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## Third-Party Checking of 2023 Scaling and Equating for the Kentucky Summative Assessments (KSA)

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## Table of Contents

Executive Summary .....	ii
Introduction .....	1
Brief Description of 2023 Assessments .....	1
Analysis Procedures .....	2
Sample Identification and File Construction.....	2
Calibration and Scaling Procedures .....	2
Equating Procedures.....	3
Raw-score-to-Scale-Score Procedures .....	3
Verification of 2023 Scoring Tables .....	3
Field Test Item Calibration .....	3
Documentation.....	4
Conclusion .....	4
References .....	5
Appendix A – Control File (Science Grade 4).....	6
Appendix B – Winsteps Item Parameter Files (Science Grade 4).....	9
Appendix C – Winsteps Anchor File (Science Grade 4) .....	13
Appendix D – Winsteps Score File (Science Grade 4) .....	16

## Executive Summary

Pearson and the Human Resources Research Organization (HumRRO) independently calibrated, scaled, and equated the 2023 Kentucky Summative Assessments (KSA) and produced the raw-score-to-theta-score tables to be applied to students' test results. HumRRO further verified that scoring tables were applied accurately by independently scoring students and comparing scoring results to Pearson's. Results calculated by HumRRO were identical to those calculated by Pearson (L. Hou, email communication, July 6, 2023 [writing]; July 14, 2023 [mathematics, reading, editing and mechanics, science, social studies]). Given that HumRRO's results were identical to those of Pearson, we are assured that Pearson did not commit processing errors.

# Third-Party Checking of 2023 Scaling and Equating for the Kentucky Summative Assessments (KSA) Tests

## Introduction

Kentucky started administering the Kentucky Summative Assessments (KSA) in spring 2022. The KSA assess student performance on the Kentucky Academic Standards (KAS) using a combination of multiple choice, short answer, and extended response items. Student scores are estimated using a Rasch Item-Response Theory (IRT) model. As new test forms have been developed, an equating process has been implemented to allow for meaningful comparisons over the years with Kentucky's previous assessments.

In spring 2023, the KSA were administered in reading, mathematics, science, social studies, editing and mechanics, and on-demand writing. Reading and mathematics were assessed in grades 3 through 8 and grade 10; science in grades 4, 7, and 11; social studies, editing and mechanics, and on-demand writing in grades 5, 8, and 11.

This report describes how student test responses for the 2023 KSA were used to create scale scores and place students in Novice, Apprentice, Proficient, or Distinguished (NAPD) performance categories. The complex analyses to accomplish these tasks were conducted independently, but cooperatively, by both HumRRO and Pearson staff members. Several interim checks were conducted during the analyses and any discrepancies between the two companies were investigated and ultimately resolved. This process was conducted transparently among Pearson, HumRRO, Kentucky Department of Education (KDE), and Kentucky's psychometric consultant (Dr. Bill Auty of Education Measurement Consulting) via frequent email communications and conference calls. The process was guided by a specifications document created by Pearson<sup>1</sup> and regularly updated based on decisions before and during calibration. This documentation is vital for ensuring consistency of processing across years and for guiding psychometric processing in future years.

## Brief Description of 2023 Assessments

In response to the COVID-19 pandemic's impact on schools during the 2020-2021 school year, the United States Department of Education (USED) waived accountability reporting requirements but maintained that states should continue to administer annual summative assessments. This led to a directive from KDE leadership to develop a simple, straightforward assessment focused on comparing current student performance to past student performance.

Beginning with the 2021-2022 academic year, the KSA cover new and revised content standards in reading, mathematics, science, social studies, and writing. For writing, there are two assessment components: 1) editing and mechanics and 2) writing. Except for writing, all tests are a blend of selected response and constructed response items. The writing component is a single essay prompt scored on multiple writing skills (or traits).

Each subject-grade assessment combination in the 2023 KSA consisted of multiple test forms. Each mathematics and reading grade consisted 10 test forms, with number of operational items ranging between 32 and 36 items per form. Science assessments in grades 4, 7, and 11

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<sup>1</sup> Kentucky Spring 2023 Psychometric Analysis Specifications v2.1.

consisted of 10 forms, with each form consisting of 24 operational items. Social studies assessments in grades 5, 8, and 11 consisted of 10 forms, with number of operational items ranging between 30 and 35 items per form. Editing and mechanics assessments in grades 5, 8, and 11 consisted of 10 forms, with each form consisting of 26 operational items. Writing assessments in grades 5, 8, and 11 consisted of 4 forms, each with a single essay prompt.

## Analysis Procedures

Item parameters were generated (i.e., calibrated) across all grade-level forms for each subject in a single run. This equates test forms for a given grade so that test scores across forms are interchangeable in terms of difficulty. Anchored item calibration and equating analyses were then conducted for all KSA assessments. Finally, raw-score-to-scale (RSS) score tables were generated for all assessments. For each of these analyses, HumRRO followed the analysis specifications provided by Pearson, independently conducted analyses, and verified that our results matched Pearson's results. We summarize HumRRO's processes and procedures for conducting these analyses below.

### Sample Identification and File Construction

We first applied exclusion rules to select the sample of student responses to include in the calibration analyses.<sup>2</sup> Kentucky selects most of its student population for use in the calibration sample for scaling and equating. However, some students are purposefully excluded from the calibration samples, as specified in the 2023 psychometrics specifications document.<sup>3</sup> Kentucky's exemption rules generally only apply to students who receive accommodations (e.g., Braille forms, audio, large print, etc.), students with duplicate records (the same identification number and name), and students with blank total test score values. Pearson and HumRRO verified n-counts after this step.

The next step was to format all subject/grade files to be read into the Winsteps IRT psychometric software and create Winsteps<sup>4</sup> control files to read student responses and estimate item parameters. A sample control file is provided in Appendix A. HumRRO created specialized SAS and R statistical software programs to generate all input and control files automatically. An item documentation file was used to specify item types, location, keys, item use, and other important information. HumRRO and Pearson used the same raw student data files (containing all student responses) but did not share programming or methodology for creating the input, control, or data files for Winsteps. HumRRO followed the guidance provided by Pearson (with input from KDE) regarding the treatment of blank responses, condition codes, etc. in creating the input data files.

### Calibration and Scaling Procedures

Once input and control files were prepared, Winsteps software was used to calibrate test items across grade-level test forms. Multiple-choice items were fit to the Rasch measurement model and constructed-response items (short constructed response and extended response items) were fit to the Partial Credit Model (PCM). Both types of items were simultaneously calibrated in Winsteps and item difficulty parameters (logits) were produced. "Step parameters" were also produced for constructed response items. Step parameters for an item indicate how the various points possible on the item relate to the item's overall difficulty and are important for generating

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<sup>2</sup> Students who are excluded from calibration analyses are not excluded from scoring and reporting.

<sup>3</sup> Kentucky Spring 2023 Psychometric Analysis Specifications v2.1.

<sup>4</sup> HumRRO used Winsteps version 4.8.0.0 for this project.



scoring tables. These parameters are produced on the theta scale (a commonly used scale with a mean of 0 and a standard deviation of 1). Appendix B contains an example of item parameters for one grade subject (logits and step parameters). Pearson and HumRRO verified item parameter estimates after this step.

