

## Appendix 12E: Mathematics Item Parameters from the TIMSS 2019 Grade 4 Less Difficult Calibration

Item	RMSD		Slope (a <sub>i</sub> )	Location (b <sub>i</sub> )	Guessing (c <sub>i</sub> )	Step 1 (d <sub>i1</sub> )	Step 2 (d <sub>i2</sub> )
	2015	2019					
<b>Items Released in 2015:</b>							
N1_01	M011135	0.026	—	0.868 (0.091)	-0.272 (0.124)	0.211 (0.051)	
N1_02	M011114	0.014	—	1.386 (0.081)	0.655 (0.034)		
N1_03	M011216	0.030	—	1.473 (0.079)	0.130 (0.029)		
N1_04	M011255	0.018	—	1.079 (0.109)	0.119 (0.079)	0.191 (0.035)	
N1_05	M011027	0.022	—	1.127 (0.062)	-0.100 (0.035)		
N1_06	M011259	0.020	—	1.703 (0.172)	0.599 (0.043)	0.173 (0.020)	
N1_07	M011031	0.026	—	0.873 (0.081)	-0.304 (0.103)	0.144 (0.044)	
N1_08	M011227	0.026	—	0.613 (0.050)	1.246 (0.098)		
N1_09	M011267	0.042	—	0.711 (0.052)	-1.472 (0.094)		
N1_10	M011042	0.022	—	0.693 (0.046)	-0.114 (0.051)		
N1_11	M011184	0.014	—	0.870 (0.054)	0.311 (0.044)		
N1_12	M011190	0.021	—	1.236 (0.075)	0.717 (0.039)		
N1_13	M011193	0.019	—	1.728 (0.257)	1.068 (0.057)	0.280 (0.019)	
N4_01	M061272	0.018	—	1.024 (0.076)	1.283 (0.068)		
N4_02	M061243	0.019	—	0.663 (0.030)	0.739 (0.039)	-0.566 (0.073)	0.566 (0.084)
N4_03	M061029	0.025	—	1.430 (0.157)	0.665 (0.051)	0.183 (0.022)	
N4_04	M061031	0.017	—	1.411 (0.177)	1.361 (0.065)	0.070 (0.012)	
N4_05	M061050	0.019	—	1.442 (0.244)	1.448 (0.081)	0.186 (0.017)	
N4_06	M061167	0.027	—	0.975 (0.057)	-0.030 (0.039)		
N4_07	M061206	0.018	—	1.327 (0.247)	1.625 (0.103)	0.164 (0.016)	
N4_08A	M061265A	0.034	—	0.869 (0.090)	2.083 (0.155)		
N4_08B	M061265B	0.022	—	1.255 (0.324)	2.019 (0.185)	0.175 (0.015)	
N4_09	M061185	0.030	—	1.392 (0.146)	0.552 (0.053)	0.175 (0.023)	
N4_10	M061239	0.017	—	1.422 (0.083)	0.558 (0.032)		
<b>Items Common in 2015 and 2019:</b>							
MN01_01	MN11128	0.032	0.077	0.998 (0.047)	0.388 (0.032)		
MN01_02	MN11022	0.027	0.047	1.278 (0.056)	-0.440 (0.029)		
MN01_03	MN11010	0.027	0.035	1.239 (0.056)	0.447 (0.027)		
MN01_04A	MN11278A	0.039	0.065	1.161 (0.077)	-0.603 (0.066)	0.134 (0.034)	
MN01_04B	MN11278B	0.034	0.039	1.576 (0.141)	0.928 (0.037)	0.146 (0.014)	
MN01_05	MN11136	0.029	0.035	0.951 (0.044)	-0.079 (0.032)		
MN01_06	MN11261	0.014	0.047	1.099 (0.055)	0.875 (0.036)		
MN01_07	MN11033	0.042	0.062	0.427 (0.030)	-0.128 (0.063)		
MN01_08	MN11039	0.040	0.060	0.727 (0.057)	-0.824 (0.132)	0.151 (0.053)	

