

APPENDIX K

ITEM RESPONSE THEORY PARAMETERS

**Table K-1. IRT Parameters for Dichotomous Items
– High School Biology**

Item Number	Parameters and Measures of Standard Error						Item Number	Parameters and Measures of Standard Error					
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>		<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>
281132	1.66484	0.00000	0.35829	0.00000	0.29168	0.00000	316178	0.98802	0.00000	-0.61315	0.00000	0.27203	0.00000
295285	0.79250	0.00000	0.44347	0.00000	0.31468	0.00000	316181	1.02853	0.00000	-0.80570	0.00000	0.28785	0.00000
299754	0.52752	0.00000	0.00093	0.00000	0.27164	0.00000	316187	0.80848	0.00000	0.50596	0.00000	0.28340	0.00000
299762	0.91717	0.00000	-0.86204	0.00000	0.29772	0.00000	316242	1.13697	0.00000	-0.43576	0.00000	0.33363	0.00000
299811	1.19173	0.00000	0.28511	0.00000	0.40569	0.00000	317088	1.07487	0.00000	-1.33771	0.00000	0.19573	0.00000
299820	0.91748	0.00000	-0.92676	0.00000	0.11814	0.00000	317089	0.68976	0.00000	0.08044	0.00000	0.31068	0.00000
304253	1.52797	0.00000	-0.44897	0.00000	0.28314	0.00000	62697164	0.78534	0.00000	-0.41154	0.00000	0.28199	0.00000
305778	0.93080	0.00000	-0.43813	0.00000	0.32097	0.00000	62697690	0.72582	0.00000	-0.36731	0.00000	0.41799	0.00000
306341	1.30020	0.00000	-0.75697	0.00000	0.33743	0.00000	62843663	1.15686	0.00000	-1.07293	0.00000	0.15535	0.00000
310160	0.97491	0.00000	-0.28475	0.00000	0.26890	0.00000	62843679	1.06362	0.00000	-1.71856	0.00000	0.15368	0.00000
310201	0.47798	0.00000	-0.79812	0.00000	0.12562	0.00000	62857712	0.28524	0.00000	-1.26104	0.00000	0.10774	0.00000
310721	1.12601	0.00000	0.45939	0.00000	0.37391	0.00000	62875196	1.12762	0.00000	-0.55086	0.00000	0.29718	0.00000
310751	0.60902	0.00000	-1.01425	0.00000	0.17811	0.00000	62917457	0.93001	0.00000	0.38100	0.00000	0.44807	0.00000
310758	1.21140	0.00000	-0.93481	0.00000	0.12976	0.00000	62990359	0.45487	0.00000	-1.58292	0.00000	0.13507	0.00000
313328	0.53787	0.00000	-0.24926	0.00000	0.26213	0.00000	63050892	0.67166	0.00000	-0.92271	0.00000	0.30379	0.00000
313383	0.65158	0.00000	1.24655	0.00000	0.26178	0.00000	63215770	0.74695	0.00000	-1.29662	0.00000	0.12381	0.00000
313428	0.75573	0.00000	-0.64592	0.00000	0.28254	0.00000	63245821	0.86127	0.00000	-0.56991	0.00000	0.37442	0.00000
313464	0.48370	0.00000	-0.00285	0.00000	0.20769	0.00000	70266138	0.60205	0.00000	0.28534	0.00000	0.22265	0.00000
314804	0.60590	0.00000	-0.72808	0.00000	0.25189	0.00000	70266283	0.69284	0.00000	-0.32617	0.00000	0.20912	0.00000
316110	0.83660	0.00000	-1.02325	0.00000	0.14875	0.00000	70682840	1.13242	0.00000	-0.09098	0.00000	0.35862	0.00000