## Equating Procedures

HumRRO conducted two types of equating for the KSA: (a) forms equating within a given test administration year and (b) equating across test administration years using common anchor items. Forms equating is accomplished by calibrating all items for a given subject-grade combination together. Calibrating all the items together (i.e., across all forms) effectively equates the various forms for a given subject-grade combination such that test scores across forms are interchangeable in terms of difficulty. Form equating was necessary for all subject-grade tests.

For each assessment, we also equated the current year's scores to scores from prior years. To accomplish this, we first examined the stability of the linking items to ensure that item difficulty had not shifted excessively between administrations. We conducted the Robust Z (Huynh & Meyer, 2010; Huynh & Rawls, 2009) statistical procedure to determine whether any linking items should be dropped from the equating process. Items with a substantial difference in item difficulty, as defined in the test specifications document, were not included as anchor items in equating. The resulting set of anchor items was then used to create the raw-score-to-scale-score tables.

## Raw-score-to-Scale-Score Procedures

The item parameter estimates from the equating analyses for reading, mathematics, science, social studies, editing and mechanics and on-demand writing were used in Winsteps to generate person ability estimates by form and by reporting categories. Ability estimates were reported in raw-score-to-theta-score tables.

Once theta scoring tables were obtained, they were linearly transformed to a reporting scale of 400-600 for all grade subjects. Performance levels (Novice, Apprentice, Proficient, and Distinguished; NAPD) were also assigned to each score. Scale score cuts were used, as opposed to theta cuts, to assign performance levels to students' scale scores. Using these cuts allowed scale scores associated with each performance level to be fixed across test administrations.

## Verification of 2023 Scoring Tables

After verification of the raw-score-to-scale score tables, scoring tables were generated to assign student performance level classifications. HumRRO checked the 2023 scoring tables and verified that the correct scale score ranges were associated with each performance level. HumRRO matched Pearson on all subjects and grades.

## Field Test Item Calibration

After operational items were placed onto the base scale, field test items were placed onto the same scale through anchored item calibration linked by the operational items. Field test items with negative point-biserial correlations were excluded from the calibration. Two Editing and Mechanics items were excluded from the calibration because they contained typing errors. HumRRO matched Pearson on all subjects and grades.

## Documentation

As HumRRO and Pearson completed each step of the process described above, Winsteps item parameter, anchor item, and score, and output files were shared to check for inconsistencies. Winsteps output files included the number of cases in the calibration sample, item-level information (e.g., p-values, parameters), and the theta scoring tables. A sample of the input and output files are appended to this document. They include:

1. Winsteps Control Files (Appendix A). These files contain the item parameter estimation specifications and important information for reading the student score files. It also specifies the output file names. The appendix includes an example control file for the initial item parameter estimation, equated item parameter estimation, and estimation of the cluster scores.
2. Winstep Item Parameter Files (Appendix B). These files contain the item parameters for the operational items. Each multiple-choice item has one parameter, a logit difficulty (named Measure in the Winstep files). Each constructed-response item has an overall difficulty parameter and a number of step parameters indicating how the points for the item are distributed along the theta scale. The file included in the appendix is an example of a final item parameter file. Initial item parameter files are in similar formats.
3. Winsteps Anchor File (Appendix C). The file includes the 2023 item parameter values for each anchor item with the equating shift estimate applied to the overall difficulty measure. The file is read by Winsteps and used to fix the item parameter values and estimate final score files.
4. Winsteps Score File (Appendix D). The file contains the raw score to theta estimation and includes the distribution of student scores.
5. Comparison of Files Output (Appendix E). This is a spreadsheet file from HumRRO's comparison program that checks scoring table results against Pearson's results. The files match if all comparison values are 0.

## Conclusion

Pearson and HumRRO independently calculated the scaled/equated raw-score-to-scale-score tables for 2023 KSA reading and math (grades 3-8, 10), social studies and writing (grades 5, 8, 11), and science (grades 4, 7, 10). No differences were found between Pearson's and HumRRO's parameter estimations or raw-score-to-scale-score tables. Given that HumRRO's and Pearson's scaling and equating results were identical, HumRRO is confident that Pearson did not commit processing errors.

## References

- Huynh, H. & Meyer, P. (2010). Use of robust z in detecting unstable items in item response theory models. *Practical Assessment, Research & Evaluation*, 15(2). Available online: <http://pareonline.net/getvn.asp?v=15&n=2>
- Huynh, H., & Rawls, A. (2009). A comparison between robust z and 0.3-logit difference procedures in assessing stability of linking items for the Rasch model. In E. V. Smith Jr. & G. E. Stone (Eds.), *Applications of Rasch measurement in criterion-referenced testing: Practice analysis to score reporting*. JAM Press.



## Appendix A – Control File (Science Grade 4)

```
;Winstep Control file g04SC_v0  
  
; HumRRO  
  
&INST  
  
&INST  
  
Item1 = 37  
  
NI = 56  
  
TABLES = 00100000000001000001000000001  
  
CODES = 01234  
  
CSV = N  
  
FITP = 3.0  
  
FITI = 3.0  
  
XWIDE = 1  
  
HLINES = Y  
  
data = KDE_SC_04.dat  
  
IFILE = KDE_SC_04.ITM  
  
ISFILE = KDE_SC_04.ISF  
  
SFILE = KDE_SC_04.CSF  
  
SCFILE = KDE_SC_04.RSS  
  
PFILE = KDE_SC_04.PER  
  
mprox = 10  
  
mucon = 100  
  
rconv = .50  
  
lconv = .01  
  
models = r  
  
groups = 0  
  
stkeep = n  
  
realse = n  
  
stbias = n  
  
target = n  
  
extrsc = 0.25
```

udecim = 4  
;uimean = 0  
;uscale = 1  
ptbis = y  
ILFILES = \*  
SC041602\_01  
SC041602\_02  
SC041602\_03b  
SC041602\_04  
SC041602\_05  
SC041602\_06  
SC041602\_07  
SC041602\_08  
SC041603\_01  
SC041603\_02  
SC041603\_03  
SC041603\_04  
SC041603\_09  
SC041603\_06  
SC041603\_07  
SC041603\_08  
SC041624\_01  
SC041624\_02  
SC041624\_03  
SC041624\_04b  
SC041624\_05  
SC041624\_06b  
SC041624\_07  
SC041624\_08  
SC041606\_01  
SC041606\_02  
SC041606\_11

SC041606\_04  
SC041606\_05  
SC041606\_06  
SC041606\_07  
SC041606\_08  
SC041623\_01b  
SC041623\_02  
SC041623\_03  
SC041623\_04  
SC041623\_05  
SC041623\_06  
SC041623\_07  
SC041623\_08  
SC041609\_01  
SC041609\_02  
SC041609\_03  
SC041609\_04  
SC041609\_05  
SC041609\_06  
SC041609\_07b  
SC041609\_08  
SC041614\_01  
SC041614\_02  
SC041614\_09  
SC041614\_04  
SC041614\_05  
SC041614\_06  
SC041614\_07  
SC041614\_08

