# MARCH 2008 OHIO GRADUATION TESTS

### STATISTICAL SUMMARY

This document is a summary of the March 2008 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 basic statistics for 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 2008 Administration for Public Grade 10 Students.

			Subject		
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	134,682	135,440	134,153	135,562	134,974
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	552	560	630	590	580
Min. Scaled Score	258	251	265	216	225
Raw Mean	30.11	29.16	31.58	28.21	29.22
Raw SD	8.74	10.16	6.25	9.41	9.42
Raw SEM	3.00	2.88	2.77	3.09	3.00
Scaled Mean	425.09	428.83	424.06	418.68	425.09
Scaled SD	25.02	35.35	26.60	32.48	32.66
Scaled SEM	8.59	10.02	11.80	10.66	10.41
Reliability	0.88	0.92	0.80	0.89	0.90

Table 2. Summary Statistics of the March 2008 Administration for Non-Public Grade 10 Students.

		_	Subject		
	Reading	Mathematics	Writing	Science	Social Studies
No. Tested	13,335	13,359	13,349	13,347	13,293
Max. Raw Score	48	46	48	48	48
Max. Scaled Score	552	560	630	590	580
Min. Scaled Score	258	251	265	216	225
Raw Mean	35.36	33.76	35.23	32.67	33.55
Raw SD	6.01	7.99	4.05	7.26	6.98
Raw SEM	2.79	2.73	2.32	2.96	2.84
Scaled Mean	440.14	444.20	440.72	433.71	439.56
Scaled SD	18.52	31.04	22.24	26.37	25.14
Scaled SEM	8.59	10.62	12.71	10.76	10.21
Reliability	0.78	0.88	0.67	0.83	0.83

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	Pero	cent	
Drofisiontor	Advanced	24,078	17.9		
Proficient or above:	Accelerated	43,068	32.0	85.1	
above.	Proficient	47,427	35.2		
Below	Basic	11,282	8.4	14.9	
proficient:	Limited	8,827	6.6	14.9	

Mathematics					
Performance Level		Number	Pero	cent	
D. C. C	Advanced	45,873	33.9		
Proficient or above:	Accelerated	28,108	20.8	79.0	
above:	Proficient	32,969	24.3		
Below	Basic	14,034	10.4	21.0	
proficient:	Limited	14,456	10.7	21.0	

Writing					
Performa	Number	Pero	cent		
Proficient or above:	Advanced	3,105	2.3		
	Accelerated	56,697	42.3	84.9	
	Proficient	54,043	40.3		
Below	Basic	14,632	10.9	15.1	
proficient:	Limited	5,676	4.2	13.1	

Science				
Performa	nce Level	Number	Pero	cent
Droficiont or	Advanced	31,144	23.0	
Proficient or above:	Accelerated	29,023	21.4	72.6
	Proficient	38,304	28.3	
Below	Basic	26,459	19.5	27.4
proficient:	Limited	10,632	7.8	27.4

Table 3 (continued)

Social Studies					
Performance Level		Number	Pero	cent	
Due fiele at an	Advanced	39,071	28.9		
Proficient or above:	Accelerated	27,243	20.2	78.4	
above:	Proficient	39,484	29.3		
Below	Basic	14,813	11.0	21.6	
proficient:	Limited	14,363	10.6	21.0	

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

Reading					
Performance Level		Number	Pero	cent	
Proficient or	Advanced	4,744	35.6		
above:	Accelerated	5,548	41.6	97.7	
above.	Proficient	2,740	20.5		
Below	Basic	207	1.6	2.3	
proficient:	Limited	96	0.7	2.3	

Mathematics					
Performance Level		Number	Perd	cent	
Proficient or above:	Advanced	6,681	50.0		
	Accelerated	3,239	24.2	93.2	
	Proficient	2,526	18.9		
Below	Basic	608	4.6	6.8	
proficient:	Limited	305	2.3	0.8	

Writing					
Performance Level		Number	Percent		
Proficient or	Advanced	708	5.3		
above:	Accelerated	9,050	67.8	97.6	
above.	Proficient	3,268	24.5		
Below	Basic	250	1.9	2.4	
proficient:	Limited	73	0.5	2.4	