Item	RMSD		Slope ( $a_i$ )	Location ( $b_i$ )	Guessing ( $c_i$ )	Step 1 ( $d_{i1}$ )	Step 2 ( $d_{i2}$ )
	2015	2019					
MN01_09	MN11040	0.036	0.040	0.425 (0.055)	0.259 (0.226)	0.162 (0.059)	
MN01_10	MN11195	0.037	0.053	0.583 (0.042)	1.607 (0.102)		
MN01_11	MN11188	0.021	0.036	0.603 (0.037)	0.831 (0.059)		
MN01_12	MN11252	0.036	0.060	1.925 (0.169)	0.797 (0.033)	0.185 (0.014)	
MN03_01	MN11055	0.031	0.057	1.031 (0.049)	-0.730 (0.038)		
MN03_02	MN11214	0.024	0.044	1.308 (0.107)	0.214 (0.054)	0.229 (0.025)	
MN03_03A	MN11116A	0.030	0.050	1.102 (0.052)	-0.779 (0.037)		
MN03_03B	MN11116B	0.025	0.047	1.100 (0.052)	0.533 (0.031)		
MN03_04A	MN11066A	0.032	0.042	1.176 (0.057)	0.721 (0.032)		
MN03_04B	MN11066B	0.043	0.051	1.236 (0.065)	1.030 (0.038)		
MN03_05	MN11260	0.025	0.027	1.563 (0.113)	0.129 (0.042)	0.183 (0.022)	
MN03_06	MN11032	0.052	0.070	0.814 (0.061)	-0.270 (0.085)	0.112 (0.035)	
MN03_07	MN11170	0.059	0.095	0.462 (0.066)	0.638 (0.191)	0.169 (0.053)	
MN03_08	MN11068	0.046	0.066	0.599 (0.035)	0.022 (0.046)		
MN03_09	MN11269	0.024	0.038	1.045 (0.048)	-0.403 (0.033)		
MN03_10	MN11001	0.046	0.101	1.046 (0.101)	0.629 (0.060)	0.185 (0.024)	
MN03_11	MN11235	0.022	0.039	0.549 (0.024)	1.432 (0.056)	-0.886 (0.080)	0.886 (0.102)
MN05_01	MN11076	0.024	0.038	0.878 (0.072)	-0.454 (0.106)	0.201 (0.044)	
MN05_02	MN11141	0.016	0.031	1.124 (0.050)	-0.107 (0.029)		
MN05_03	MN11142	0.023	0.038	1.888 (0.136)	0.505 (0.029)	0.128 (0.014)	
MN05_04	MN11005	0.031	0.057	2.191 (0.189)	0.640 (0.031)	0.228 (0.015)	
MN05_05A	MN11256A	0.060	0.065	0.989 (0.045)	-0.507 (0.036)		
MN05_05B	MN11256B	0.044	0.054	0.987 (0.045)	-0.030 (0.031)		
MN05_06	MN11108	0.034	0.046	1.000 (0.055)	1.049 (0.045)		
MN05_07	MN11062	0.046	0.067	0.397 (0.031)	0.685 (0.081)		
MN05_08	MN11174	0.037	0.069	0.814 (0.042)	0.529 (0.039)		
MN05_09	MN11067	0.041	0.052	0.488 (0.064)	-0.054 (0.241)	0.223 (0.065)	
MN05_10	MN11043	0.052	0.099	0.687 (0.045)	-2.155 (0.113)		
MN05_11	MN11268	0.027	0.048	0.782 (0.067)	0.264 (0.076)	0.107 (0.029)	
MN05_12	MN11270	0.027	0.026	1.214 (0.058)	0.622 (0.030)		
MN07_01	MN11023	0.029	0.045	1.527 (0.116)	0.169 (0.045)	0.216 (0.022)	
MN07_02	MN11056	0.029	0.063	1.164 (0.094)	0.258 (0.056)	0.183 (0.025)	
MN07_03	MN11057	0.023	0.060	1.235 (0.054)	-0.274 (0.028)		
MN07_04	MN11113	0.021	0.059	1.045 (0.047)	-0.151 (0.031)		
MN07_05	MN11200	0.045	0.073	0.475 (0.016)	-1.102 (0.048)	-1.648 (0.116)	1.648 (0.102)
MN07_06	MN11129	0.023	0.047	1.313 (0.108)	0.466 (0.046)	0.180 (0.021)	
MN07_07	MN11218	0.024	0.070	0.854 (0.042)	-0.770 (0.045)		
MN07_08	MN11036	0.020	0.037	1.373 (0.136)	1.041 (0.045)	0.156 (0.015)	
MN07_09	MN11225	0.054	0.074	0.644 (0.040)	1.090 (0.066)		
MN07_10	MN11041	0.020	0.058	0.913 (0.095)	0.269 (0.094)	0.281 (0.035)	
MN07_11	MN11179	0.028	0.082	0.946 (0.048)	0.710 (0.038)		

