

# Using International Benchmarking to Help Establish High Internationally Competitive Common Performance Standards

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**Race to the Top Assessments: Common Core Standards and Their Impact on  
Student Testing**

**Thursday, October 28, 2010**

**The Brookings Institution, Falk Auditorium, 1775 Massachusetts Ave, NW,  
Washington, DC**

# International Benchmarking with TIMSS and PISA

- The Tables below were used in 2010 to generate the data for standard settings in two states. These were
  - West Virginia (Grade 8 mathematics using TIMSS)
  - Hawaii (Grade 10 science using PISA)
- The international benchmarking with PISA was replicated in in 2010 in three states (Hawaii, Oregon and Delaware) in three subjects (reading, mathematics and science).
- The statistical linking with TIMSS was accomplished by using State-NAEP as a cross walk between the state test and TIMSS.
- The statistical linking with PISA was accomplished by embedding secure PISA items in the state assessment through a legally binding Memo of Understanding and Confidentiality Agreement between AIR and the OECD.

# TIMSS Grade 8 Mathematics

International Benchmarks for West Virginia Mathematics Grade 8 (2010) using TIMSS										
State Math 2009, Grade 8			NAEP-equivalents to State Standard			TIMSS-equivalents to State Standard				
Page in Bookmark Ordered	State Scaled Scores	Estimated Proportion Above State Cut-Score	NAEP- Equivalent Scaled Score	Standard Error of NAEP- Equivalent	Proportion in U.S. Above NAEP-Equiv	TIMSS Standard	TIMSS- Equivalent Scaled Score	Standard Error of TIMSS- Equivalent	Proportion in Korea Above TIMSS- Equiv	Phillips (2009) Benchmark Grade
45	2.7	0.02	367	4	0.01	Advanced = 625	691	19	0.15	A+
44	2.6	0.03	364	4	0.01		684	19	0.17	A+
43	2.5	0.04	360	3	0.01		676	19	0.19	A+
42	2.4	0.04	357	3	0.02		669	18	0.22	A+
41	2.2	0.05	353	3	0.02		662	18	0.24	A+
40	2.1	0.07	350	3	0.03		654	18	0.27	A+
39	2.0	0.08	346	3	0.04		647	18	0.29	A
38	1.9	0.10	343	3	0.04		639	17	0.32	A
37	1.7	0.12	339	3	0.05		632	17	0.35	A
36	1.6	0.14	336	3	0.06		High = 550	625	17	0.38
35	1.5	0.16	333	3	0.08	617		17	0.41	A-
34	1.4	0.18	329	3	0.09	610		16	0.44	A-
33	1.2	0.21	326	3	0.11	603		16	0.48	A-
32	1.1	0.24	322	2	0.13	595		16	0.51	B+
31	1.0	0.27	319	2	0.15	588		16	0.54	B+
30	0.9	0.31	315	2	0.17	581		16	0.57	B+
29	0.7	0.34	312	2	0.20	573		16	0.60	B
28	0.6	0.38	308	2	0.23	566		16	0.63	B
27	0.5	0.42	305	2	0.26	558		15	0.66	B
26	0.4	0.46	301	2	0.29	551		15	0.69	B

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25	0.2	0.50	298	2	0.32	Intermediate = 475	544	15	0.72	B-
24	0.1	0.54	294	2	0.36		536	15	0.75	B-
23	0.0	0.58	291	2	0.39		529	15	0.77	B-
22	-0.1	0.62	288	2	0.43		522	15	0.79	C+
21	-0.3	0.66	284	2	0.47		514	15	0.82	C+
20	-0.4	0.69	281	2	0.51		507	15	0.84	C+
19	-0.5	0.73	277	2	0.55		500	16	0.86	C
18	-0.6	0.76	274	2	0.58		492	16	0.87	C
17	-0.8	0.79	270	3	0.62		485	16	0.89	C
16	-0.9	0.82	267	3	0.66		477	16	0.90	C
15	-1.0	0.84	263	3	0.69	Low=400	470	16	0.92	C-
14	-1.1	0.86	260	3	0.72		463	16	0.93	C-
13	-1.3	0.88	256	3	0.76		455	16	0.94	C-
12	-1.4	0.90	253	3	0.78		448	17	0.95	D+
11	-1.5	0.92	249	3	0.81		441	17	0.96	D+
10	-1.6	0.93	246	3	0.84		433	17	0.96	D+
9	-1.8	0.95	243	3	0.86		426	17	0.97	D+
8	-1.9	0.96	239	3	0.88		419	18	0.97	D
7	-2.0	0.96	236	3	0.90		411	18	0.98	D
6	-2.1	0.97	232	4	0.91		404	18	0.98	D
5	-2.2	0.98	229	4	0.93	Below Low	396	18	0.99	D-
4	-2.4	0.98	225	4	0.94		389	19	0.99	D-
3	-2.5	0.99	222	4	0.95		382	19	0.99	D-
2	-2.6	0.99	218	4	0.96		374	19	0.99	BD
1	-2.7	0.99	215	4	0.97		367	19	0.99	BD