Table 4 (continued)

Science					
Performance Level		Number	Perd	cent	
Proficient or above:	Advanced	4,685	35.1		
	Accelerated	3,953	29.6	90.6	
	Proficient	3,454	25.9		
Below	Basic	1,072	8.0	9.4	
proficient:	Limited	183	1.4	9.4	

Social Studies					
Performa	ince Level	Number	Pero	cent	
Proficient or above:	Advanced	5,753	43.3		
	Accelerated	3,465	26.1	94.2	
	Proficient	3,299	24.8		
Below	Basic	547	4.1	5.8	
proficient:	Limited	229	1.7	3.6	

Table 5 provides the raw and scaled scores associated with each performance level on each test for the March 2008 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
	Advanced	38.5 – 48.0	448 – 552
	Accelerated	32.0 – 38.0	429 – 447
Reading	Proficient	20.5 – 31.5	400 – 428
	Basic	14.5 – 20.0	383 – 399
	Limited	0.0 - 14.0	258 – 382
	Advanced	35.5 – 46.0	444 – 560
	Accelerated	29.5 – 35.0	425 – 443
Mathematics	Proficient	20.0 – 29.0	400 – 424
	Basic	14.5 – 19.5	384 – 399
	Limited	0.0 - 14.0	251 – 383
	Advanced	40.5 – 48.0	476 – 630
	Accelerated	34.0 - 40.0	430 – 475
Writing	Proficient	26.0 - 33.5	400 – 429
	Basic	19.0 – 25.5	378 – 399
	Limited	0.0 – 18.5	265 – 377
	Advanced	36.5 – 48.0	445 – 590
	Accelerated	31.0 – 36.0	425 – 444
Science	Proficient	22.5 – 30.5	400 – 424
	Basic	13.5 – 22.0	371 – 399
	Limited	0.0 – 13.0	216 – 370
	Advanced	36.0 - 48.0	446 – 580
	Accelerated	31.0 – 35.5	429 – 445
Social Studies	Proficient	21.5 – 30.5	400 – 428
	Basic	16.0 – 21.0	382 – 399
	Limited	0.0 – 15.5	225 – 381

Performance levels for each content standard (subscale) on each of the five tests are presented in Table 6. A score "at band" 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 Band	At Band	Above Band	Total Points
		0.0-	3.5-	5.5-	
	Acquisition of Vocabulary	3.0	5.0	8.0	8
		0.0-	6.0-	8.0-	
Reading	Reading Process	5.5	7.5	10.0	10
Reduing	Informational, Technical, and	0.0-	7.0-	9.5-	
	Persuasive Text	6.5	9.0	18.0	18
		0.0-	4.0-	6.5-	
	Literary Text	3.5	6.0	12.0	12
	Number, Number Sense, and	0.0-	3.0-	5.5-	
	Operations	2.5	5.0	9.0	9
		0.0-	3.0-	5.5-	
	Measurement	2.5	5.0	8.0	8
Mathematics		0.0-	3.0-	5.0-	
iviati lerriatics	Geometry and Spatial Sense	2.5	4.5	8.0	8
		0.0-	5.0-	7.0-	
	Patterns, Functions, and Algebra	4.5	6.5	10.0	10
		0.0-	5.5-	8.0-	
	Data Analysis and Probability	5.0	7.5	11.0	11
		0.0-	6.5-	8.5-	
	Writing Processes	6.0	8.0	12.0	12
Writing		0.0-	11.0-	13.0-	
viillig	Writing Applications	10.0	12.0	24.0	24
		0.0-	10.0-		
	Writing Conventions	9.0	11.0	12.0	12
		0.0-	5.0-	7.5-	
	Scientific Processes	4.5	7.0	12.0	12
		0.0-	6.0-	8.5-	
Science	Earth and Space Sciences	5.5	8.0	12.0	12
Science		0.0-	5.5-	8.0-	
	Life Sciences	5.0	7.5	12.0	12
		0.0-	5.5-	8.0-	
	Physical Sciences	5.0	7.5	12.0	12

Table 6 (continued)

Subject	Content Standard	Below Band	At Band	Above Band	Total Points
		0.0-	5.5-	8.0-	
	History	5.0	7.5	14.0	14
		0.0-	5.0-	7.0-	
Social Studies	People in Societies and Geography	4.5	6.5	12.0	12
	Economics, Government, and	0.0-	6.5-	9.0-	
	Citizenship	6.0	8.5	13.0	13
		0.0-	5.0-	7.0-	
	Skills and Methods	4.5	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 2008 administration of the OGT.