Item	RMSD		Slope ( $a_i$ )	Location ( $b_i$ )	Guessing ( $c_i$ )	Step 1 ( $d_{i1}$ )	Step 2 ( $d_{i2}$ )
	2015	2019					
MN07_12	MN11303	0.030	0.076	1.113 (0.062)	1.156 (0.044)		
MN07_13	MN11305	0.020	0.041	1.136 (0.161)	1.256 (0.071)	0.279 (0.020)	
MN09_01	MN11019	0.027	0.048	0.953 (0.088)	0.237 (0.078)	0.219 (0.031)	
MN09_02	MN11145	0.035	0.069	1.060 (0.048)	-0.379 (0.032)		
MN09_03	MN11211	0.034	0.023	1.858 (0.135)	0.286 (0.034)	0.179 (0.018)	
MN09_04	MN11014	0.020	0.074	1.196 (0.054)	0.395 (0.028)		
MN09_05	MN11300	0.018	0.027	1.148 (0.055)	0.620 (0.031)		
MN09_06	MN11028	0.031	0.041	1.383 (0.060)	0.040 (0.025)		
MN09_07	MN11231	0.029	0.040	1.327 (0.201)	1.610 (0.079)	0.190 (0.014)	
MN09_08	MN11061	0.064	0.096	0.660 (0.051)	-1.040 (0.146)	0.138 (0.054)	
MN09_09	MN11045	0.029	0.072	0.999 (0.081)	0.075 (0.069)	0.165 (0.030)	
MN09_10	MN11265	0.038	0.091	0.851 (0.069)	-1.083 (0.141)	0.215 (0.061)	
MN09_11	MN11154	0.034	0.042	0.685 (0.025)	0.425 (0.028)		-0.377 (0.055) 0.377 (0.059)
MN09_12	MN11240	0.020	0.043	1.100 (0.148)	1.214 (0.069)	0.252 (0.020)	
MN11_01	MN11009	0.034	0.039	0.978 (0.084)	0.073 (0.078)	0.210 (0.033)	
MN11_02	MN11024	0.028	0.063	1.072 (0.048)	0.172 (0.029)		
MN11_03	MN11134	0.025	0.051	1.272 (0.116)	0.430 (0.056)	0.262 (0.024)	
MN11_04	MN11212	0.034	0.060	0.873 (0.042)	-0.178 (0.035)		
MN11_05	MN11253	0.025	0.044	0.960 (0.080)	0.079 (0.075)	0.179 (0.032)	
MN11_06	MN11221	0.035	0.049	2.127 (0.177)	0.767 (0.029)	0.161 (0.013)	
MN11_07	MN11146	0.052	0.078	0.760 (0.042)	0.820 (0.048)		
MN11_08	MN11177	0.019	0.032	1.337 (0.067)	0.910 (0.032)		
MN11_09	MN11158	0.045	0.081	0.675 (0.037)	0.273 (0.044)		
MN11_10	MN11002	0.029	0.054	1.288 (0.143)	1.083 (0.052)	0.204 (0.017)	
MN11_11A	MN11182A	0.037	0.078	0.987 (0.072)	-1.076 (0.105)	0.172 (0.051)	
MN11_11B	MN11182B	0.045	0.070	0.859 (0.064)	-0.548 (0.096)	0.142 (0.042)	
MN11_12	MN11272	0.019	0.028	0.766 (0.043)	1.859 (0.071)		-0.185 (0.060) 0.185 (0.104)
MN13_01	MN11017	0.042	0.060	0.786 (0.040)	-0.936 (0.052)		
MN13_02	MN11125	0.042	0.080	0.894 (0.044)	0.322 (0.034)		
MN13_03	MN11077	0.025	0.020	1.141 (0.058)	0.844 (0.035)		
MN13_04A	MN11047A	0.053	0.075	1.045 (0.072)	-0.753 (0.083)	0.147 (0.040)	
MN13_04B	MN11047B	0.051	0.063	1.100 (0.083)	-0.407 (0.078)	0.198 (0.037)	
MN13_05	MN11223	0.022	0.021	1.154 (0.056)	0.703 (0.032)		
MN13_06	MN11034	0.047	0.070	0.915 (0.113)	1.123 (0.070)	0.173 (0.022)	
MN13_07	MN11175	0.039	0.030	1.049 (0.050)	0.473 (0.031)		
MN13_08	MN11262	0.022	0.035	0.975 (0.105)	0.825 (0.063)	0.191 (0.024)	
MN13_09	MN11239	0.023	0.027	0.800 (0.123)	1.408 (0.097)	0.202 (0.024)	
MN13_10	MN11202	0.025	0.026	0.910 (0.043)	-0.152 (0.034)		
MN13_11	MN11299	0.027	0.083	1.349 (0.061)	0.321 (0.025)		
MP03_01	MP61026	0.025	0.034	1.112 (0.093)	0.459 (0.053)	0.158 (0.023)	
MP03_02	MP61273	0.041	0.043	1.083 (0.110)	0.953 (0.054)	0.156 (0.019)	

Item	RMSD		Slope ( $a_i$ )	Location ( $b_i$ )	Guessing ( $c_i$ )	Step 1 ( $d_{i1}$ )	Step 2 ( $d_{i2}$ )
	2015	2019					
MP03_03	MP61034	0.016	0.040	1.221 (0.077)	1.498 (0.056)		
MP03_04	MP61040	0.029	0.037	1.722 (0.226)	1.443 (0.054)	0.180 (0.012)	
MP03_05	MP61228	0.026	0.032	0.808 (0.046)	1.885 (0.072)		-0.178 (0.059) 0.178 (0.105)
MP03_06	MP61166	0.021	0.030	1.194 (0.058)	0.709 (0.031)		
MP03_07	MP61171	0.020	0.041	1.404 (0.129)	0.605 (0.047)	0.236 (0.020)	
MP03_08	MP61080	0.021	0.030	0.677 (0.048)	1.668 (0.097)		
MP03_09	MP61222	0.026	0.038	0.880 (0.115)	0.952 (0.081)	0.253 (0.027)	
MP03_10	MP61076	0.035	0.030	0.522 (0.035)	0.790 (0.066)		
MP03_11	MP61084	0.035	0.027	0.961 (0.068)	1.725 (0.083)		

