

MARCH 2006 OHIO ACHIEVEMENT TESTS ADMINISTRATION

STATISTICAL SUMMARY

This document provides a summary of information from the March 2006 administration of the Ohio Achievement Tests to students in grades three through eight. The statistics shown are computed from the entire population of Ohio public school students (including community school students) for each subject and grade tested. Tables 1 and 2 summarize parameters computed from the data. Tables 3 and 4 show the percent of students at each performance level for each grade and test. Table 5 shows the raw score cut points computed from test data and the scaled score cut points adopted by the State Board of Education. Subscale passing bands are shown in Tables 6 and 7. Tables 8 and 9 show the conversions of raw scores to scaled scores.

Table 1 - Summary of Parameters from the March 2006 Administration of the Ohio Achievement Tests for Grades 3, 4, and 5.

Parameter	Grade 3		Grade 4			Grade 5	
	Reading	Math	Reading	Math	Writing	Reading	Math
N-count	122,249	128,911	129,131	129,087	128,960	132,191	132,254
Max Raw Score	49	52	49	52	39	49	52
Max Scaled Score	520	520	525	549	516	542	547
Min Scaled Score	250	239	262	249	216	250	247
Raw Score Mean	34.57	38.26	32.29	32.51	24.04	31.38	27.12
Raw Score Standard Deviation	8.33	8.38	9.70	10.25	6.01	10.04	10.13
Raw Score SEM	3.02	3.04	3.23	3.44	3.82	3.18	3.44
Scaled Score Mean	415.07	418.43	419.72	421.70	423.70	422.04	407.38
Scaled Score Standard Deviation	27.99	29.28	29.94	32.70	24.99	34.85	30.94
Scaled Score SEM	10.15	10.61	9.98	10.99	15.90	11.04	10.51
Reliability	0.87	0.87	0.89	0.89	0.60	0.90	0.88

Grade 3 Reading is administered in both fall and spring test administrations. Therefore, the number of examinees (N-count) in Table 1 for Grade 3 Reading does not include some students that achieved a Proficient (or above) score on the fall test and did not retake the test during the spring administration. For this reason, the data for Grade 3 Reading in Table 3 reflects results for a cohort of examinees that may not include several thousand students who tested as proficient or above in the Fall 2005 administration.

Table 2 – Summary of Parameters from the March 2006 Administration of the Ohio Achievement Tests for Grades 6, 7, and 8.

Parameter	Grade 6		Grade 7		Grade 8	
	Reading	Math	Reading	Math	Reading	Math
N-count	135,582	135,645	141,190	141,030	141,369	141,290
Max Raw Score	49	50	47	50	48	46
Max Scaled Score	558	579	541	560	548	534
Min Scaled Score	274	233	274	271	267	290
Raw Score Mean	26.76	25.37	28.10	20.48	26.46	21.30
Raw Score Standard Deviation	9.30	9.91	9.70	9.59	9.58	9.35
Raw Score SEM	3.33	3.45	3.27	3.27	3.16	3.23
Scaled Score Mean	426.63	416.15	421.43	410.29	421.09	412.51
Scaled Score Standard Deviation	28.42	34.98	30.33	30.07	31.18	26.75
Scaled Score SEM	10.16	12.19	10.22	10.24	10.30	9.25
Reliability	0.87	0.88	0.89	0.88	0.89	0.88

Table 3 - Percentage of Students at Each Performance Level for Grades 3, 4, and 5.

Standard	Grade 3		Grade 4			Grade 5	
	Reading	Math	Reading	Math	Writing	Reading	Math
	Percent						
Advanced	28.4	20.2	6.1	18.4	3.0	16.4	17.7
Accelerated	23.9	17.4	25.2	21.4	26.7	16.8	15.2
Proficient	18.9	37.2	45.4	37.1	56.3	42.0	29.5
Basic	15.3	18.3	12.1	15.0	10.2	11.5	17.4
Limited	13.5	6.9	11.2	8.1	3.8	13.4	20.2

Table 4 - Percentage of Students at Each Performance Level for Grades 6, 7, and 8.