Table 7. Raw Score to Scaled Score Conversion for Reading, March 2008 Administration

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	258	16.5	389	33.0	432
0.5	286	17.0	390	33.5	433
1.0	303	17.5	392	34.0	434
1.5	313	18.0	393	34.5	436
2.0	320	18.5	394	35.0	437
2.5	326	19.0	396	35.5	439
3.0	331	19.5	397	36.0	440
3.5	336	20.0	398	36.5	442
4.0	339	20.5	400	37.0	443
4.5	343	21.0	401	37.5	445
5.0	346	21.5	402	38.0	446
5.5	349	22.0	403	38.5	448
6.0	351	22.5	405	39.0	450
6.5	354	23.0	406	39.5	452
7.0	356	23.5	407	40.0	453
7.5	358	24.0	408	40.5	455
8.0	361	24.5	410	41.0	457
8.5	363	25.0	411	41.5	460
9.0	365	25.5	412	42.0	462
9.5	367	26.0	413	42.5	464
10.0	368	26.5	415	43.0	467
10.5	370	27.0	416	43.5	470
11.0	372	27.5	417	44.0	473
11.5	374	28.0	419	44.5	476
12.0	375	28.5	420	45.0	480
12.5	377	29.0	421	45.5	485
13.0	378	29.5	422	46.0	490
13.5	380	30.0	424	46.5	497
14.0	382	30.5	425	47.0	507
14.5	383	31.0	426	47.5	523
15.0	384	31.5	428	48.0	552
15.5	386	32.0	429		
16.0	387	32.5	430		

Table 8. Raw Score to Scaled Score Conversion for Mathematics, March 2008 Administration

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	251	16.5	390	33.0	436
0.5	281	17.0	392	33.5	438
1.0	299	17.5	393	34.0	439
1.5	310	18.0	394	34.5	441
2.0	318	18.5	396	35.0	443
2.5	325	19.0	397	35.5	444
3.0	330	19.5	399	36.0	446
3.5	334	20.0	400	36.5	448
4.0	338	20.5	401	37.0	450
4.5	342	21.0	403	37.5	452
5.0	345	21.5	404	38.0	454
5.5	348	22.0	405	38.5	456
6.0	351	22.5	407	39.0	459
6.5	354	23.0	408	39.5	461
7.0	356	23.5	409	40.0	464
7.5	359	24.0	410	40.5	466
8.0	361	24.5	412	41.0	469
8.5	363	25.0	413	41.5	472
9.0	365	25.5	414	42.0	475
9.5	367	26.0	416	42.5	479
10.0	369	26.5	417	43.0	483
10.5	371	27.0	418	43.5	488
11.0	373	27.5	420	44.0	494
11.5	374	28.0	421	44.5	502
12.0	376	28.5	423	45.0	512
12.5	378	29.0	424	45.5	530
13.0	380	29.5	425	46.0	560
13.5	381	30.0	427		
14.0	383	30.5	428		
14.5	384	31.0	430		
15.0	386	31.5	431		
15.5	387	32.0	433		
16.0	389	32.5	434		

Table 9. Raw Score to Scaled Score Conversion for Writing, March 2008 Administration

