score Conversion for Reading,  
March 2007 Administration**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	260	16.5	392	<b>33.0</b>	<b>429</b>
0.5	289	17.0	393	33.5	430
1.0	306	17.5	395	34.0	432
1.5	316	18.0	396	34.5	433
2.0	324	18.5	397	35.0	434
2.5	330	19.0	398	35.5	436
3.0	335	19.5	399	36.0	437
3.5	339	<b>20.0</b>	<b>401</b>	36.5	438
4.0	343	20.5	402	37.0	440
4.5	347	21.0	403	37.5	441
5.0	350	21.5	404	38.0	443
5.5	353	22.0	405	38.5	444
6.0	355	22.5	406	39.0	446
6.5	358	23.0	407	<b>39.5</b>	<b>448</b>
7.0	361	23.5	408	40.0	450
7.5	363	24.0	409	40.5	452
8.0	365	24.5	410	41.0	454
8.5	367	25.0	411	41.5	456
9.0	369	25.5	412	42.0	458
9.5	371	26.0	413	42.5	461
10.0	373	26.5	415	43.0	463
10.5	375	27.0	416	43.5	466
11.0	376	27.5	417	44.0	469
11.5	378	28.0	418	44.5	473
12.0	380	28.5	419	45.0	477
12.5	381	29.0	420	45.5	482
<b>13.0</b>	<b>383</b>	29.5	421	46.0	487
13.5	384	30.0	422	46.5	494
14.0	386	30.5	423	47.0	504
14.5	387	31.0	424	47.5	521
15.0	388	31.5	426	48.0	549
15.5	390	32.0	427		
16.0	391	32.5	428		

**Table 8. Raw Score to Scaled Score Conversion for Mathematics,  
March 2007 Administration**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	250	16.5	397	33.0	439
0.5	282	17.0	398	33.5	441
1.0	300	<b>17.5</b>	<b>400</b>	34.0	442
1.5	312	18.0	401	<b>34.5</b>	<b>444</b>
2.0	320	18.5	402	35.0	445
2.5	327	19.0	404	35.5	447
3.0	332	19.5	405	36.0	448
3.5	337	20.0	407	36.5	450
4.0	341	20.5	408	37.0	452
4.5	345	21.0	409	37.5	453
5.0	349	21.5	410	38.0	455
5.5	352	22.0	412	38.5	457
6.0	355	22.5	413	39.0	459
6.5	358	23.0	414	39.5	461
7.0	361	23.5	416	40.0	463
7.5	363	24.0	417	40.5	466
8.0	366	24.5	418	41.0	468
8.5	368	25.0	419	41.5	471
9.0	370	25.5	420	42.0	474
9.5	372	26.0	422	42.5	477
10.0	374	26.5	423	43.0	481
10.5	376	27.0	424	43.5	486
11.0	378	<b>27.5</b>	<b>425</b>	44.0	491
11.5	380	28.0	427	44.5	498
12.0	382	28.5	428	45.0	508
12.5	383	29.0	429	45.5	525
<b>13.0</b>	<b>386</b>	29.5	430	46.0	555
13.5	387	30.0	432		
14.0	389	30.5	433		
14.5	390	31.0	434		
15.0	392	31.5	435		
15.5	394	32.0	437		
16.0	395	32.5	438		

**Table 9. Raw Score to Scaled Score Conversion for Writing,  
March 2007 Administration**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	276	16.5	377	33.0	426
0.5	300	<b>17.0</b>	<b>378</b>	33.5	428
1.0	313	17.5	379	<b>34.0</b>	<b>430</b>
1.5	321	18.0	380	34.5	432
2.0	327	18.5	382	35.0	434
2.5	331	19.0	383	35.5	436
3.0	335	19.5	384	36.0	438
3.5	338	20.0	386	36.5	440
4.0	341	20.5	387	37.0	442
4.5	343	21.0	388	37.5	445
5.0	345	21.5	390	38.0	447
5.5	347	22.0	391	38.5	449
6.0	349	22.5	393	39.0	452
6.5	351	23.0	394	39.5	454
7.0	352	23.5	395	40.0	457
7.5	354	24.0	397	40.5	460
8.0	355	24.5	398	41.0	463
8.5	357	<b>25.0</b>	<b>400</b>	41.5	466
9.0	358	25.5	401	42.0	469
9.5	359	26.0	403	42.5	472
10.0	361	26.5	405	<b>43.0</b>	<b>476</b>
10.5	362	27.0	406	43.5	479
11.0	363	27.5	408	44.0	483
11.5	364	28.0	409	44.5	488
12.0	366	28.5	411	45.0	492
12.5	367	29.0	413	45.5	498
13.0	368	29.5	414	46.0	504
13.5	369	30.0	416	46.5	511
14.0	370	30.5	418	47.0	520
14.5	372	31.0	419	47.5	535
15.0	373	31.5	421	48.0	560
15.5	374	32.0	423		
16.0	375	32.5	425		