Standard	Grade 6		Grade 7		Grade 8	
	Reading	Math	Reading	Math	Reading	Math
	Percent	Percent	Percent	Percent	Percent	Percent
Advanced	15.8	18.3	15.0	7.6	19.6	5.7
Accelerated	26.7	20.6	23.6	13.6	26.1	18.2
Proficient	41.2	29.4	40.3	41.8	31.4	44.5
Basic	11.2	18.6	13.1	26.6	13.1	21.9
Limited	5.1	13.2	8.1	10.4	9.9	9.7

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. The Rasch model is based on the probabilities that examinees answered each item correctly. This model is used because of its widespread acceptance, its ease of use, and commercial availability of software for implementing it. The Rasch model provides estimates of the difficulties of each item on a linear scale in log-odds units, or logits.

Equating and Test Form Construction

Equating is a process where test forms comprised of different items are calibrated to the same performance standards. Because each test form is made up of items that have been field-tested, item difficulty estimates from the field test administration are used to pre-equate operational forms during form construction so that operational test forms are of approximately equal difficulty for each administration.

Common Item Equating

Following administration of the March 2006 achievement tests, item difficulty values were estimated using an early return sample for all grades. The early return sample was selected to be statistically representative of all Ohio public school students. Because item difficulty estimates were available from field tests, all the operational items could potentially serve as anchor items in the equating process.

Calibrating, equating and linking proceeded through four steps. First, the current administration difficulty values (from the early return sample) were computed and compared with the “bank” or reference difficulty values. The mean difference between the current and the bank difficulties of the anchor items is called the equating constant. Second, the equating constant was added to each difficulty value for items on the current test so that the mean item difficulties were equal. In step three, the “linked” current values were compared with the bank values to identify the item with the largest absolute difference between the two values. If the absolute value of the difference is greater than 0.3 logits, the item was eliminated as an anchor item. Fourth, this procedure was repeated until the largest difference between a linked current value and 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. When the equating process was complete, item difficulties from the current administration were calibrated to the same scale as the items used in setting performance standards.

Scaling

Ohio performance standards are expressed in scaled scores. Scaled scores are invariant while raw scores reflect minor differences in the difficulty of test items in any test administration. A scaled score of 400 for the March administration is the same as a scaled score of 400 from the October administration in terms of overall performance, but the number of raw score points corresponding to a 400 may shift slightly from administration to administration.

After the March 2006 operational test administration, test items were calibrated and test forms were equated. Rasch ability estimates (called theta scores) were computed for each

possible raw score. The Rasch ability estimates were then transformed to the appropriate Ohio Achievement Test scale scores, all of which are calibrated so that the proficient standard is equal to a scaled score of 400.

Ohio Rounding Rule

Raw scores are integers that rarely have associated integer scaled scores at the points used to define Ohio performance standards. Therefore Ohio uses a rounding rule to match the raw score with the scaled score nearest the performance standard (e.g. 400 scaled score for Proficient) to establish the raw score cut points (e.g. Proficient). For example, if a raw score of 31 is associated with an observed scaled score of 399.14, and 399.14 is the closest observed scaled score to the proficient level performance standard, the scaled score is rounded up to 400. For that test, an examinee must have a raw score of 31 or more to be judged proficient.

If the closest scaled score value for an integer raw score exceeds the standard, then that raw score serves as the raw score cut point. For example, suppose that a raw score of 30 produces a rounded scaled score of 398 and a raw score of 31 produces a rounded scaled score of 401. The raw score cut would be 31 points for a scaled score of 401. 401 would be the lowest possible scaled score to be proficient for that test form, even though the scaled score cut for proficient would remain at 400.