#### Items Introduced in 2019:

MN04_01	MN21061	—	0.027	1.821 (0.197)	-0.071 (0.061)	0.142 (0.034)	
MN04_02	MN21067	—	0.023	1.223 (0.181)	0.332 (0.099)	0.254 (0.043)	
MN04_03	MN21046	—	0.024	1.023 (0.084)	0.635 (0.054)		
MN04_04	MN21023	—	0.034	1.193 (0.088)	-0.450 (0.053)		
MN04_05	MN21018	—	0.046	0.894 (0.081)	0.935 (0.071)		
MN04_06	MN21020	—	0.035	1.318 (0.153)	0.384 (0.065)	0.096 (0.030)	
MN04_07	MN21069	—	0.031	1.658 (0.200)	-0.065 (0.076)	0.214 (0.041)	
MN04_08	MN21040	—	0.031	1.990 (0.249)	0.399 (0.054)	0.193 (0.029)	
MN04_09	MN21070	—	0.027	1.154 (0.217)	1.135 (0.091)	0.179 (0.030)	
MN04_10	MN21037	—	0.027	1.675 (0.198)	0.389 (0.057)	0.137 (0.028)	
MN04_11	MN21033	—	0.035	0.719 (0.074)	1.183 (0.102)		
MN04_12	MN21001	—	0.028	1.039 (0.185)	0.809 (0.101)	0.210 (0.039)	
MN04_13	MN21060	—	0.034	0.487 (0.027)	-0.219 (0.059)		-1.214 (0.150) 1.214 (0.142)
MN04_14	MN21003	—	0.062	0.518 (0.041)	-0.174 (0.063)		0.244 (0.116) -0.244 (0.104)
MN12_01	MN21066	—	0.037	1.003 (0.128)	-0.385 (0.143)	0.157 (0.067)	
MN12_02	MN21045	—	0.036	0.606 (0.132)	0.530 (0.231)	0.151 (0.080)	
MN12_03	MN21064	—	0.024	1.686 (0.207)	0.663 (0.052)	0.114 (0.023)	
MN12_04	MN21051	—	0.026	1.568 (0.112)	0.224 (0.038)		
MN12_05	MN21054	—	0.043	1.363 (0.180)	-0.662 (0.132)	0.279 (0.069)	
MN12_06	MN21025	—	0.027	0.850 (0.045)	0.179 (0.037)		-0.499 (0.084) 0.499 (0.084)
MN12_07	MN21038	—	0.025	1.156 (0.179)	0.359 (0.109)	0.260 (0.045)	
MN12_08	MN21043	—	0.026	1.226 (0.097)	0.699 (0.049)		
MN12_09	MN21030	—	0.028	0.933 (0.156)	0.665 (0.110)	0.163 (0.044)	
MN12_10	MN21032	—	0.034	0.665 (0.059)	-0.335 (0.077)		
MN12_11	MN21053	—	0.029	1.107 (0.155)	-0.160 (0.136)	0.248 (0.061)	
MN12_12A	MN21010A	—	0.031	0.808 (0.150)	-0.086 (0.236)	0.302 (0.083)	
MN12_12B	MN21010B	—	0.040	0.893 (0.120)	2.081 (0.188)		
MN12_13	MN21059	—	0.027	1.166 (0.094)	0.678 (0.051)		
MN14_01	MN21049	—	0.041	0.442 (0.038)	0.355 (0.070)		0.666 (0.116) -0.666 (0.125)
MN14_02	MN21050	—	0.047	0.512 (0.053)	0.210 (0.089)		
MN14_03	MN21065	—	0.031	1.794 (0.295)	0.817 (0.066)	0.283 (0.028)	