\*

&END

END NAMES

## Appendix B – Winsteps Item Parameter Files (Science Grade 4)

### Item parameters 2023 - Science 4 (g04SCv0.ITM)

```

; ITEM C:\2023\KY Psychometrics\KSA2023\Winsteps\SC\g04SCv0.con Jul 13 2023 3:51
;ENTRY MEASURE ST COUNT SCORE MODLSE IN.MSQ INZSTD OUTMSQ OUTZST DISPL PBSX WEIGHT OBSMA EXPMA PBX-E RMSR WMLE INDF OUTDF G M R NAME
1 .2803 1 11307.0 4276.0 .0212 1.07 7.82 1.17 9.90 .0041 .25 1.00 68.2 69.7 .33 .46 .2803 28193 12335 0 R . SC041602_01
2 -.5355 1 11307.0 6169.0 .0207 1.04 5.08 1.07 6.04 .0036 .29 1.00 65.9 67.5 .33 .46 -.5355 35237 17400 0 R . SC041602_02
3 -1.4044 1 11307.0 15413.0 .0169 .99 -.89 .99 -1.16 .0027 .39 1.00 60.8 61.1 .38 .55 -1.4044 14000 12680 0 R . SC041602_03b
4 -2.1947 1 11307.0 9404.0 .0268 .86 -9.00 .68 -9.90 .0031 .40 1.00 84.5 83.8 .25 .33 -2.1945 7595 2589 0 R . SC041602_04
5 .0720 1 11307.0 4748.0 .0209 1.10 9.90 1.11 9.46 .0040 .23 1.00 63.3 68.4 .33 .47 .0720 32138 15255 0 R . SC041602_05
6 -1.6685 1 11307.0 8567.0 .0237 .93 -6.07 .87 -6.80 .0031 .35 1.00 78.9 77.4 .28 .38 -1.6684 13953 4900 0 R . SC041602_06
7 -.3577 1 11307.0 5752.0 .0206 1.13 9.90 1.15 9.90 .0036 .20 1.00 60.8 67.3 .33 .48 -.3577 36109 18404 0 R . SC041602_07
8 1.8529 1 11307.0 6061.0 .0150 .98 -1.18 .94 -3.25 .0085 .43 1.00 62.3 61.1 .41 .62 1.8528 7270 5645 0 R . SC041602_08
9 .0858 1 33711.0 14198.0 .0119 1.06 9.90 1.07 9.90 .0012 .23 1.00 64.3 67.2 .30 .47 .0857 109E3 55549 0 R . SC041603_01
10 .2197 1 33711.0 13264.0 .0120 .95 -9.90 .94 -9.90 .0013 .36 1.00 70.7 68.1 .30 .44 .2197 98728 48194 0 R . SC041603_02
11 -.6312 1 33711.0 19332.0 .0119 .94 -9.90 .92 -9.90 .0009 .36 1.00 69.1 66.6 .29 .45 -.6312 116E3 57610 0 R . SC041603_03
12 -1.1885 1 33711.0 23091.0 .0126 .92 -9.90 .87 -9.90 .0009 .37 1.00 73.8 71.5 .27 .42 -1.1884 70452 29535 0 R . SC041603_04
13 .7868 1 33711.0 9586.0 .0129 1.17 9.90 1.33 9.90 .0018 .07 1.00 71.3 73.9 .28 .45 .7868 55865 23095 0 R . SC041603_09
14 -.2051 1 33711.0 16275.0 .0118 .97 -7.41 .96 -7.18 .0010 .34 1.00 67.5 66.0 .30 .46 -.2051 125E3 66876 0 R . SC041603_06
15 .4407 1 33711.0 11769.0 .0123 .99 -2.20 1.00 .57 .0015 .30 1.00 71.2 70.1 .29 .44 .4406 80746 36653 0 R . SC041603_07
16 1.4427 1 33711.0 22676.0 .0085 .96 -3.86 .95 -5.77 .0052 .43 1.00 61.5 57.9 .38 .63 1.4427 19716 23742 0 R . SC041603_08
17 -.6080 1 34002.0 19297.0 .0119 .85 -9.90 .81 -9.90 -.0013 .47 1.00 74.2 66.8 .30 .42 -.6080 115E3 56577 0 R . SC041624_01
18 .3412 1 34002.0 12545.0 .0122 1.10 9.90 1.14 9.90 -.0008 .18 1.00 65.3 69.3 .30 .47 .3412 87844 39851 0 R . SC041624_02
19 -.1231 1 34002.0 15805.0 .0118 .99 -3.04 .99 -2.64 -.0009 .32 1.00 67.4 66.5 .30 .46 -.1231 119E3 61610 0 R . SC041624_03
20 -.8381 1 34002.0 20910.0 .0120 .88 -9.90 .83 -9.90 -.0010 .43 1.00 72.9 68.2 .29 .42 -.8381 98792 45064 0 R . SC041624_04b
21 -.3590 1 34002.0 34862.0 .0091 .95 -7.19 .95 -8.24 -.0013 .42 1.00 58.8 57.8 .37 .58 -.3590 45158 44819 0 R . SC041624_05
22 -.2339 1 34002.0 16604.0 .0118 1.02 5.70 1.02 3.06 -.0010 .28 1.00 64.3 66.3 .30 .47 -.2339 122E3 64004 0 R . SC041624_06b
23 -.5052 1 34002.0 18563.0 .0118 .90 -9.90 .87 -9.90 -.0011 .41 1.00 71.1 66.4 .30 .44 -.5052 119E3 60694 0 R . SC041624_07
24 1.3357 1 34002.0 26263.0 .0068 .85 -9.90 .78 -9.90 .0018 .54 1.00 56.0 51.6 .45 .74 1.3357 29506 14772 0 R . SC041624_08
25 -.1006 1 11416.0 10763.0 .0167 1.10 7.75 1.11 8.93 -.0002 .25 1.00 60.9 62.1 .34 .59 -.1006 13560 13614 0 R . SC041606_01