Subscale bands

The test results are also reported by subscales for content standards. In some subjects, some content standards are combined, so there will be reasonable numbers of items (points) in each subscale. The subscale bands are estimated based on the overall performance on the test for students who just achieve proficient performance (scaled score of 400). The lower end of the band is the closest raw score point corresponding to the proficient cut score of 400. The upper end of the band is one standard error above the minimally proficient performance, then rounded up to the nearest point.

Table 5 - Cut Score Points for Basic, Proficient, Accelerated, and Advanced Standards, March 2006 Administration

Grade	Subject	Score	Limited	Basic	Proficient	Accelerated	Advanced
3	Reading	Raw	< 25	25	31	36	41
		Scaled	< 385	385	400	415	432
	Math	Raw	< 24	24	34	43	46
		Scaled	< 378	378	400	429	447
4	Reading	Raw	< 19	19	26	39	45
		Scaled	< 384	384	400	435	467
	Math	Raw	< 17	17	25	37	43
		Scaled	< 377	377	400	432	452
	Writing	Raw	< 13	13	18	28	35
		Scaled	< 383	383	400	436	472
5	Reading	Raw	< 19	19	25	38	42
		Scaled	< 384	384	400	441	459
	Math	Raw	< 18	18	24	33	38
		Scaled	< 382	382	400	424	439
6	Reading	Raw	< 11	11	17	30	37
		Scaled	< 380	380	400	436	456
	Math	Raw	< 14	14	20	29	36
		Scaled	< 378	378	400	429	448
7	Reading	Raw	< 13	13	20	33	39
		Scaled	< 379	379	400	432	452
	Math	Raw	< 10	10	16	29	37
		Scaled	< 378	378	400	436	458
8	Reading	Raw	< 13	13	19	29	36
		Scaled	< 378	378	400	428	451
	Math	Raw	< 10	10	16	29	38
		Scaled	< 379	379	400	432	459

Note: The raw score cuts apply to the March 2006 administration only.

Subscale bands

Subscale bands are estimated for all subjects tested. The band is roughly what you would expect a minimally proficient student would score, based on the overall achievement of the test near the scaled score of 400.

Table 6 - Subscale Bands for Minimally Proficient Students in Grades 3, 4, and 5.

		Raw Score Bands			Possible Score
Content Standard		Below	At	Above	
Grade 3 Reading	Vocabulary	0 – 7	8	9	9
	Reading process	0 – 9	10 - 12	13 - 18	18
	Informational text	0 – 6	7 - 9	10 - 12	12
	Literary text	0 – 5	6 - 8	9 - 10	10
Grade 3 Mathematics	Number, Number Sense, and Operations	0 – 8	9 - 12	13 - 15	15
	Measurement	0 – 5	6 - 8	9	9
	Geometry and Spatial Sense	0 – 4	5 - 7	8 - 10	10
	Patterns, Function, and Algebra	0 - 5	6 - 8	9	9
	Data Analysis and Probability	0 - 6	7 - 8	9	9
Grade 4 Reading	Vocabulary	0 - 4	5 - 7	8 - 9	9
	Reading process	0 - 8	9 - 11	12 - 16	16
	Informational text	0 - 5	6 - 8	9 - 13	13
	Literary text	0 - 4	5 - 8	9 - 11	11
Grade 4 Mathematics	Number, Number Sense, and Operations	0 - 5	6 - 9	10 - 16	16
	Measurement	0 - 3	4 - 6	7 - 8	8
	Geometry and Spatial Sense	0 - 4	5 - 7	8 - 9	9
	Patterns, Function, and Algebra	0 - 4	5 - 7	8 - 9	9
	Data Analysis and Probability	0 - 4	5 - 7	8 - 10	10
Grade 4 Writing	Writing Process	0 - 8	9 - 13	14 - 24	24
	Writing Conventions	0 - 7	8 - 10	11 - 15	15
Grade 5 Reading	Vocabulary	0 - 4	5 - 7	8	8
	Reading process	0 - 9	10 - 12	13 - 17	17
	Informational text	0 - 3	4 - 6	7 - 12	12
	Literary text	0 - 4	5 - 8	9 - 12	12
Grade 5 Mathematics	Number, Number Sense, and Operations	0 - 4	5 - 8	9 - 14	14
	Measurement	0 - 3	4 - 6	7 - 9	9
	Geometry and Spatial Sense	0 - 5	6 - 8	9 - 10	10
	Patterns, Function, and Algebra	0 - 3	4 - 6	7 - 9	9
	Data Analysis and Probability	0 - 5	6 - 7	8 - 10	10

Table 7 - Subscale Bands for Minimally Proficient Students in Grades 6, 7, and 8.