Item	RMSD		Slope ( $a_i$ )	Location ( $b_i$ )	Guessing ( $c_i$ )	Step 1 ( $d_{i1}$ )	Step 2 ( $d_{i2}$ )
	2015	2019					
MN14_04	MN21014	—	0.055	0.910 (0.073)	-0.823 (0.075)		
MN14_05	MN21019	—	0.031	1.210 (0.168)	-0.037 (0.118)	0.266 (0.053)	
MN14_06	MN21024	—	0.025	1.498 (0.223)	1.023 (0.062)	0.121 (0.023)	
MN14_07	MN21035	—	0.020	1.261 (0.190)	0.368 (0.099)	0.270 (0.043)	
MN14_08	MN21039	—	0.028	1.190 (0.162)	0.069 (0.110)	0.231 (0.050)	
MN14_09	MN21062	—	0.046	0.517 (0.053)	-0.136 (0.091)		
MN14_10	MN21057	—	0.025	0.650 (0.064)	0.828 (0.088)		
MN14_11	MN21063	—	0.030	1.225 (0.155)	-0.017 (0.103)	0.193 (0.049)	
MN14_12	MN21005	—	0.026	0.919 (0.077)	0.581 (0.058)		
MN14_13A	MN21012A	—	0.053	0.767 (0.064)	-0.319 (0.071)		
MN14_13B	MN21012B	—	0.032	1.605 (0.252)	0.848 (0.066)	0.213 (0.028)	
MP02_01	MP71219	—	0.035	0.995 (0.140)	0.107 (0.122)	0.174 (0.053)	
MP02_02	MP71021	—	0.033	1.692 (0.240)	0.892 (0.057)	0.140 (0.023)	
MP02_03	MP71167	—	0.042	1.084 (0.119)	1.638 (0.111)		
MP02_04	MP71041	—	0.033	0.973 (0.157)	0.810 (0.095)	0.129 (0.037)	
MP02_05	MP71162	—	0.024	0.540 (0.045)	1.972 (0.140)	-0.968 (0.153)	0.968 (0.215)
MP02_06	MP71078	—	0.027	0.788 (0.070)	0.573 (0.068)		
MP02_07	MP71090	—	0.029	0.788 (0.182)	1.355 (0.140)	0.139 (0.040)	
MP02_08	MP71151	—	0.027	0.590 (0.044)	1.819 (0.107)	-1.918 (0.219)	1.918 (0.253)
MP02_09	MP71119	—	0.041	0.649 (0.059)	-0.203 (0.077)		
MP02_10A	MP71217A	—	0.030	0.711 (0.065)	0.411 (0.071)		
MP02_11	MP71142	—	0.031	1.207 (0.094)	0.440 (0.047)		
MP02_12	MP71204	—	0.027	1.112 (0.115)	1.418 (0.091)		
MP08_01	MP71018	—	0.024	1.343 (0.235)	1.140 (0.078)	0.175 (0.026)	
MP08_02	MP71009	—	0.039	1.361 (0.116)	1.019 (0.053)		
MP08_03	MP71037	—	0.052	0.761 (0.071)	0.961 (0.082)		
MP08_04	MP71051	—	0.032	1.049 (0.132)	1.973 (0.150)		
MP08_05	MP71064	—	0.027	1.016 (0.257)	1.590 (0.142)	0.195 (0.030)	
MP08_06	MP71169	—	0.030	1.379 (0.135)	1.391 (0.071)		
MP08_07	MP71083	—	0.033	1.708 (0.432)	1.590 (0.103)	0.237 (0.022)	
MP08_09	MP71184	—	0.027	2.331 (0.847)	1.883 (0.120)	0.244 (0.018)	
MP08_10	MP71141	—	0.050	0.585 (0.089)	2.430 (0.293)		
MP08_11	MP71194	—	0.044	0.750 (0.064)	-0.224 (0.071)		
MP08_12	MP71193	—	0.033	0.596 (0.043)	1.289 (0.077)	-0.565 (0.114)	0.565 (0.143)
MP08_13	MP71192	—	0.025	0.498 (0.037)	1.885 (0.120)	-2.221 (0.247)	2.221 (0.283)
MP13_01	MP61240	—	0.045	0.572 (0.081)	2.083 (0.241)		
MP13_02	MP61254	—	0.062	0.678 (0.069)	1.111 (0.102)		
MP13_03	MP61244	—	0.025	1.382 (0.236)	0.802 (0.083)	0.257 (0.033)	
MP13_04	MP61041	—	0.029	0.729 (0.267)	1.997 (0.286)	0.195 (0.040)	
MP13_05	MP61173	—	0.038	0.774 (0.067)	0.458 (0.066)		
MP13_06	MP61252	—	0.027	1.748 (0.395)	1.650 (0.097)	0.127 (0.017)	

Item	RMSD		Slope ( $a_i$ )	Location ( $b_i$ )	Guessing ( $c_i$ )	Step 1 ( $d_{i1}$ )	Step 2 ( $d_{i2}$ )
	2015	2019					
MP13_07	MP61261	—	0.032	1.562 (0.137)	1.084 (0.051)		
MP13_08	MP61224	—	0.023	0.821 (0.083)	1.321 (0.101)		
MP13_09	MP61077	—	0.027	1.151 (0.232)	1.438 (0.105)	0.126 (0.025)	
MP13_10A	MP61069A	—	0.035	0.716 (0.063)	0.290 (0.069)		
MP13_10B	MP61069B	—	0.033	0.726 (0.070)	0.874 (0.084)		