```

26	.6676	1	11416.0	3495.0	.0218	1.05	4.93	1.10	6.73	.0001	.22	1.00	71.3	72.4	.28	.44	.6675	21811	9427	0	R	.	SC041606_02
27	1.3279	1	11416.0	2259.0	.0249	1.21	9.90	1.54	9.90	.0003	-.03	1.00	78.8	80.7	.25	.41	1.3278	10177	3968	0	R	.	SC041606_11
28	-1.3726	1	11416.0	8212.0	.0223	.89	-9.90	.85	-9.90	-.0008	.38	1.00	77.2	73.8	.26	.40	-1.3725	19239	7946	0	R	.	SC041606_04
29	-.9629	1	11416.0	7331.0	.0210	.97	-3.69	.96	-3.26	-.0009	.31	1.00	70.5	69.1	.28	.44	-.9629	30178	13779	0	R	.	SC041606_05
30	-.3595	1	11416.0	11678.0	.0173	1.22	9.90	1.22	9.90	-.0005	.10	1.00	63.3	65.1	.33	.60	-.3595	12392	12378	0	R	.	SC041606_06
31	2.0557	1	11416.0	1290.0	.0308	1.16	7.23	1.79	9.90	.0006	-.07	1.00	88.6	88.7	.21	.33	2.0554	4308	1688	0	R	.	SC041606_07
32	.7753	1	11416.0	13754.0	.0104	.95	-3.79	.93	-4.99	.0010	.51	1.00	41.4	40.4	.48	.88	.7753	12624	9165	0	R	.	SC041606_08
33	-.9569	1	22267.0	14408.0	.0149	.93	-9.90	.91	-9.90	-.0033	.34	1.00	71.4	68.6	.26	.43	-.9569	62317	27964	0	R	.	SC041623_01b
34	.2673	1	22267.0	8604.0	.0147	1.03	6.16	1.08	9.90	-.0025	.24	1.00	66.3	67.8	.28	.46	.2673	67369	33690	0	R	.	SC041623_02
35	-.1150	1	22267.0	10414.0	.0144	.94	-9.90	.94	-8.87	-.0027	.35	1.00	68.4	65.3	.28	.45	-.1150	89749	48106	0	R	.	SC041623_03
36	-.8773	1	22267.0	27536.0	.0110	1.05	6.43	1.08	9.09	-.0035	.29	1.00	55.3	55.8	.34	.63	-.8773	30681	28483	0	R	.	SC041623_04
37	-.3748	1	22267.0	11672.0	.0144	.98	-5.25	.98	-3.80	-.0029	.30	1.00	66.4	64.9	.28	.46	-.3748	93689	49229	0	R	.	SC041623_05
38	.8247	1	22267.0	6203.0	.0159	1.20	9.90	1.33	9.90	-.0022	.01	1.00	69.4	74.1	.27	.46	.8247	35842	15831	0	R	.	SC041623_06
39	1.1227	1	22267.0	18326.0	.0086	1.00	.44	.97	-2.95	-.0005	.43	1.00	49.9	48.8	.42	.78	1.1226	17655	14806	0	R	.	SC041623_07
40	-.7694	1	22267.0	27248.0	.0102	.99	-.66	1.00	-.08	-.0030	.36	1.00	53.0	51.5	.35	.65	-.7693	33573	26327	0	R	.	SC041623_08
41	.6098	1	10988.0	8264.0	.0179	1.26	9.90	1.26	9.90	.0014	.00	1.00	58.7	62.9	.29	.60	.6098	13520	13275	0	R	.	SC041609_01
42	1.0689	1	10988.0	5998.0	.0173	1.20	9.90	1.27	9.90	.0019	.09	1.00	49.1	60.6	.31	.60	1.0688	13873	12228	0	R	.	SC041609_02
43	.5336	1	10988.0	8156.0	.0169	1.14	9.90	1.15	9.90	.0013	.16	1.00	54.3	59.3	.31	.60	.5336	14327	14182	0	R	.	SC041609_03
44	-.6492	1	10988.0	12603.0	.0157	.99	-.73	1.00	.01	.0002	.32	1.00	55.2	56.7	.32	.61	-.6492	15037	14767	0	R	.	SC041609_04
45	1.2233	1	10988.0	9048.0	.0117	.81	-9.90	.74	-9.90	.0029	.56	1.00	53.8	47.3	.42	.74	1.2232	10526	6745	0	R	.	SC041609_05
46	.3443	1	10988.0	4070.0	.0210	.91	-9.90	.90	-9.90	.0008	.38	1.00	72.3	68.2	.26	.43	.3442	31696	16637	0	R	.	SC041609_06
47	.2539	1	10988.0	4276.0	.0209	1.09	9.90	1.11	9.90	.0007	.14	1.00	62.6	67.3	.27	.48	.2538	34936	18747	0	R	.	SC041609_07b
48	-.6220	1	10988.0	6364.0	.0206	.91	-9.90	.87	-9.90	.0003	.38	1.00	69.1	65.2	.26	.44	-.6219	44237	22390	0	R	.	SC041609_08
49	-.6004	1	11279.0	6443.0	.0205	.96	-6.27	.95	-5.42	-.0063	.34	1.00	68.5	66.1	.29	.45	-.6004	41281	19966	0	R	.	SC041614_01
50	-1.3442	1	11279.0	15710.0	.0163	.87	-9.90	.86	-9.90	-.0074	.46	1.00	63.8	58.6	.34	.54	-1.3442	14146	12119	0	R	.	SC041614_02
51	.0338	1	11279.0	4909.0	.0205	.96	-5.34	.96	-4.37	-.0058	.34	1.00	69.0	66.4	.30	.45	.0338	39708	19900	0	R	.	SC041614_09
52	-.1535	1	11279.0	10919.0	.0176	1.11	7.93	1.11	7.74	-.0058	.21	1.00	66.1	66.3	.33	.56	-.1535	11708	11584	0	R	.	SC041614_04
53	1.1300	1	11279.0	11106.0	.0130	.96	-3.31	.94	-4.62	-.0032	.46	1.00	52.3	49.7	.42	.71	1.1300	10520	10781	0	R	.	SC041614_05
54	.7432	1	11279.0	3316.0	.0221	1.16	9.90	1.28	9.90	-.0055	.07	1.00	69.9	73.2	.28	.46	.7431	19832	8350	0	R	.	SC041614_06
55	.1707	1	11279.0	4584.0	.0206	1.08	9.90	1.08	7.20	-.0058	.20	1.00	62.5	67.3	.29	.47	.1707	35877	17407	0	R	.	SC041614_07
56	.1005	1	11279.0	4750.0	.0205	1.05	6.55	1.06	5.83	-.0058	.24	1.00	65.1	66.8	.29	.47	.1004	37909	18718	0	R	.	SC041614_08

## Step parameters 2023 - Science Grade 4 (g04SCv0.CSF)

; STRUCTURE-THRESHOLD MEASURE ANCHOR FILE FOR C:\2023\KY Psychometrics\KSA2023\Winsteps\SC\g04SCv0.con Jul 13 2023 3:51

; ITEM CATEGORY Rasch-Andrich threshold MEASURE

1	0	.0000
1	1	.0000
2	0	.0000
2	1	.0000
3	0	.0000
3	1	-1.2159
3	2	1.2159
4	0	.0000
4	1	.0000
5	0	.0000
5	1	.0000
6	0	.0000
6	1	.0000
7	0	.0000
7	1	.0000
8	0	.0000
8	1	-1.5262
8	2	-.1845
8	3	.6355
8	4	1.0752
9	0	.0000
9	1	.0000
10	0	.0000
10	1	.0000
11	0	.0000
11	1	.0000
12	0	.0000
12	1	.0000
13	0	.0000
13	1	.0000
14	0	.0000
14	1	.0000
15	0	.0000
15	1	.0000
16	0	.0000
16	1	-1.8250
16	2	.7443
16	3	.4646
16	4	.6161
17	0	.0000
17	1	.0000
18	0	.0000
18	1	.0000
19	0	.0000
19	1	.0000
20	0	.0000
20	1	.0000
21	0	.0000
21	1	-1.1829
21	2	1.1829
22	0	.0000
22	1	.0000
23	0	.0000
23	1	.0000
24	0	.0000
24	1	-.7170
24	2	-1.1081
24	3	.3176
24	4	1.5074
25	0	.0000
25	1	-1.4391
25	2	1.4391
26	0	.0000
26	1	.0000
27	0	.0000
27	1	.0000
28	0	.0000
28	1	.0000
29	0	.0000
29	1	.0000
30	0	.0000



