Explanation of modeling of norms

The tests used to construct these two tests were GC15G and GC17G. Items were used without alteration from the original test form. The sample used to model norms for this test were based on the performances of 1652 students from 36 institutions.

The modeling process used both item response theory (IRT) and partial credit assignment. Many models of the items were considered using both polytomously and dichotomously scored items. Additionally, a number of fitting procedures were also trialed for the best fit to the published norms. Based on all of the models vetted, the use of polytomously scored items with two parameter IRT (2PL-IRT) was selected as the best fit and used to generate the modeled norms provided here.

Once sufficient samples of students taking these tests are submitted, these modeled norms will be transitioned over using sampling to norms generated entirely based on student data collected for these tests.

Any questions to this process or any of our test products or statistics can be sent to Kristen Murphy (kmurphy@uwm.edu).

Explanation of item statistics

The difficulty index is the percentage of students who responded correctly to an item. The discrimination index measures the performance on the item of students who did well on the test overall relative to those who did poorly. The frequencies with which incorrect responses are chosen are expressed as percentages. For additional information, obtain *Writing Tests and Interpreting Test Statistics – A Practical Guide* from the ACS DivCHED Examinations Institute.

These item statistics were generated from the administration of GC15G and GC17G with no alterations.
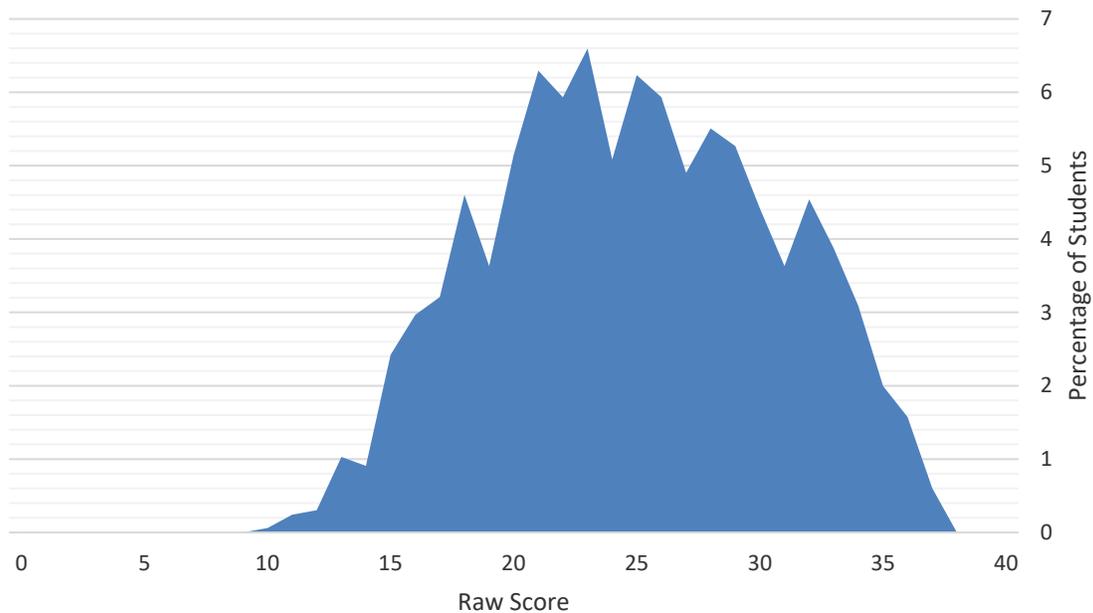
American Chemical Society Division of Chemical Education
Modeled Composite Norms
Dual Enrollment General Chemistry I 2022 (DE22 GCF)

Score	Percentile	Score	Percentile	Score	Percentile
40	100	24	46	8	0
39	100	23	40	7	0
38	100	22	34	6	0
37	100	21	28	5	0
36	99	20	22	4	0
35	97	19	18	3	0
34	94	18	13	2	0
33	91	17	10	1	0
32	87	16	6	0	0
31	83	15	4		
30	78	14	2		
29	74	13	1		
28	68	12	0		
27	63	11	0		
26	58	10	0		
25	52	9	0		