**Table 10. Raw Score to Scaled Score Conversion for Science,  
March 2007 Administration**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	212	16.5	384	<b>33.0</b>	<b>445</b>
0.5	249	17.0	385	33.5	446
1.0	271	17.5	387	34.0	448
1.5	285	18.0	389	34.5	451
2.0	294	18.5	391	35.0	453
2.5	302	19.0	393	35.5	455
3.0	308	19.5	394	36.0	457
3.5	314	20.0	396	36.5	459
4.0	319	20.5	398	37.0	462
4.5	323	<b>21.0</b>	<b>400</b>	37.5	464
5.0	327	21.5	402	38.0	467
5.5	331	22.0	403	38.5	469
6.0	334	22.5	405	39.0	472
6.5	338	23.0	407	39.5	474
7.0	341	23.5	409	40.0	477
7.5	344	24.0	410	40.5	480
8.0	347	24.5	412	41.0	483
8.5	349	25.0	414	41.5	486
9.0	352	25.5	416	42.0	489
9.5	354	26.0	418	42.5	492
10.0	357	26.5	419	43.0	496
10.5	359	27.0	421	43.5	500
11.0	361	27.5	423	44.0	504
11.5	364	<b>28.0</b>	<b>425</b>	44.5	509
12.0	366	28.5	427	45.0	514
12.5	368	29.0	429	45.5	520
13.0	370	29.5	430	46.0	527
<b>13.5</b>	<b>372</b>	30.0	432	46.5	536
14.0	374	30.5	434	47.0	549
14.5	376	31.0	436	47.5	571
15.0	378	31.5	438	48.0	608
15.5	380	32.0	440		
16.0	382	32.5	442		

**Table 11. Raw Score to Scaled Score Conversion for Social Studies,  
March 2007 Administration**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	231	16.5	385	33.0	441
0.5	266	17.0	387	33.5	443
1.0	286	17.5	389	34.0	445
1.5	298	18.0	390	<b>34.5</b>	<b>447</b>
2.0	307	18.5	392	35.0	449
2.5	314	19.0	393	35.5	451
3.0	320	19.5	395	36.0	453
3.5	325	20.0	396	36.5	455
4.0	329	20.5	398	37.0	457
4.5	333	<b>21.0</b>	<b>400</b>	37.5	459
5.0	336	21.5	401	38.0	462
5.5	340	22.0	403	38.5	464
6.0	343	22.5	404	39.0	467
6.5	346	23.0	406	39.5	469
7.0	348	23.5	408	40.0	472
7.5	351	24.0	409	40.5	475
8.0	353	24.5	411	41.0	478
8.5	356	25.0	412	41.5	481
9.0	358	25.5	414	42.0	485
9.5	360	26.0	416	42.5	488
10.0	362	26.5	417	43.0	493
10.5	364	27.0	419	43.5	497
11.0	366	27.5	421	44.0	502
11.5	368	28.0	422	44.5	508
12.0	370	28.5	424	45.0	515
12.5	372	29.0	426	45.5	523
13.0	373	29.5	428	46.0	533
13.5	375	<b>30.0</b>	<b>429</b>	46.5	545
14.0	377	30.5	431	47.0	561
14.5	379	31.0	433	47.5	587
15.0	380	31.5	435	48.0	626
<b>15.5</b>	<b>382</b>	32.0	437		
16.0	384	32.5	439		

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

Ohio uses the Rasch model (a single-parameter logistic model) for computing item difficulties and student abilities. This model is used because of its widespread acceptance, its relative simplicity and ease of use, 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 2007 OGT, item difficulty values were estimated using data from an early return sample of grade 10 students. This sample was selected to be statistically representative of the Ohio student population.

Calibration and equating proceeded through four steps. First, the March 2007 operational difficulty values were computed from the early return data and compared to the "bank" or reference difficulty values. 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 2007 difficulty value so that the mean item difficulties from the March 2007 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. Finally, the difficulties of the anchor items were reset to their bank values, and the difficulties of the remaining items were placed on the bank scale.

## Scaling

Ohio's performance standards are expressed in scaled scores. Scaled scores are constant across different forms of the same test, while raw scores may reflect minor differences in the difficulty of test items on different forms. A scaled score of 430 for the March 2007 administration represents the same level of performance as a scaled score of 430 from any other administration of the same test, but the raw score corresponding to a 430 may change 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.

## 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.