**Table K-2. IRT Parameters for Polytomous Items
– High School Biology**

Item Number	Parameters and Measures of Standard Error													
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>	<i>D1</i>	<i>SE (D1)</i>	<i>D2</i>	<i>SE (D2)</i>	<i>D3</i>	<i>SE (D3)</i>	<i>D4</i>	<i>SE (D4)</i>
291000	1.18155	0.00000	0.39432	0.00000	1.51162	0.00000	0.64544	0.00000	-0.49801	0.00000	-1.65905	0.00000	0.00000	0.00000
296810	1.12204	0.00000	0.81552	0.00000	2.05718	0.00000	0.24125	0.00000	-0.67533	0.00000	-1.62309	0.00000	0.00000	0.00000
316261	0.91757	0.00000	0.73225	0.00000	1.99856	0.00000	0.53047	0.00000	-0.70521	0.00000	-1.82382	0.00000	0.00000	0.00000
70593592	0.98011	0.00461	-0.13307	0.00494	1.20668	0.00802	0.84684	0.00714	-0.66606	0.00630	-1.38746	0.00742	0.00000	0.00000
70594475	1.05010	0.00000	0.54249	0.00000	1.94916	0.00000	0.73461	0.00000	-0.74847	0.00000	-1.93530	0.00000	0.00000	0.00000

**Table K-3. IRT Parameters for Dichotomous Items
– High School Chemistry**

Item Number	Parameters and Measures of Standard Error						Item Number	Parameters and Measures of Standard Error					
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>		<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>
208242	1.83237	0.00000	0.45698	0.00000	0.25469	0.00000	294600	0.49114	0.00000	-0.77892	0.00000	0.00000	0.00000
230480	1.23221	0.00000	-0.28894	0.00000	0.17437	0.00000	294729	0.49803	0.00000	-0.38429	0.00000	0.00000	0.00000
258969	0.55561	0.00000	1.73810	0.00000	0.19246	0.00000	294735	1.08049	0.00000	0.51505	0.00000	0.28569	0.00000
261071	1.26082	0.00000	0.25395	0.00000	0.24853	0.00000	294762	1.25229	0.00000	-0.12501	0.00000	0.16884	0.00000
273004	0.98629	0.00000	1.01383	0.00000	0.29074	0.00000	299690	1.29122	0.00000	-0.23997	0.00000	0.30783	0.00000
273009	0.57042	0.00000	-0.66883	0.00000	0.00000	0.00000	299718	0.77266	0.00000	-0.85006	0.00000	0.00000	0.00000
275812	1.53514	0.00000	0.68193	0.00000	0.36118	0.00000	300099	1.17471	0.00000	-0.02080	0.00000	0.20268	0.00000
275816	0.91447	0.00000	-0.40726	0.00000	0.28789	0.00000	300105	1.32701	0.00000	0.49122	0.00000	0.22021	0.00000
275844	1.31785	0.00000	0.77563	0.00000	0.26926	0.00000	300119	0.81002	0.00000	0.16893	0.00000	0.20998	0.00000
275849	1.39437	0.00000	0.53678	0.00000	0.26567	0.00000	300121	1.24406	0.00000	0.38140	0.00000	0.23247	0.00000
275854	1.60832	0.00000	-0.10209	0.00000	0.24288	0.00000	300189	1.10896	0.00000	-0.05089	0.00000	0.24343	0.00000
281264	0.90572	0.00000	1.66347	0.00000	0.28418	0.00000	300193	1.59571	0.00000	0.95785	0.00000	0.25943	0.00000
281269	1.59718	0.00000	-0.73003	0.00000	0.22921	0.00000	300198	1.08571	0.00000	0.14729	0.00000	0.30807	0.00000
281310	1.02536	0.00000	-0.28139	0.00000	0.27283	0.00000	304366	1.28791	0.00000	0.65205	0.00000	0.15197	0.00000
281326	1.51705	0.00000	1.62122	0.00000	0.27497	0.00000	304388	1.00381	0.00000	-0.23953	0.00000	0.23047	0.00000
281333	1.17113	0.00000	1.27233	0.00000	0.32616	0.00000	304405	1.02569	0.00000	-0.13098	0.00000	0.22339	0.00000
281917	1.00740	0.00000	0.31488	0.00000	0.22869	0.00000	305196	0.54368	0.00000	-1.27241	0.00000	0.00000	0.00000
287273	0.71179	0.00000	-0.25814	0.00000	0.25594	0.00000	305197	1.12643	0.00000	0.32205	0.00000	0.24641	0.00000
287570	1.60280	0.00000	0.15982	0.00000	0.27099	0.00000	305213	0.98611	0.00000	0.20687	0.00000	0.25162	0.00000
288192	1.14490	0.00000	-0.11241	0.00000	0.21621	0.00000	309490	1.39340	0.00000	0.42390	0.00000	0.36244	0.00000