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	265	16.5	371	33.0	426
0.5	289	17.0	372	33.5	428
1.0	303	17.5	373	34.0	430
1.5	311	18.0	375	34.5	433
2.0	316	18.5	376	35.0	436
2.5	321	19.0	378	35.5	438
3.0	325	19.5	379	36.0	441
3.5	328	20.0	381	36.5	444
4.0	331	20.5	382	37.0	448
4.5	333	21.0	384	37.5	451
5.0	336	21.5	385	38.0	455
5.5	338	22.0	387	38.5	458
6.0	340	22.5	388	39.0	462
6.5	342	23.0	390	39.5	467
7.0	343	23.5	391	40.0	471
7.5	345	24.0	393	40.5	476
8.0	347	24.5	395	41.0	482
8.5	348	25.0	396	41.5	487
9.0	350	25.5	398	42.0	493
9.5	351	26.0	400	42.5	500
10.0	353	26.5	401	43.0	508
10.5	354	27.0	403	43.5	517
11.0	355	27.5	404	44.0	526
11.5	357	28.0	406	44.5	537
12.0	358	28.5	408	45.0	547
12.5	360	29.0	410	45.5	556
13.0	361	29.5	411	46.0	566
13.5	362	30.0	413	46.5	575
14.0	364	30.5	415	47.0	587
14.5	365	31.0	417	47.5	604
15.0	366	31.5	419	48.0	630
15.5	368	32.0	421		
16.0	369	32.5	423		

Table 10. Raw Score to Scaled Score Conversion for Science, March 2008 Administration

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0.0	216	16.5	381	33.0	432
0.5	253	17.0	383	33.5	434
1.0	275	17.5	385	34.0	435
1.5	288	18.0	386	34.5	437
2.0	297	18.5	388	35.0	439
2.5	305	19.0	390	35.5	441
3.0	311	19.5	391	36.0	442
3.5	316	20.0	393	36.5	445
4.0	321	20.5	394	37.0	446
4.5	325	21.0	396	37.5	448
5.0	329	21.5	397	38.0	450
5.5	333	22.0	399	38.5	452
6.0	336	22.5	400	39.0	454
6.5	339	23.0	402	39.5	457
7.0	342	23.5	403	40.0	459
7.5	345	24.0	405	40.5	462
8.0	347	24.5	406	41.0	464
8.5	350	25.0	408	41.5	467
9.0	352	25.5	409	42.0	470
9.5	355	26.0	411	42.5	473
10.0	357	26.5	412	43.0	476
10.5	359	27.0	414	43.5	480
11.0	361	27.5	415	44.0	484
11.5	363	28.0	417	44.5	489
12.0	365	28.5	418	45.0	494
12.5	367	29.0	420	45.5	500
13.0	369	29.5	421	46.0	508
13.5	371	30.0	423	46.5	517
14.0	373	30.5	424	47.0	530
14.5	375	31.0	426	47.5	552
15.0	376	31.5	427	48.0	590
15.5	378	32.0	429		
16.0	380	32.5	430		

Table 11. Raw Score to Scaled Score Conversion for Social Studies, March 2008 Administration

Raw Score	Scaled	Raw Score	Scaled	Raw Score	Scaled
	Score		Score		Score
0.0	225	16.5	384	33.0	435
0.5	260	17.0	386	33.5	437
1.0	281	17.5	388	34.0	439
1.5	293	18.0	389	34.5	440
2.0	302	18.5	391	35.0	442
2.5	309	19.0	392	35.5	444
3.0	315	19.5	394	36.0	446
3.5	320	20.0	396	36.5	447
4.0	325	20.5	397	37.0	449
4.5	329	21.0	399	37.5	451
5.0	332	21.5	400	38.0	453
5.5	336	22.0	402	38.5	455
6.0	339	22.5	403	39.0	457
6.5	342	23.0	405	39.5	459
7.0	345	23.5	406	40.0	462
7.5	348	24.0	408	40.5	464
8.0	350	24.5	409	41.0	466
8.5	353	25.0	411	41.5	469
9.0	355	25.5	412	42.0	472
9.5	358	26.0	414	42.5	475
10.0	360	26.5	415	43.0	478
10.5	362	27.0	417	43.5	481
11.0	364	27.5	418	44.0	485
11.5	366	28.0	420	44.5	489
12.0	368	28.5	421	45.0	494
12.5	370	29.0	423	45.5	499
13.0	372	29.5	424	46.0	506
13.5	374	30.0	426	46.5	514
14.0	376	30.5	427	47.0	526
14.5	377	31.0	429	47.5	546
15.0	379	31.5	431	48.0	580
15.5	381	32.0	432		
16.0	383	32.5	434		

# **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 2008 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 2008 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 2008 difficulty value so that the mean item difficulties from the March 2008 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 2008 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 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.