# PISA Grade 10 Science

International Benchmarks for Hawaii Science Grade 10 (2010) using PISA

Ordered Item Booklet Page	Item Parameter	RP67 (Theta)	Standard Error Measurement (Theta)	Inverse Cum. % Hawaii	PISA Equiv.	Standard Error PISA Equiv.	PISA Level	Inverse Cum. % U. S. 2006	Inverse Cum. % OECD 2006	Inverse Cum. % Finland 2006
65	2.28	3.0	0.60	0	760	56	VI=707.9	1	0	1
64	1.10	1.8	0.39	2	648	36		7	6	16
63	0.95	1.7	0.37	3	634	34	V=633.3	9	8	20
62	0.82	1.5	0.35	4	622	33		10	10	25
61	0.79	1.5	0.35	4	620	33		11	10	25
60	0.76	1.5	0.35	4	617	33		11	11	27
59	0.71	1.4	0.34	5	612	32		12	12	28
58	0.65	1.4	0.34	5	606	32		13	13	31
57	0.63	1.3	0.34	5	604	31		14	14	32
56	0.63	1.3	0.34	5	604	31		14	14	32
55	0.60	1.3	0.33	6	601	31		15	14	33
54	0.54	1.3	0.33	6	596	31		16	16	35
53	0.54	1.3	0.33	6	596	31		16	16	35
52	0.53	1.2	0.33	6	595	31		16	16	35
51	0.53	1.2	0.33	6	595	31		16	16	35
50	0.51	1.2	0.33	7	593	30		16	16	36
49	0.40	1.1	0.32	7	583	30		19	19	41
48	0.40	1.1	0.32	7	582	30		19	19	41
47	0.37	1.1	0.32	8	580	29		20	20	42
46	0.34	1.0	0.31	8	577	29		20	21	44
45	0.33	1.0	0.31	9	577	29		20	21	44
44	0.30	1.0	0.31	9	574	29		21	22	45
43	0.27	1.0	0.31	11	571	29	IV=558.7	22	23	46
42	-0.61	0.8	0.30	11	558	28		26	27	52
41	0.10	0.8	0.30	12	555	28		27	28	54
40	0.09	0.8	0.30	13	554	28		27	28	54
39	0.04	0.8	0.29	14	550	27		28	30	56
38	0.00	0.7	0.29	14	546	27		30	31	58
37	-0.05	0.7	0.29	15	541	27		31	33	60

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36	-0.10	0.6	0.29	16	536	27		33	35	62
35	-0.11	0.6	0.29	18	535	27		33	36	63
34	-0.16	0.5	0.28	20	531	27		35	37	65
33	0.78	0.4	0.28	21	518	26		39	42	70
32	-0.32	0.4	0.28	23	515	26		40	44	71
31	-0.40	0.3	0.28	26	508	26		43	47	74
30	-0.74	0.3	0.28	26	507	26		43	47	74
29	-0.44	0.3	0.27	28	505	26		44	48	75
28	-0.50	0.2	0.27	30	499	26		46	50	77
27	-0.58	0.1	0.27	33	491	25	III=484.1	49	54	80
26	-0.66	0.1	0.27	36	484	25		52	57	82
25	-0.66	0.0	0.27	38	484	25		52	57	82
24	-0.71	0.0	0.27	40	479	25		54	59	84
23	-0.72	0.0	0.27	43	478	25		54	59	84
22	-0.89	-0.2	0.27	46	463	25		60	65	88
21	-0.95	-0.2	0.27	50	457	25		62	67	89
20	-1.06	-0.3	0.27	53	447	25		65	71	91
19	-1.15	-0.4	0.27	56	438	25		68	74	93
18	-1.10	-0.5	0.27	59	437	25		69	75	93
17	-1.17	-0.5	0.27	59	437	25		69	75	93
16	-1.27	-0.6	0.27	63	427	25		72	78	94
15	-1.28	-0.6	0.27	63	426	25		72	78	94
14	-0.87	-0.6	0.27	64	426	25		72	78	94
13	-0.80	-0.6	0.27	66	425	25		73	79	95
12	-1.31	-0.6	0.27	67	423	25		73	79	95
11	-1.38	-0.7	0.27	70	417	25	II=409.5	75	81	96
10	-1.48	-0.8	0.27	73	407	26		78	84	97
9	-1.50	-0.8	0.27	75	405	26		79	84	97

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International Benchmarks for Hawaii Science Grade 10 (2010) using PISA

Ordered Item Booklet Page	Item Parameter	RP67 (Theta)	Standard Error Measurement (Theta)	Inverse Cum. % Hawaii	PISA Equiv.	Standard Error PISA Equiv.	PISA Level	Inverse Cum. % U. S. 2006	Inverse Cum. % OECD 2006	Inverse Cum. % Finland 2006
8	-1.52	-0.8	0.27	76	403	26		79	85	97
7	-1.65	-0.9	0.28	79	392	26		82	87	98
6	-1.92	-1.2	0.29	86	366	27		88	92	99
5	-1.95	-1.2	0.29	87	364	27		88	92	99
4	-2.09	-1.4	0.30	90	351	28		90	94	99
3	-1.71	-1.5	0.30	93	337	28	I = 334.9	92	96	100
2	-2.63	-1.9	0.33	97	300	31		96	98	100
1	-2.85	-2.1	0.35	98	280	33		98	99	100

*Note:* In this table, an international benchmark is a performance standard on the State scale that is comparable in difficulty to the international PISA performance standard. The 2006 PISA inverse cumulative percentages (percent at and above) in science were not available to the authors. Therefore, the distributions were estimated assuming a normal approximation (30 OECD countries mean = 500, standard deviation = 95; United States mean = 489, standard deviation = 106; Finland mean = 563, standard deviation = 86). Any country, or combination of countries, that participated in 2006 PISA can be selected for comparisons. PISA Levels are I = 334.9, II = 409.5, III = 484.1, IV = 558.7, V = 663.3 and VI = 707.9.