30 1 -1.5796  
30 2 1.5796  
31 0 .0000  
31 1 .0000  
32 0 .0000  
32 1 -.9993  
32 2 -.7130  
32 3 -.1187  
32 4 1.8310  
33 0 .0000  
33 1 .0000  
34 0 .0000  
34 1 .0000  
35 0 .0000  
35 1 .0000  
36 0 .0000  
36 1 -.9806  
36 2 .9806  
37 0 .0000  
37 1 .0000  
38 0 .0000  
38 1 .0000  
39 0 .0000  
39 1 -1.2281  
39 2 -.1295  
39 3 .4027  
39 4 .9549  
40 0 .0000  
40 1 -.6000  
40 2 .6000  
41 0 .0000  
41 1 -1.6268  
41 2 1.6268  
42 0 .0000  
42 1 -1.1727  
42 2 1.1727  
43 0 .0000  
43 1 -1.3630  
43 2 1.3630  
44 0 .0000  
44 1 -1.0836  
44 2 1.0836  
45 0 .0000  
45 1 -.7660  
45 2 -1.1287  
45 3 .6871  
45 4 1.2075  
46 0 .0000  
46 1 .0000  
47 0 .0000  
47 1 .0000  
48 0 .0000  
48 1 .0000  
49 0 .0000  
49 1 .0000  
50 0 .0000  
50 1 -1.0241  
50 2 1.0241  
51 0 .0000  
51 1 .0000  
52 0 .0000  
52 1 -1.6348  
52 2 1.6348  
53 0 .0000  
53 1 -1.9645  
53 2 -.3735  
53 3 1.2089  
53 4 1.1292  
54 0 .0000  
54 1 .0000  
55 0 .0000  
55 1 .0000  
56 0 .0000  
56 1 .0000

## Appendix C – Winsteps Anchor File (Science Grade 4)

Item Anchor File (g04SCv0anchors.IAF)

1 0.6113

2 -0.2181

3 -0.9761

4 -1.7202

5 0.3352

6 -1.3771

7 -0.0967

9 0.1198

11 -0.6202

12 -1.1244

13 0.9252

14 -0.1009

15 0.5120

17 -0.3066

18 0.6715

19 0.2228

20 -0.5859

21 -0.0244  
22 0.0639  
23 -0.1602  
33 -0.6575  
34 0.4000  
35 0.1132  
36 -0.6692  
37 -0.2168  
38 0.9298  
40 -0.4616  
42 1.4521  
43 0.8829  
44 -0.4570  
46 0.5371  
48 -0.5778  
49 -0.5651  
50 -1.0393  
52 0.0331  
55 0.4568  
56 0.4301

## Step Parameter Anchor File (g04SCv0anchors.SAF)

3 0 0.0000

3 1 -1.1958

3 2 1.1959

21 0 0.0000

21 1 -1.1658

21 2 1.1658

36 0 0.0000

36 1 -0.9289

36 2 0.9289

40 0 0.0000

40 1 -0.5406

40 2 0.5406

42 0 0.0000

42 1 -1.1876

42 2 1.1876

43 0 0.0000

43 1 -1.4246

43 2 1.4247

44 0 0.0000

44 1 -1.1665

44 2 1.1665

50 0 0.0000

50 1 -0.8536

50 2 0.8536

52 0 0.0000

52 1 -1.4763

52 2 1.4763

## Appendix D – Winsteps Score File (Science Grade 4)

PERSON SCORE FILE FOR C:\Users\mfan\Documents\2023\KY Psychometrics\KSA2023\Winsteps\SC\g04Scv0\_eq. Jul 13 2023 3:51 USCALE=1.00

SCORE	MEASURE	S.E.	INFO	NORMED	S.E.	FREQUENCY	%	CUM.FREQ.	%	PERCENTILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18												
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49										
50	51	52	53	54	55	56																																		
0	-6.0163	2.0074	.25	-171	226	0	.0	0	.0	.0	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00									
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00									
.00	.00	.00	.00																																					
1	-4.6079	1.0146	.97	-12	114	30	.1	30	.1	.1	.01	.01	.08	.05	.01	.04	.01	.01	.01	.01	.02	.03	.00	.01	.01	.01	.01	.01	.01	.01	.02	.03								
.01	.01	.00	.04	.00	.00	.03	.02	.05	.00	.01	.02	.01	.01	.05	.01	.00	.01	.03	.02	.01	.02	.05	.01	.01	.01	.02	.02	.06	.01	.04										
.02	.00	.01	.01																																					
2	-3.8854	.7276	1.89	69	82	24	.1	54	.1	.1	.01	.02	.16	.10	.01	.08	.02	.01	.02	.01	.04	.06	.01	.02	.01	.02	.03	.01	.02	.04	.06									
.02	.02	.01	.07	.01	.00	.06	.04	.11	.00	.02	.04	.01	.02	.09	.02	.01	.02	.05	.05	.02	.03	.10	.01	.01	.01	.04	.03	.13	.02	.08										
.04	.01	.01	.01																																					
3	-3.4506	.6022	2.76	118	68	81	.2	135	.3	.2	.02	.04	.23	.15	.02	.11	.03	.02	.03	.02	.06	.09	.01	.03	.02	.04	.04	.02	.02	.05	.10									
.03	.04	.01	.11	.01	.01	.09	.06	.16	.00	.03	.06	.02	.03	.14	.04	.01	.03	.08	.07	.02	.05	.14	.02	.02	.02	.05	.05	.19	.02	.12										
.06	.01	.02	.02																																					
4	-3.1335	.5285	3.58	154	60	0	.0	135	.3	.3	.02	.05	.29	.20	.03	.15	.05	.02	.04	.03	.07	.12	.02	.05	.03	.05	.06	.02	.03	.07	.13									
.04	.05	.02	.15	.02	.01	.12	.09	.20	.00	.05	.08	.03	.04	.19	.05	.02	.04	.11	.09	.03	.07	.19	.02	.02	.03	.07	.07	.24	.03	.16										
.08	.02	.03	.03																																					
5	-2.8811	.4789	4.36	182	54	119	.3	254	.6	.4	.03	.07	.35	.24	.04	.18	.06	.03	.05	.04	.09	.15	.02	.06	.03	.06	.07	.03	.04	.09	.16									
.05	.06	.03	.18	.02	.01	.15	.11	.25	.01	.06	.10	.04	.05	.23	.07	.02	.05	.15	.12	.04	.09	.23	.03	.03	.03	.09	.09	.30	.04	.20										
.10	.02	.03	.04																																					
6	-2.6694	.4427	5.10	206	50	0	.0	254	.6	.6	.04	.08	.41	.28	.05	.22	.07	.04	.06	.04	.11	.18	.03	.07	.04	.08	.09	.03	.05	.11	.19									
.06	.08	.03	.22	.03	.01	.18	.13	.29	.01	.07	.12	.04	.06	.28	.08	.03	.06	.18	.14	.05	.11	.28	.04	.04	.04	.11	.11	.36	.05	.23										
.12	.03	.04	.04																																					
7	-2.4860	.4149	5.81	227	47	88	.2	342	.8	.7	.04	.09	.47	.32	.06	.25	.08	.05	.07	.05	.13	.20	.03	.08	.05	.09	.10	.04	.06	.13	.23									
.07	.09	.04	.25	.03	.02	.21	.15	.33	.01	.09	.14	.05	.07	.32	.09	.03	.07	.21	.16	.06	.13	.32	.05	.05	.05	.13	.13	.41	.06	.27										
.14	.03	.05	.05																																					
8	-2.3232	.3928	6.48	245	44	62	.1	404	.9	.8	.05	.11	.52	.35	.07	.28	.10	.05	.08	.06	.15	.23	.04	.10	.06	.11	.12	.05	.07	.15	.26									
.08	.10	.05	.28	.04	.02	.24	.17	.37	.01	.11	.16	.06	.08	.37	.11	.04	.09	.24	.19	.07	.15	.36	.06	.05	.06	.15	.15	.47	.07	.30										
.16	.04	.06	.06																																					
9	-2.1761	.3747	7.12	262	42	0	.0	404	.9	.9	.06	.12	.56	.39	.08	.31	.11	.06	.09	.07	.17	.26	.04	.11	.06	.12	.13	.05	.08	.17	.29									
.10	.12	.05	.32	.05	.02	.27	.20	.41	.01	.12	.18	.07	.09	.41	.12	.04	.10	.28	.21	.08	.17	.40	.07	.06	.07	.17	.17	.52	.08	.34										
.18	.04	.07	.07																																					
10	-2.0415	.3595	7.74	277	41	227	.5	631	1.4	1.2	.07	.14	.61	.42	.08	.34	.13	.07	.10	.08	.19	.29	.05	.13	.07	.14	.15	.06	.09	.19										
.32	.11	.13	.06	.35	.05	.03	.30	.22	.45	.01	.14	.20	.08	.10	.45	.14	.05	.11	.31	.23	.09	.19	.44	.08	.07	.08	.19	.19	.57	.09										
.37	.21	.05	.08	.08																																				
11	-1.9169	.3467	8.32	291	39	118	.3	749	1.7	1.5	.07	.15	.65	.45	.10	.37	.14	.08	.12	.09	.21	.31	.06	.14	.08	.15	.17	.07	.11	.21										
.35	.12	.15	.07	.38	.06	.03	.32	.24	.48	.02	.16	.22	.09	.12	.49	.15	.05	.13	.35	.26	.10	.21	.47	.09	.08	.09	.21	.21	.62	.10										
.40	.23	.05	.09	.09																																				
12	-1.8006	.3356	8.88	304	38	293	.7	1042	2.3	2.0	.08	.17	.69	.48	.11	.40	.15	.09	.13	.10	.23	.34	.06	.15	.09	.17	.18	.08	.12	.23										
.38	.13	.16	.08	.41	.07	.03	.35	.26	.51	.02	.18	.24	.10	.13	.53	.17	.06	.14	.39	.28	.12	.23	.51	.10	.09	.10	.23	.23	.66	.11										
.44	.26	.06	.09	.10																																				