		Raw Score Bands			Possible Score
	Content Standard	Below	At	Above	
Grade 6 Reading	Vocabulary	0 - 2	3 - 5	6 - 8	8
	Reading process	0 - 4	5 - 7	8 - 12	12
	Informational text	0 - 4	5 - 7	8 - 17	17
	Literary text	0 - 3	4 - 6	7 - 12	12
Grade 6 Mathematics	Number, Number Sense, and Operations	0 - 5	6 - 8	9 - 13	13
	Measurement	0 - 1	2 - 4	5 - 8	8
	Geometry and Spatial Sense	0 - 2	3 - 5	6 - 9	9
	Patterns, Function, and Algebra	0 - 3	4 - 7	8 - 11	11
	Data Analysis and Probability	0 - 3	4 - 6	7 - 9	9
Grade 7 Reading	Vocabulary	0 - 4	5 - 7	8	8
	Reading process	0 - 4	5 - 7	8 - 12	12
	Informational text	0 - 4	5 - 7	8 - 14	14
	Literary text	0 - 5	6 - 8	9 - 13	13
Grade 7 Mathematics	Number, Number Sense, and Operations	0 - 2	3 - 5	6 - 10	10
	Measurement	0 - 2	3 - 5	6 - 10	10
	Geometry and Spatial Sense	0 - 3	4 - 6	7 - 10	10
	Patterns, Function, and Algebra	0 - 2	3 - 5	6 - 10	10
	Data Analysis and Probability	0 - 2	3 - 5	6 - 10	10
Grade 8 Reading	Vocabulary	0 - 3	4 - 6	7 - 8	8
	Reading process	0 - 4	5 - 7	8 - 11	11
	Informational text	0 - 6	7 - 10	11 - 17	17
	Literary text	0 - 2	3 - 5	6 - 12	12
Grade 8 Mathematics	Number, Number Sense, and Operations	0 - 3	4 - 6	7 - 10	10
	Measurement	0 - 1	2 - 4	5 - 8	8
	Geometry and Spatial Sense	0 - 2	3 - 5	6 - 8	8
	Patterns, Function, and Algebra	0 - 2	3 - 5	6 - 11	11
	Data Analysis and Probability	0 - 4	5 - 7	8 - 9	9

Tables of Concordance between Raw Scores and Cut Scores

Tables 8 and 9 provide the concordance between raw scores and scaled scores for all tests in the March 2006 administration of the Ohio Achievement Tests.

Table 8 - Raw Score to Scaled Score Conversion, March 2006 Administration

Scaled Scores Corresponding to Raw Score Points for Each Grade and Subject							
Raw Score	Grade 3		Grade 4			Grade 5	
	Reading	Math	Reading	Math	Writing	Reading	Math
0	250	239	262	249	216	250	247
1	269	260	283	272	238	272	270
2	288	281	303	295	259	294	293
3	300	294	315	309	278	308	307
4	308	303	324	319	296	318	318
5	316	311	331	327	312	326	326
6	322	318	337	333	327	332	333
7	327	323	343	339	340	338	339
8	332	329	347	344	350	343	344
9	336	333	352	349	358	348	349
10	340	337	356	354	365	353	354
11	344	341	359	358	371	357	358
12	348	345	363	361	376	361	362
13	351	348	366	365	383	364	365
14	354	351	369	368	386	368	369
15	358	354	372	371	390	371	372
16	361	357	375	375	394	374	376
17	364	360	378	378	398	378	379
18	366	363	381	380	402	381	382
19	369	365	384	383	405	384	385
20	372	368	386	386	409	387	388
21	375	370	389	389	412	389	391
22	377	373	391	391	416	392	394
23	380	375	394	394	420	395	396
24	383	378	396	397	423	398	400
25	385	380	398	400	427	401	402
26	388	382	401	402	430	403	405
27	391	384	403	405	434	406	407
28	393	387	406	407	438	409	410
29	396	389	408	410	442	412	413
30	399	391	411	412	446	414	415
31	401	393	413	415	450	417	418
32	404	396	416	418	455	420	421
33	407	398	418	420	460	423	424
34	410	400	421	423	465	426	426
35	413	403	424	426	472	429	429