**Table K-4. IRT Parameters for Polytomous Items
– High School Chemistry**

Item Number	Parameters and Measures of Standard Error													
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>D0</i>	<i>SE (D0)</i>	<i>D1</i>	<i>SE (D1)</i>	<i>D2</i>	<i>SE (D2)</i>	<i>D3</i>	<i>SE (D3)</i>	<i>D4</i>	<i>SE (D4)</i>
252684	1.84292	0.00000	0.54480	0.00000	1.01312	0.00000	0.16041	0.00000	-0.32466	0.00000	-0.84887	0.00000	0.00000	0.00000
294738	1.44489	0.00000	0.34076	0.00000	1.68953	0.00000	0.36783	0.00000	-0.47526	0.00000	-1.58211	0.00000	0.00000	0.00000
294741	1.26936	0.00000	1.39038	0.00000	1.53754	0.00000	0.30273	0.00000	-0.40473	0.00000	-1.43553	0.00000	0.00000	0.00000
294742	1.72418	0.00000	0.88537	0.00000	0.94811	0.00000	0.45150	0.00000	-0.43590	0.00000	-0.96371	0.00000	0.00000	0.00000
305241	1.18271	0.00000	0.27278	0.00000	0.94488	0.00000	0.28105	0.00000	-0.15792	0.00000	-1.06801	0.00000	0.00000	0.00000

**Table K-5. IRT Parameters for Dichotomous Items
– High School Introductory Physics**

Item Number	Parameters and Measures of Standard Error						Item Number	Parameters and Measures of Standard Error					
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>		<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>
208510	0.25399	0.00000	-0.91947	0.00000	0.00000	0.00000	315643	1.17551	0.00000	-0.07114	0.00000	0.25021	0.00000
279739	0.86782	0.00000	0.36212	0.00000	0.26128	0.00000	315663	1.41270	0.00000	-0.01512	0.00000	0.25855	0.00000
280466	0.99574	0.00000	-0.18727	0.00000	0.23801	0.00000	316338	1.68567	0.00000	-0.01477	0.00000	0.32753	0.00000
280943	1.08712	0.00000	-0.46329	0.00000	0.27565	0.00000	316369	0.83033	0.00000	0.24579	0.00000	0.26946	0.00000
281910	0.69158	0.00000	-0.20312	0.00000	0.19277	0.00000	316372	1.54969	0.00000	0.05210	0.00000	0.37206	0.00000
287329	0.94582	0.00000	0.57760	0.00000	0.30833	0.00000	316409	1.17315	0.00000	-0.57629	0.00000	0.19867	0.00000
287391	0.83034	0.00000	-0.64298	0.00000	0.17626	0.00000	62810931	1.07430	0.00000	-1.73132	0.00000	0.12359	0.00000
288358	1.14935	0.00000	0.18661	0.00000	0.37372	0.00000	62976857	0.76165	0.00000	-0.96736	0.00000	0.21440	0.00000
293922	0.59253	0.00000	0.00374	0.00000	0.18974	0.00000	62977046	0.70978	0.00000	-0.04347	0.00000	0.39278	0.00000
295868	1.10499	0.00000	0.31919	0.00000	0.30804	0.00000	62977127	0.56520	0.00000	-0.31791	0.00000	0.16763	0.00000
299239	1.19514	0.00000	-0.93410	0.00000	0.22634	0.00000	62998213	0.88312	0.00000	-1.04379	0.00000	0.19814	0.00000
299264	0.76984	0.00000	0.29510	0.00000	0.22492	0.00000	63016168	0.70454	0.00000	-0.33214	0.00000	0.29558	0.00000
301737	1.34791	0.00000	0.69610	0.00000	0.33867	0.00000	63061676	1.38586	0.00000	0.00741	0.00000	0.35298	0.00000
302732	1.32304	0.00000	-0.99505	0.00000	0.14431	0.00000	63076324	1.13606	0.00000	-0.17093	0.00000	0.48027	0.00000
304727	0.91304	0.00000	-0.03400	0.00000	0.24052	0.00000	63090761	0.87275	0.00000	-1.13672	0.00000	0.14743	0.00000
311031	0.88812	0.00000	-1.06917	0.00000	0.19980	0.00000	70095695	1.06372	0.00000	-1.50953	0.00000	0.19424	0.00000
311349	1.12629	0.00000	-0.69743	0.00000	0.27443	0.00000	70107457	1.31207	0.00000	-0.97179	0.00000	0.26641	0.00000
313635	0.84457	0.00000	-0.98179	0.00000	0.15379	0.00000	70334142	0.61760	0.00000	-1.29486	0.00000	0.13742	0.00000
313730	1.49139	0.00000	-1.15456	0.00000	0.11128	0.00000	70455164	1.12772	0.00000	-1.08050	0.00000	0.17376	0.00000
313758	1.33298	0.00000	0.91391	0.00000	0.35219	0.00000	70455614	0.93164	0.00000	-0.63012	0.00000	0.41489	0.00000