13	-1.6913	.3259	9.41	316	37	297	.7	1339	3.0	2.6	.09	.19	.73	.51	.12	.42	.17	.10	.14	.11	.26	.36	.07	.17	.10	.19	.20	.09	.13	.25
.41	.15	.18	.09	.44	.07	.04	.37	.28	.55	.02	.21	.26	.11	.14	.57	.19	.07	.16	.42	.31	.13	.25	.55	.11	.10	.11	.25	.24	.71	.12
.47	.28	.07	.10	.11																										
14	-1.5878	.3174	9.93	328	36	183	.4	1522	3.4	3.2	.10	.20	.77	.53	.13	.45	.18	.11	.15	.12	.28	.39	.07	.18	.11	.20	.22	.09	.14	.27
.44	.16	.19	.10	.47	.08	.04	.40	.31	.58	.02	.23	.28	.12	.15	.61	.20	.07	.17	.46	.33	.14	.27	.58	.13	.11	.12	.27	.26	.75	.14
.50	.31	.07	.11	.12																										
15	-1.4895	.3098	10.42	339	35	570	1.3	2092	4.6	4.0	.11	.22	.81	.56	.14	.47	.20	.12	.17	.13	.30	.41	.08	.20	.12	.22	.23	.10	.15	.29
.47	.17	.21	.11	.50	.09	.05	.42	.33	.61	.02	.25	.30	.13	.17	.65	.22	.08	.19	.50	.35	.15	.29	.62	.14	.12	.13	.29	.28	.80	.15
.52	.33	.08	.12	.13																										
16	-1.3956	.3031	10.89	350	34	654	1.5	2746	6.1	5.4	.12	.24	.84	.58	.15	.50	.21	.13	.18	.14	.32	.43	.09	.22	.13	.24	.25	.11	.17	.31
.50	.19	.23	.13	.53	.09	.05	.45	.35	.63	.03	.28	.32	.14	.18	.69	.24	.09	.21	.54	.38	.16	.31	.65	.16	.13	.14	.31	.30	.84	.16
.55	.36	.09	.14	.14																										
17	-1.3056	.2970	11.34	360	33	333	.7	3079	6.8	6.5	.13	.25	.88	.60	.16	.52	.23	.14	.19	.15	.34	.45	.10	.23	.14	.25	.27	.12	.18	.33
.53	.20	.24	.14	.55	.10	.06	.47	.37	.66	.03	.31	.34	.15	.19	.73	.25	.10	.23	.58	.40	.18	.33	.68	.17	.14	.15	.33	.32	.88	.17
.58	.39	.09	.15	.15																										
18	-1.2191	.2915	11.77	370	33	1083	2.4	4162	9.3	8.0	.14	.27	.91	.62	.17	.54	.25	.15	.21	.16	.35	.48	.10	.25	.15	.27	.29	.13	.19	.35
.56	.22	.26	.15	.58	.11	.06	.49	.39	.69	.03	.34	.36	.17	.21	.76	.27	.10	.25	.61	.42	.19	.35	.71	.19	.15	.16	.34	.34	.92	.19
.61	.41	.10	.16	.16																										
19	-1.1356	.2865	12.18	379	32	400	.9	4562	10.1	9.7	.15	.29	.94	.64	.19	.56	.26	.17	.22	.17	.37	.50	.11	.26	.16	.29	.30	.14	.20	.37
.59	.23	.27	.17	.61	.12	.07	.51	.41	.71	.03	.37	.38	.18	.22	.80	.29	.11	.27	.65	.44	.21	.37	.74	.21	.16	.17	.36	.36	.96	.20
.63	.44	.11	.17	.17																										
20	-1.0548	.2820	12.58	388	32	1081	2.4	5643	12.5	11.3	.16	.30	.97	.66	.20	.58	.28	.18	.24	.19	.39	.52	.12	.28	.17	.31	.32	.15	.22	.38
.62	.25	.29	.19	.63	.13	.07	.53	.43	.74	.04	.40	.40	.19	.24	.83	.30	.12	.29	.69	.47	.22	.40	.77	.23	.17	.18	.38	.38	.99	.21
.66	.47	.12	.18	.18																										
21	-.9764	.2778	12.95	397	31	1187	2.6	6830	15.2	13.9	.17	.32	1.00	.68	.21	.60	.29	.19	.25	.20	.41	.54	.13	.29	.18	.33	.34	.16	.23	.40
.64	.26	.31	.21	.66	.14	.08	.55	.45	.76	.04	.44	.42	.20	.25	.87	.32	.13	.31	.73	.49	.23	.42	.80	.25	.18	.20	.40	.40	1.03	.23
.68	.50	.13	.19	.20																										
22	-.9003	.2740	13.32	406	31	620	1.4	7450	16.6	15.9	.18	.34	1.03	.69	.23	.62	.31	.21	.27	.21	.43	.56	.14	.31	.20	.35	.36	.17	.25	.42
.67	.28	.32	.22	.68	.15	.08	.57	.47	.78	.04	.48	.44	.21	.27	.90	.34	.14	.33	.77	.51	.25	.44	.83	.28	.19	.21	.42	.42	1.06	.24
.71	.53	.13	.20	.21																										
23	-.8262	.2705	13.67	414	31	2140	4.8	9590	21.3	18.9	.19	.35	1.06	.71	.24	.63	.33	.22	.28	.22	.45	.57	.15	.33	.21	.37	.37	.18	.26	.44
.70	.29	.34	.24	.70	.16	.09	.59	.49	.81	.04	.52	.46	.23	.28	.93	.35	.15	.35	.81	.53	.27	.46	.86	.30	.20	.22	.44	.44	1.10	.25
.73	.56	.14	.22	.22																										
24	-.7539	.2673	14.00	422	30	757	1.7	10347	23.0	22.2	.20	.37	1.08	.72	.25	.65	.34	.24	.29	.23	.47	.59	.16	.34	.22	.39	.39	.19	.27	.46
.72	.31	.36	.27	.73	.17	.09	.60	.50	.83	.05	.56	.48	.24	.30	.96	.37	.16	.38	.84	.55	.28	.48	.89	.33	.22	.23	.46	.45	1.13	.27
.75	.58	.15	.23	.23																										
25	-.6833	.2643	14.31	430	30	1447	3.2	11794	26.2	24.6	.22	.39	1.11	.74	.27	.67	.36	.25	.31	.25	.48	.61	.17	.36	.23	.41	.41	.21	.29	
.48	.75	.32	.37	.29	.75	.18	.10	.62	.52	.85	.05	.60	.49	.25	.31	.99	.39	.17	.40	.88	.57	.30	.50	.91	.36	.23	.25	.47	.47	1.16
.28	.77	.61	.16	.24	.25																									
26	-.6141	.2616	14.62	438	30	751	1.7	12545	27.9	27.0	.23	.40	1.14	.75	.28	.68	.37	.27	.32	.26	.50	.62	.18	.37	.24	.43	.42	.22	.30	.49
.78	.34	.39	.31	.77	.19	.11	.64	.54	.87	.05	.64	.51	.27	.33	1.02	.40	.18	.43	.92	.59	.31	.52	.94	.39	.24	.26	.49	.49	1.19	.29
.80	.64	.17	.26	.26																										
27	-.5464	.2590	14.90	446	29	1541	3.4	14086	31.3	29.6	.24	.42	1.16	.76	.29	.70	.39	.28	.34	.27	.52	.64	.19	.39	.26	.45	.44	.23	.32	
.51	.80	.35	.40	.34	.79	.20	.11	.65	.56	.89	.06	.69	.53	.28	.34	1.05	.42	.19	.45	.95	.61	.33	.54	.97	.42	.25	.27	.51	.50	1.22
.31	.82	.67	.18	.27	.27																									