Table 8 - Raw Score to Scaled Score Conversion, March 2006 Administration
(continued)

Scaled Scores Corresponding to Raw Score Points for Each Grade and Subject							
Raw Score	Grade 3		Grade 4			Grade 5	
	Reading	Math	Reading	Math	Writing	Reading	Math
36	416	405	427	428	478	433	432
37	419	408	430	432	487	436	435
38	422	411	433	434	502	441	439
39	425	414	436	437	516	444	441
40	429	417	440	440		448	444
41	433	420	444	444		453	448
42	437	424	448	447		459	451
43	442	429	453	452		463	455
44	448	433	459	455		470	459
45	455	438	467	460		478	463
46	464	447	474	465		487	468
47	477	452	486	472		500	474
48	499	461	505	479		521	481
49	520	471	525	489		542	490
50		483		503			503
51		502		526			525
52		520		549			547

Table 9 - Raw Score to Scaled Score Conversion, March 2006 Administration

Scaled Scores Corresponding to Raw Score Points for Each Grade and Subject						
	Grade 6		Grade 7		Grade 8	
Raw Score	Reading	Math	Reading	Math	Reading	Math
0	274	233	274	271	267	290
1	296	261	294	294	289	310
2	318	288	315	317	311	329
3	331	305	327	331	324	341
4	341	317	336	341	333	350
5	349	327	343	349	341	357
6	355	335	349	356	348	363
7	361	342	355	362	354	368
8	366	349	359	367	359	373
9	371	355	364	372	363	377
10	376	360	368	378	368	381
11	380	365	371	381	372	384
12	383	370	375	385	376	388
13	387	374	379	389	379	391
14	390	378	381	392	383	394
15	394	382	384	396	386	397
16	397	386	387	400	389	400
17	400	390	390	402	393	403
18	403	393	393	405	396	405
19	405	397	396	408	400	408
20	408	400	400	411	402	410
21	411	403	401	414	405	413
22	414	407	404	417	408	415
23	416	410	407	420	411	418
24	419	413	409	422	414	420
25	422	416	412	425	416	423
26	424	419	414	428	419	425
27	427	422	417	430	422	427
28	430	425	419	433	425	430
29	432	429	422	436	428	432
30	436	431	424	438	431	435
31	438	434	427	441	435	437
32	440	437	430	444	438	440
33	443	440	433	446	441	442
34	446	443	436	449	444	445
35	449	446	439	452	447	448
36	452	449	442	454	451	451
37	456	453	446	458	454	454
38	459	456	450	460	457	459
39	463	460	454	464	460	462

Table 9 - Raw Score to Scaled Score Conversion, March 2006 Administration
(continued)

Scaled Scores Corresponding to Raw Score Points for Each Grade and Subject						
	Grade 6		Grade 7		Grade 8	
Raw Score	Reading	Math	Reading	Math	Reading	Math
40	467	464	459	467	464	466
41	471	469	464	471	468	471
42	476	474	470	475	473	477
43	481	479	478	479	478	485
44	487	485	487	484	485	496
45	494	493	500	490	494	515
46	503	501	520	497	506	534
47	515	512	541	505	527	
48	537	528		518	548	
49	558	554		539		
50		579		560		
51						
52						