## Appendix 12F: Science Item Parameters from the TIMSS 2019 Grade 4 Less Difficult Calibration

Item	RMSD	Slope (a <sub>i</sub> )	Location (b <sub>i</sub> )	Guessing (c <sub>i</sub> )	Step 1 (d <sub>i1</sub> )	Step 2 (d <sub>i2</sub> )
<b>Trend Items*:</b>						
SP01_01	SP51054	0.114	0.934	-0.419	0.261	
SP01_02	SP51024	0.058	0.612	0.674		
SP01_03A	SP51132A	0.033	0.881	1.254		
SP01_03B	SP51132B	0.059	0.810	1.065		
SP01_04	SP51040	0.126	0.453	0.606		
SP01_05	SP51193	0.064	0.940	-0.126	0.274	
SP01_06	SP51063	0.034	1.148	0.754	0.222	
SP01_07	SP51012	0.049	0.989	0.268	0.253	
SP01_08	SP51115	0.033	1.090	0.146		
SP01_09	SP51180	0.062	0.880	0.057	0.360	
SP01_10	SP51106	0.062	1.024	0.721	0.215	
SP01_11	SP51148	0.067	1.049	0.043	0.241	
SP03_01	SP61141	0.097	1.235	0.519	0.300	
SP03_02	SP61023	0.039	0.770	0.015		
SP03_03	SP61054	0.075	0.479	0.643	1.489	-1.489
SP03_04	SP61007	0.082	0.647	-0.209	0.163	
SP03_05	SP61006	0.118	0.785	-0.650		
SP03_06	SP61108	0.058	1.050	0.233	0.352	
SP03_07	SP61109	0.064	0.583	0.710	0.235	
SP03_08	SP61080	0.056	0.968	0.297	0.264	
SP03_09	SP61088	0.051	0.672	1.417		
SP03_10	SP61151	0.069	0.952	0.440		
SP03_11	SP61150	0.090	0.624	0.408		
SP03_12	SP61169	0.037	1.077	0.079	0.268	
SP05_01	SP51044	0.119	0.503	0.201		
SP05_03	SP51003	0.061	0.711	-0.122	0.104	
SP05_04	SP51168	0.179	0.704	-0.475		
SP05_05	SP51010	0.060	0.766	0.076		
SP05_06	SP51035	0.035	1.249	1.298	0.236	
SP05_07	SP51059	0.064	0.584	0.104		
SP05_08	SP51142	0.048	0.802	0.598	0.199	
SP05_09A	SP51131A	0.054	1.014	-0.089	0.193	
SP05_09B	SP51131B	0.029	0.988	0.576	0.197	
SP05_10	SP51151	0.122	0.918	-1.120		
SP05_11	SP51157	0.065	0.739	0.999	0.190	

\* Item parameters for trend items were fixed from the paperTIMSS fourth grade science concurrent calibration.

Item		RMSD	Slope (a <sub>i</sub> )	Location (b <sub>i</sub> )	Guessing (c <sub>i</sub> )	Step 1 (d <sub>1i</sub> )	Step 2 (d <sub>2i</sub> )
<b>Trend Items*:</b>							
SP06_01	SP61071	0.124	0.335	-1.372	0.197		
SP06_02	SP61138	0.119	0.616	0.002			
SP06_03A	SP61016A	0.049	0.926	0.365	0.216		
SP06_03B	SP61016B	0.026	0.990	0.509			
SP06_04	SP61011	0.103	0.733	-0.536			
SP06_06	SP61083	0.100	0.726	-1.025			
SP06_07	SP61034	0.038	0.788	1.088			
SP06_08	SP61044	0.052	0.740	0.551			
SP06_09A	SP61142A	0.056	0.623	0.351			
SP06_09B	SP61142B	0.052	0.788	1.034			
SP06_10A	SP61115A	0.062	1.468	0.346	0.264		
SP06_10B	SP61115B	0.072	1.345	0.662	0.328		
SP07_01	SP51161	0.109	0.488	1.007	0.217		
SP07_02	SP51051	0.121	1.391	1.370	0.281		
SP07_03Z	SP51138Z	0.055	0.583	0.313			
SP07_04	SP51194	0.017	0.970	1.014			
SP07_05	SP51029	0.040	0.518	1.220	0.202		
SP07_06	SP51077	0.079	0.747	-0.167			
SP07_07	SP51200	0.129	0.679	1.196			
SP07_08	SP51075	0.135	0.670	-0.586			
SP07_09	SP51065	0.084	0.870	-0.215	0.333		
SP07_10	SP51191	0.051	1.342	0.578	0.205		
SP07_11	SP51099	0.044	0.868	0.332	0.216		
SP07_12	SP51175	0.024	0.978	0.968			
SP09_01	SP61135	0.102	0.758	-0.598	0.268		
SP09_02	SP61069	0.120	0.400	-0.481			
SP09_03	SP61134	0.086	0.651	0.181	0.126		
SP09_04	SP61140	0.040	1.039	0.601	0.296		
SP09_05	SP61019	0.031	0.887	0.943			
SP09_06	SP61022	0.085	0.656	0.183	0.241		
SP09_07	SP61036	0.095	0.951	0.903			
SP09_08	SP61160	0.108	0.761	-0.954			
SP09_09	SP61159	0.114	0.826	-0.788			
SP09_10	SP61091	0.036	0.452	1.170		-0.176	0.176
SP09_11	SP61118	0.034	1.001	0.542	0.217		
SP09_12	SP61097	0.036	0.798	0.517	0.275		
SP11_01	SP61132	0.090	0.710	0.539	0.213		
SP11_02	SP61120	0.048	0.884	0.333	0.197		
SP11_03	SP61025	0.079	0.531	-0.366			

\* Item parameters for trend items were fixed from the paperTIMSS fourth grade science concurrent calibration.