28	-4799	.2567	15.17	453	29	1507	3.3	15593	34.7	33.0	.25	.43	1.19	.78	.31	.71	.41	.30	.35	.29	.54	.66	.20	.41	.27	.47	.46	.24	.33	
.53	.83	.37	.42	.37	.81	.21	.12	.67	.57	.91	.06	.74	.54	.29	.36	1.08	.43	.20	.48	.99	.63	.35	.56	.99	.45	.27	.29	.52	.52	1.25
.32	.84	.70	.19	.28	.29																									
29	-4145	.2546	15.43	460	29	1495	3.3	17088	38.0	36.3	.26	.45	1.21	.79	.32	.72	.42	.32	.37	.30	.55	.67	.21	.42	.28	.49	.47	.25	.35	
.54	.85	.38	.44	.40	.84	.22	.13	.68	.59	.93	.06	.79	.56	.31	.37	1.11	.45	.21	.51	1.03	.65	.36	.58	1.02	.48	.28	.30	.54	.54	
1.28	.34	.86	.74	.20	.29	.30																								
30	-3503	.2526	15.68	468	28	723	1.6	17811	39.6	38.8	.28	.47	1.23	.80	.34	.74	.44	.34	.38	.31	.57	.68	.22	.44	.30	.51	.49	.26	.36	.56
.88	.40	.45	.43	.86	.23	.13	.70	.60	.95	.07	.84	.58	.32	.39	1.14	.47	.22	.54	1.06	.67	.38	.60	1.04	.52	.29	.31	.56	.55	1.31	
.35	.88	.77	.21	.31	.31																									
31	-2869	.2508	15.90	475	28	1596	3.5	19407	43.1	41.4	.29	.48	1.26	.81	.35	.75	.45	.36	.40	.33	.58	.70	.23	.45	.31	.53	.50	.28	.38	
.57	.90	.41	.47	.46	.88	.24	.14	.71	.62	.96	.07	.90	.59	.33	.40	1.17	.48	.23	.57	1.09	.69	.40	.62	1.07	.55	.30	.33	.57	.57	
1.33	.37	.90	.80	.22	.32	.33																								
32	-2245	.2491	16.12	482	28	780	1.7	20187	44.9	44.0	.30	.50	1.28	.82	.36	.76	.47	.38	.41	.34	.60	.71	.24	.47	.32	.55	.52	.29	.39	.59
.92	.43	.48	.50	.90	.25	.15	.72	.63	.98	.08	.95	.61	.35	.42	1.19	.50	.24	.60	1.13	.71	.41	.64	1.09	.59	.32	.34	.59	.58	1.36	
.38	.92	.83	.23	.34	.34																									
33	-1628	.2476	16.31	489	28	2212	4.9	22399	49.8	47.3	.32	.51	1.30	.83	.38	.77	.48	.40	.43	.36	.61	.72	.25	.48	.34	.57	.54	.30	.40	
.60	.95	.44	.50	.53	.92	.26	.16	.73	.65	1.00	.08	1.01	.62	.36	.43	1.22	.51	.25	.63	1.16	.73	.43	.66	1.11	.63	.33	.35	.60	.60	
1.38	.40	.94	.86	.24	.35	.36																								
34	-1018	.2462	16.49	496	28	694	1.5	23093	51.3	50.6	.33	.53	1.32	.83	.39	.78	.50	.42	.44	.37	.63	.74	.26	.50	.35	.59	.55	.32	.42	.62
.97	.46	.51	.57	.94	.28	.16	.75	.66	1.02	.09	1.07	.64	.38	.45	1.25	.53	.26	.67	1.19	.74	.45	.68	1.14	.68	.35	.37	.62	.61	1.41	
.41	.96	.89	.26	.36	.37																									
35	-.0415	.2450	16.66	503	28	0	.0	23093	51.3	51.3	.34	.54	1.34	.84	.41	.79	.51	.44	.46	.38	.64	.75	.28	.51	.37	.61	.57	.33	.43	.63
.99	.47	.53	.61	.96	.29	.17	.76	.67	1.04	.09	1.13	.65	.39	.46	1.27	.54	.27	.70	1.22	.76	.47	.70	1.16	.72	.36	.38	.63	.63	1.43	
.43	.98	.92	.27	.38	.38																									
36	.0182	.2439	16.81	509	28	2690	6.0	25783	57.3	54.3	.36	.56	1.37	.85	.42	.80	.53	.46	.47	.40	.65	.76	.29	.53	.38	.63	.58	.34	.45	
.65	1.02	.49	.54	.65	.98	.30	.18	.77	.69	1.05	.10	1.19	.66	.41	.48	1.30	.56	.29	.74	1.25	.78	.49	.72	1.18	.76	.37	.40	.64	.64	
1.45	.44	1.00	.96	.28	.39	.40																								
37	.0775	.2430	16.94	516	27	0	.0	25783	57.3	57.3	.37	.57	1.39	.86	.44	.81	.54	.48	.49	.41	.67	.77	.30	.54	.39	.66	.59	.36	.46	.66
1.04	.50	.56	.69	.99	.31	.19	.78	.70	1.07	.10	1.25	.68	.42	.49	1.32	.57	.30	.77	1.28	.80	.51	.74	1.20	.81	.39	.41	.66	.66	1.48	
.45	1.01	.99	.29	.41	.41																									
38	.1363	.2421	17.05	523	27	2562	5.7	28345	63.0	60.2	.38	.59	1.41	.86	.45	.82	.56	.51	.50	.43	.68	.78	.31	.56	.41	.68	.61	.37	.48	
.67	1.06	.52	.57	.74	1.01	.33	.20	.79	.71	1.09	.11	1.31	.69	.43	.51	1.34	.59	.31	.81	1.31	.81	.52	.76	1.23	.86	.40	.43	.67	.67	
1.50	.47	1.03	1.02	.30	.42	.43																								
39	.1948	.2415	17.15	529	27	0	.0	28345	63.0	63.0	.40	.60	1.43	.87	.46	.83	.57	.53	.52	.44	.69	.79	.33	.57	.42	.70	.62	.38	.49	.69
1.08	.53	.59	.79	1.03	.34	.21	.80	.72	1.10	.11	1.37	.70	.45	.52	1.37	.60	.32	.85	1.34	.83	.54	.78	1.25	.91	.42	.44	.68	.68	1.52	
.48	1.05	1.05	.32	.43	.44																									
40	.2530	.2409	17.23	536	27	1161	2.6	29506	65.6	64.3	.41	.62	1.45	.88	.48	.84	.59	.55	.53	.46	.71	.80	.34	.59	.44	.73	.64	.40	.51	
.70	1.11	.55	.60	.84	1.05	.35	.22	.81	.74	1.12	.12	1.44	.71	.46	.53	1.39	.62	.34	.89	1.37	.85	.56	.80	1.27	.96	.43	.45	.70	.69	
1.54	.50	1.07	1.09	.33	.45	.46																								
41	.3109	.2404	17.30	542	27	1284	2.9	30790	68.4	67.0	.43	.63	1.46	.88	.49	.84	.60	.58	.55	.47	.72	.81	.35	.60	.45	.75	.65	.41	.52	
.71	1.13	.56	.62	.89	1.07	.37	.23	.82	.75	1.14	.13	1.50	.72	.48	.55	1.41	.63	.35	.93	1.39	.86	.58	.81	1.29	1.01	.44	.47	.71	.71	
1.56	.51	1.09	1.12	.34	.46	.47																								
42	.3686	.2401	17.34	549	27	548	1.2	31338	69.7	69.0	.44	.64	1.48	.89	.51	.85	.61	.61	.56	.49	.73	.82	.36	.62	.46	.77	.66	.42	.54	.72
1.15	.58	.63	.94	1.09	.38	.24	.82	.76	1.16	.13	1.57	.74	.49	.56	1.43	.64	.36	.98	1.42	.88	.60	.83	1.31	1.06	.46	.48	.72	.72	1.58	
.53	1.11	1.16	.35	.48	.48																									