**Table K-6. IRT Parameters for Polytomous Items
– High School Introductory Physics**

Item Number	Parameters and Measures of Standard Error													
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>D0</i>	<i>SE (D0)</i>	<i>D1</i>	<i>SE (D1)</i>	<i>D2</i>	<i>SE (D2)</i>	<i>D3</i>	<i>SE (D3)</i>	<i>D4</i>	<i>SE (D4)</i>
293949	0.96664	0.00000	0.00272	0.00000	1.81607	0.00000	0.34445	0.00000	-0.68152	0.00000	-1.47900	0.00000	0.00000	0.00000
313763	1.00890	0.00000	0.64106	0.00000	1.88949	0.00000	0.65981	0.00000	-0.44375	0.00000	-2.10555	0.00000	0.00000	0.00000
63118018	1.19452	0.00000	0.14057	0.00000	1.50972	0.00000	0.64193	0.00000	-0.33198	0.00000	-1.81967	0.00000	0.00000	0.00000
70454668	1.41629	0.00000	-0.08191	0.00000	1.18099	0.00000	0.34611	0.00000	-0.32924	0.00000	-1.19785	0.00000	0.00000	0.00000
70544575	1.22144	0.00000	-0.60135	0.00000	1.49413	0.00000	0.51362	0.00000	-0.39258	0.00000	-1.61517	0.00000	0.00000	0.00000