Item	RMSD	Slope (a <sub>i</sub> )	Location (b <sub>i</sub> )	Guessing (c <sub>i</sub> )	Step 1 (d <sub>1i</sub> )	Step 2 (d <sub>2i</sub> )
<b>Trend Items*:</b>						
SP11_04A	SP61133A	0.061	1.370	0.245	0.326	
SP11_04B	SP61133B	0.046	1.701	0.792	0.114	
SP11_05	SP61074	0.075	0.772	0.219		
SP11_06	SP61093	0.142	0.761	-0.057	0.937	-0.937
SP11_07	SP61161	0.086	0.614	0.664		
SP11_08A	SP61042A	0.031	1.366	0.806	0.239	
SP11_08B	SP61042B	0.040	0.791	0.640	0.150	
SP11_09A	SP61041A	0.055	0.871	0.116		
SP11_09B	SP61041B	0.066	0.719	0.167		
SP11_10	SP61155	0.097	0.735	-0.488	0.286	
SP13_02	SP61014	0.085	0.495	0.425		
SP13_03	SP61056	0.104	0.853	-0.738		
SP13_04	SP61015	0.110	0.692	-0.395		
SP13_05	SP61113	0.101	0.760	0.954		
SP13_06	SP61107	0.075	1.001	0.641	0.180	
SP13_07	SP61046	0.029	1.164	0.804	0.227	
SP13_08	SP61047	0.095	0.751	-0.518	0.313	
SP13_09	SP61048	0.045	1.300	0.509	0.221	
SP13_10	SP61096	0.054	1.100	0.730	0.257	
SP13_11	SP61124	0.031	0.590	1.242		
SP13_12	SP61116	0.092	0.681	0.159		
<b>New Items:</b>						
SP02_01	SP71002	0.103	0.516 (0.047)	-0.414 (0.099)		
SP02_02	SP71402	0.049	1.200 (0.183)	-0.140 (0.086)	0.240 (0.027)	
SP02_03	SP71017	0.048	0.598 (0.065)	0.571 (0.142)		
SP02_04	SP71077	0.038	0.970 (0.089)	0.243 (0.076)		
SP02_05	SP71072	0.030	0.959 (0.240)	0.673 (0.150)	0.246 (0.027)	
SP02_06	SP71054	0.053	0.954 (0.082)	-0.045 (0.067)		
SP02_07	SP71115	0.046	0.703 (0.197)	0.728 (0.202)	0.249 (0.034)	
SP02_08	SP71140	0.046	0.850 (0.180)	0.366 (0.131)	0.231 (0.030)	
SP02_09	SP71128	0.084	0.478 (0.122)	-0.242 (0.285)	0.281 (0.063)	
SP02_10	SP71147	0.086	0.639 (0.125)	-0.285 (0.171)	0.235 (0.045)	
SP02_11A	SP71920A	0.049	0.862 (0.078)	0.113 (0.079)		
SP02_11B	SP71920B	0.029	0.955 (0.096)	0.458 (0.091)		
SP02_12	SP71268	0.024	1.089 (0.425)	1.318 (0.292)	0.213 (0.022)	
SP04_01	SP71013	0.086	0.959 (0.140)	-0.850 (0.124)	0.272 (0.038)	
SP04_02	SP71902	0.058	0.343 (0.043)	0.537 (0.215)		
SP04_03	SP71076	0.050	1.053 (0.155)	-0.254 (0.092)	0.210 (0.029)	

\* Item parameters for trend items were fixed from the paperTIMSS fourth grade science concurrent calibration.