Mean	24.8
Std. deviation	5.8
Median	25
KR-21 reliability	0.74
Std error/meas	2.97

DE22 GCF Norms
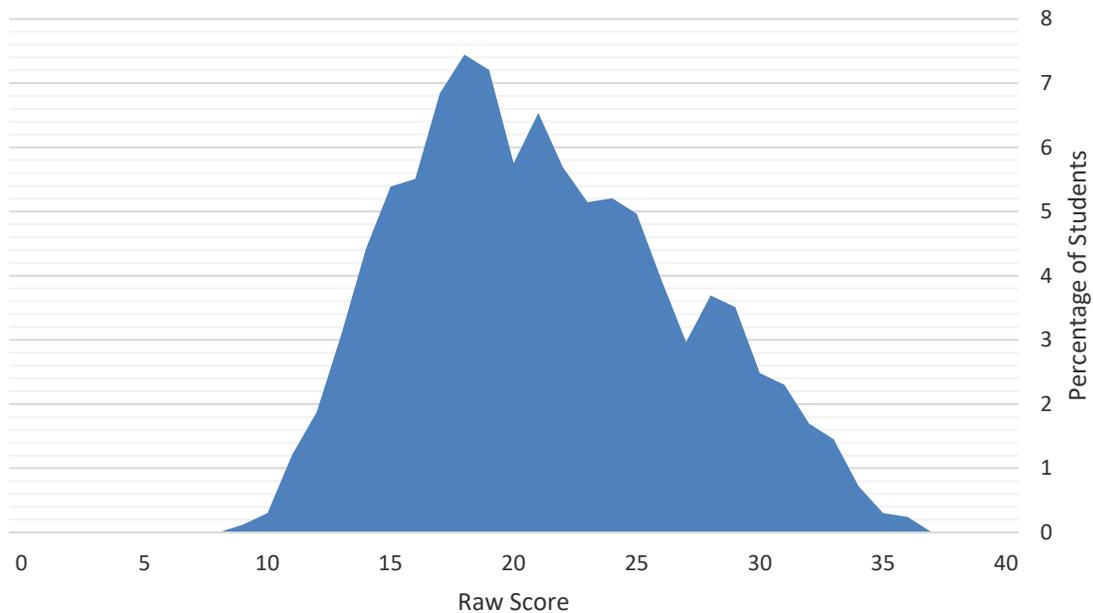### Models based on the scores of 1652 students from 36 institutions

American Chemical Society Division of Chemical Education
Modeled Composite Norms
Dual Enrollment General Chemistry II 2022 (DE22 GCS)

Score	Percentile	Score	Percentile	Score	Percentile
40	100	24	69	8	0
39	100	23	64	7	0
38	100	22	59	6	0
37	100	21	52	5	0
36	100	20	46	4	0
35	100	19	40	3	0
34	99	18	32	2	0
33	98	17	25	1	0
32	96	16	19	0	0
31	94	15	14		
30	92	14	9		
29	89	13	5		
28	85	12	3		
27	82	11	1		
26	79	10	0		
25	74	9	0		

Mean	21.2
Std. deviation	5.6
Median	21
KR-21 reliability	0.70
Std error/meas	3.07