**Table K-7. IRT Parameters for Dichotomous Items
– High School Technology/Engineering**

Item Number	Parameters and Measures of Standard Error						Item Number	Parameters and Measures of Standard Error					
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>		<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>c</i>	<i>SE (c)</i>
206784	1.00000	0.00000	0.07213	0.06644	0.00000	0.00000	306830	1.00000	0.00000	-0.17099	0.07031	0.00000	0.00000
246647	1.00000	0.00000	-0.13157	0.06826	0.00000	0.00000	309910	1.00000	0.00000	-0.36927	0.00000	0.00000	0.00000
268468	1.00000	0.00000	-0.41919	0.06033	0.00000	0.00000	310012	1.00000	0.00000	-0.43937	0.06258	0.00000	0.00000
271593	1.00000	0.00000	0.01922	0.06182	0.00000	0.00000	310019	1.00000	0.00000	-0.01328	0.05725	0.00000	0.00000
283422	1.00000	0.00000	-0.00297	0.06256	0.00000	0.00000	310033	1.00000	0.00000	-0.03749	0.06253	0.00000	0.00000
283426	1.00000	0.00000	-0.42691	0.06191	0.00000	0.00000	310042	1.00000	0.00000	0.27585	0.05641	0.00000	0.00000
283487	1.00000	0.00000	0.22515	0.05765	0.00000	0.00000	310289	1.00000	0.00000	-0.67405	0.00000	0.00000	0.00000
287774	1.00000	0.00000	0.05216	0.06598	0.00000	0.00000	310290	1.00000	0.00000	0.08053	0.05674	0.00000	0.00000
287784	1.00000	0.00000	-0.74331	0.08029	0.00000	0.00000	310292	1.00000	0.00000	0.06409	0.05681	0.00000	0.00000
294359	1.00000	0.00000	-0.21885	0.05765	0.00000	0.00000	310299	1.00000	0.00000	-0.37925	0.08544	0.00000	0.00000
294403	1.00000	0.00000	-0.99257	0.17287	0.00000	0.00000	310304	1.00000	0.00000	-0.48817	0.00000	0.00000	0.00000
299353	1.00000	0.00000	-0.21240	0.06575	0.00000	0.00000	313223	1.00000	0.00000	-1.11811	0.08169	0.00000	0.00000
300296	1.00000	0.00000	-0.31148	0.00000	0.00000	0.00000	313226	1.00000	0.00000	-1.33488	0.09232	0.00000	0.00000
300319	1.00000	0.00000	-0.68716	0.06724	0.00000	0.00000	313295	1.00000	0.00000	0.06280	0.05656	0.00000	0.00000
305178	1.00000	0.00000	0.04275	0.06217	0.00000	0.00000	316456	1.00000	0.00000	-0.96699	0.00000	0.00000	0.00000
306789	1.00000	0.00000	-0.07029	0.06428	0.00000	0.00000	316464	1.00000	0.00000	-0.64836	0.00000	0.00000	0.00000
306804	1.00000	0.00000	-0.18072	0.05876	0.00000	0.00000	316468	1.00000	0.00000	-0.30972	0.00000	0.00000	0.00000
306821	1.00000	0.00000	0.02875	0.05821	0.00000	0.00000	316500	1.00000	0.00000	-0.30638	0.00000	0.00000	0.00000
306828	1.00000	0.00000	-0.24216	0.05916	0.00000	0.00000	316507	1.00000	0.00000	-0.49578	0.00000	0.00000	0.00000
306829	1.00000	0.00000	-0.65261	0.00000	0.00000	0.00000	316514	1.00000	0.00000	0.16101	0.00000	0.00000	0.00000

**Table K-8. IRT Parameters for Polytomous Items
– High School Technology/Engineering**

Item Number	Parameters and Measures of Standard Error													
	<i>a</i>	<i>SE (a)</i>	<i>b</i>	<i>SE (b)</i>	<i>D0</i>	<i>SE (D0)</i>	<i>D1</i>	<i>SE (D1)</i>	<i>D2</i>	<i>SE (D2)</i>	<i>d3</i>	<i>SE(d3)</i>	<i>d4</i>	<i>SE(d4)</i>
246687	1.00000	0.00000	0.50289	0.05629	1.83755	0.10506	0.50732	0.06469	-0.69741	0.08450	-1.64746	0.15219	0.00000	0.00000
265143	1.00000	0.00000	0.61876	0.05198	1.51623	0.07825	0.34203	0.06095	-0.41207	0.07271	-1.44619	0.13141	0.00000	0.00000
287869	1.00000	0.00000	0.82289	0.04770	1.66863	0.07408	0.75257	0.05634	-0.39315	0.06778	-2.02805	0.19164	0.00000	0.00000
294378	1.00000	0.00000	1.12189	0.04757	1.43491	0.05979	0.72101	0.05575	-0.43664	0.07920	-1.71927	0.18508	0.00000	0.00000
306812	1.00000	0.00000	0.18747	0.04608	1.46816	0.08785	0.54532	0.05893	-0.41729	0.05648	-1.59619	0.09011	0.00000	0.00000