Item		RMSD	Slope ( $a_i$ )	Location ( $b_i$ )	Guessing ( $c_i$ )	Step 1 ( $d_{i1}$ )	Step 2 ( $d_{i2}$ )
<b>New Items:</b>							
SP04_04	SP71041	0.030	0.659 (0.063)	1.056 (0.125)		-0.010 (0.105)	0.010 (0.183)
SP04_05	SP71046	0.039	0.645 (0.069)	0.627 (0.137)			
SP04_06	SP71095	0.048	0.558 (0.060)	0.567 (0.147)			
SP04_07	SP71129	0.091	0.818 (0.134)	-0.904 (0.165)	0.308 (0.045)		
SP04_08	SP71102	0.031	0.811 (0.088)	0.656 (0.122)			
SP04_09	SP71124	0.031	0.900 (0.232)	0.762 (0.167)	0.223 (0.027)		
SP04_10	SP71112	0.138	0.686 (0.099)	-1.453 (0.211)	0.218 (0.058)		
SP04_11	SP71265	0.053	0.209 (0.099)	1.461 (0.883)	0.273 (0.097)		
SP04_12	SP71223	0.118	0.482 (0.078)	-1.707 (0.350)	0.238 (0.080)		
SP08_02	SP71033	0.059	0.320 (0.131)	0.812 (0.461)	0.275 (0.080)		
SP08_03	SP71065	0.092	0.428 (0.042)	-0.391 (0.119)			
SP08_04	SP71025	0.081	0.353 (0.094)	-0.043 (0.366)	0.215 (0.072)		
SP08_05	SP71081	0.023	0.937 (0.323)	1.328 (0.300)	0.167 (0.022)		
SP08_06	SP71056	0.025	0.610 (0.082)	1.382 (0.243)			
SP08_07	SP71145	0.075	0.493 (0.114)	0.010 (0.214)	0.198 (0.051)		
SP08_08	SP71104	0.115	0.741 (0.057)	-0.780 (0.071)			
SP08_09	SP71144	0.065	0.492 (0.131)	0.547 (0.222)	0.180 (0.045)		
SP08_10	SP71150	0.065	0.742 (0.065)	-0.104 (0.081)			
SP08_11	SP71201	0.042	1.069 (0.180)	-0.046 (0.098)	0.248 (0.029)		
SP08_12	SP71237	0.044	1.097 (0.097)	0.096 (0.065)			
SP08_13	SP71260	0.031	0.664 (0.237)	1.404 (0.381)	0.170 (0.028)		
SP10_01	SP71009	0.126	0.521 (0.036)	-0.386 (0.073)		1.209 (0.101)	-1.209 (0.126)
SP10_02	SP71093	0.081	0.731 (0.059)	-0.493 (0.073)			
SP10_03	SP71069	0.038	0.842 (0.281)	0.955 (0.240)	0.288 (0.029)		
SP10_04	SP71051	0.036	0.687 (0.073)	0.630 (0.134)			
SP10_05	SP71039	0.045	0.985 (0.161)	0.083 (0.096)	0.173 (0.026)		
SP10_06	SP71080	0.028	0.819 (0.473)	1.799 (0.682)	0.236 (0.026)		
SP10_07	SP71137	0.066	0.720 (0.062)	-0.213 (0.080)			
SP10_08	SP71103	0.043	0.833 (0.189)	0.323 (0.142)	0.271 (0.032)		
SP10_09	SP71106	0.057	0.422 (0.054)	1.021 (0.242)			
SP10_10	SP71100	0.067	0.697 (0.146)	-0.203 (0.167)	0.288 (0.042)		
SP10_12	SP71220	0.034	0.783 (0.221)	0.832 (0.206)	0.222 (0.030)		
SP10_13	SP71254	0.041	0.546 (0.067)	0.967 (0.200)			
SP12_01	SP71031	0.066	0.320 (0.044)	1.046 (0.295)			
SP12_02	SP71090	0.061	0.726 (0.065)	0.024 (0.088)			
SP12_03	SP71048	0.027	2.262 (0.784)	1.004 (0.127)	0.224 (0.017)		
SP12_04	SP71071	0.025	0.732 (0.093)	1.110 (0.186)			
SP12_05	SP71011	0.070	1.081 (0.154)	-0.350 (0.089)	0.203 (0.028)		
SP12_06	SP71142	0.095	0.387 (0.101)	-0.138 (0.331)	0.221 (0.069)		

Item	RMSD	Slope ( $a_i$ )	Location ( $b_i$ )	Guessing ( $c_i$ )	Step 1 ( $d_{i1}$ )	Step 2 ( $d_{i2}$ )
<b>New Items:</b>						
SP12_07	SP71138	0.113	0.702 (0.055)	-0.752 (0.074)		
SP12_08	SP71127	0.068	0.711 (0.153)	-0.064 (0.157)	0.285 (0.039)	
SP12_10	SP71500	0.049	0.816 (0.153)	0.232 (0.120)	0.170 (0.028)	
SP12_11	SP71257	0.034	1.649 (0.762)	1.030 (0.207)	0.429 (0.022)	
SP12_12	SP71222	0.044	0.985 (0.092)	0.194 (0.076)		
SP12_13	SP71252	0.043	0.968 (0.200)	0.200 (0.119)	0.266 (0.030)	
SP14_01	SP71063	0.075	0.409 (0.045)	0.160 (0.153)		
SP14_02	SP71900	0.043	0.965 (0.206)	0.083 (0.127)	0.351 (0.032)	
SP14_04	SP71043	0.026	0.742 (0.096)	1.179 (0.193)		
SP14_05	SP71005	0.101	0.845 (0.065)	-0.691 (0.063)		
SP14_06	SP71118	0.033	1.178 (0.233)	0.473 (0.101)	0.185 (0.023)	
SP14_07	SP71139	0.106	0.538 (0.106)	-0.701 (0.243)	0.236 (0.059)	
SP14_08	SP71114	0.086	0.713 (0.059)	-0.481 (0.074)		
SP14_09	SP71131	0.077	0.566 (0.053)	-0.097 (0.102)		
SP14_10	SP71152	0.040	0.862 (0.197)	0.361 (0.138)	0.271 (0.031)	
SP14_11	SP71218	0.120	0.600 (0.102)	-0.922 (0.212)	0.211 (0.054)	
SP14_12	SP71214	0.040	0.923 (0.169)	0.218 (0.108)	0.185 (0.027)	
SP14_13	SP71213	0.030	0.939 (0.106)	0.721 (0.116)		