DE22 GCS Norms
Models based on the scores of 1652 students from 36 institutions

Dual Enrollment Exam, General Chemistry I (DE22 GCF) 2022

Models based on 1652 performances from 36 institutions

Item	Diff Index	Disc Index	% 1st Wrong	% 2nd Wrong	% 3rd Wrong	Item	Diff Index	Disc Index	% 1st Wrong	% 2nd Wrong	% 3rd Wrong
1	0.65	0.36	8.4	21.6	5.1	21	0.57	0.54	14.1	14.7	13.8
2	0.79	0.31	6.7	1.9	12.4	22	0.75	0.44	10.8	9.8	4.4
3	0.72	0.35	1.6	6.3	20.0	23	0.51	0.43	13.7	28.6	6.7
4	0.81	0.37	3.1	13.7	2.5	24	0.82	0.37	6.2	6.9	4.6
5	0.65	0.44	6.3	28.3	0.6	25	0.83	0.44	5.1	5.7	5.4
6	0.46	0.29	8.5	14.8	30.8	26	0.68	0.55	6.7	17.1	7.3
7	0.85	0.26	7.0	4.8	2.9	27	0.57	0.59	17.1	10.8	15.1
8	0.70	0.14	5.0	5.9	18.9	28	0.47	0.36	26.7	14.3	9.5
9	0.86	0.27	4.4	5.4	4.1	29	0.47	0.45	14.3	26.7	11.4
10	0.90	0.18	2.2	3.2	4.8	30	0.34	0.19	54.6	2.5	8.3
11	0.67	0.41	8.3	20.0	4.4	31	0.63	0.37	14.8	8.9	12.9
12	0.44	0.43	37.5	7.3	10.5	32	0.84	0.22	4.9	4.0	7.2
13	0.76	0.47	6.2	9.6	8.1	33	0.40	0.51	29.8	18.4	11.7
14	0.49	0.47	9.8	9.8	31.0	34	0.87	0.21	3.1	6.7	3.1
15	0.58	0.42	11.3	16.7	13.4	35	0.30	0.34	7.3	15.9	45.4
16	0.43	0.29	5.1	47.3	3.8	36	0.52	0.59	19.7	21.3	6.7
17	0.33	0.40	12.2	32.1	22.9	37	0.52	0.14	4.1	35.9	7.3
18	0.89	0.20	1.9	0.5	8.8	38	0.70	0.20	11.6	15.0	3.1
19	0.68	0.42	2.5	19.4	10.2	39	0.68	0.33	5.5	20.3	5.3
20	0.47	0.61	20.1	25.4	7.3	40	0.26	0.32	19.1	44.8	10.2

Dual Enrollment Exam, General Chemistry II (DE22 GCS) 2022

Models based on 1652 performances from 36 institutions

Item	Diff Index	Disc Index	% 1st Wrong	% 2nd Wrong	% 3rd Wrong	Item	Diff Index	Disc Index	% 1st Wrong	% 2nd Wrong	% 3rd Wrong
1	0.68	0.32	21.0	7.2	3.4	21	0.61	0.43	4.0	13.5	21.0
2	0.66	0.39	17.6	1.8	14.5	22	0.35	0.32	8.9	34.0	20.3
3	0.50	0.33	7.9	10.5	31.4	23	0.69	0.16	26.0	2.2	3.2
4	0.79	0.26	7.0	7.9	3.8	24	0.57	0.36	7.8	16.7	17.9
5	0.32	0.07	14.7	31.9	21.4	25	0.19	0.27	21.0	16.2	42.2
6	0.58	0.34	13.3	5.1	23.5	26	0.55	0.29	8.5	25.3	11.1
7	0.47	0.62	6.7	42.3	4.0	27	0.50	0.31	15.6	25.1	5.4
8	0.65	0.51	14.1	10.8	9.5	28	0.37	0.28	12.2	42.6	8.3
9	0.62	0.40	10.5	14.3	13.0	29	0.53	0.42	12.6	14.2	19.5
10	0.82	0.35	7.7	5.8	4.5	30	0.38	0.31	12.9	23.0	25.7
11	0.38	0.32	41.6	7.9	12.7	31	0.61	0.52	9.5	14.5	14.6
12	0.45	0.37	8.1	16.2	30.2	32	0.62	0.53	15.2	18.7	4.1
13	0.37	0.38	16.8	27.6	17.8	33	0.44	0.45	14.6	12.4	29.2
14	0.47	0.48	34.9	4.4	14.0	34	0.77	0.34	6.0	12.4	3.5
15	0.57	0.43	12.5	8.6	21.7	35	0.53	0.40	33.3	5.4	7.9
16	0.61	0.39	10.2	20.0	8.6	36	0.70	0.34	8.2	17.1	4.9
17	0.51	0.29	9.2	27.9	11.1	37	0.63	0.26	4.2	12.0	20.5
18	0.49	0.46	9.9	20.5	20.7	38	0.57	0.22	3.4	10.6	28.7
19	0.40	0.38	13.0	34.6	9.2	39	0.45	0.35	17.1	26.7	11.1
20	0.34	0.40	38.4	22.9	4.1	40	0.52	0.40	16.8	20.3	10.2