43	.4262	.2399	17.37	555	27	1712	3.8	33050	73.5	71.6	.45	.66	1.50	.90	.52	.86	.63	.63	.58	.50	.74	.83	.38	.63	.48	.80	.68	.44	.55	
.73	1.17	.59	.64	.99	1.11	.39	.25	.83	.77	1.17	.14	1.63	.75	.51	.58	1.45	.66	.38	1.02	1.44	.90	.62	.85	1.33	1.12	.47	.50	.73	.73	
1.59	.54	1.12	1.19	.37	.49	.50																								
44	.4838	.2399	17.38	562	27	0	0	33050	73.5	73.5	.47	.67	1.52	.90	.54	.87	.64	.66	.59	.51	.75	.83	.39	.64	.49	.82	.69	.45	.56	.74
1.19	.60	.66	1.05	1.13	.41	.26	.84	.78	1.19	.15	1.69	.76	.52	.59	1.47	.67	.39	1.07	1.47	.91	.64	.87	1.35	1.17	.49	.51	.74	.74	1.61	
.56	1.14	1.23	.38	.51	.51																									
45	.5413	.2399	17.37	568	27	1447	3.2	34497	76.7	75.1	.48	.68	1.54	.91	.55	.87	.65	.69	.60	.53	.76	.84	.41	.66	.51	.85	.70	.47	.58	
.76	1.22	.62	.67	1.11	1.14	.42	.27	.85	.79	1.21	.15	1.76	.77	.54	.61	1.49	.68	.40	1.12	1.49	.93	.66	.89	1.37	1.23	.50	.53	.75	.75	
1.63	.57	1.16	1.26	.40	.52	.53																								
46	.5989	.2401	17.35	575	27	553	1.2	35050	77.9	77.3	.50	.69	1.55	.91	.57	.88	.67	.72	.62	.54	.77	.85	.42	.67	.52	.88	.71	.48	.59	.77
1.24	.63	.68	1.16	1.16	.43	.28	.86	.80	1.22	.16	1.82	.78	.55	.62	1.51	.69	.42	1.17	1.51	.94	.68	.91	1.39	1.28	.52	.54	.76	.76	1.64	
.58	1.18	1.30	.41	.54	.54																									
47	.6566	.2404	17.31	581	27	900	2.0	35950	79.9	78.9	.51	.71	1.57	.92	.58	.88	.68	.75	.63	.56	.78	.86	.43	.68	.54	.91	.72	.50	.61	.78
1.26	.64	.69	1.22	1.18	.45	.30	.86	.81	1.24	.17	1.89	.79	.56	.63	1.53	.71	.43	1.22	1.54	.96	.70	.93	1.41	1.34	.53	.55	.77	.77	1.66	
.60	1.20	1.33	.42	.55	.56																									
48	.7144	.2407	17.25	588	27	956	2.1	36906	82.0	81.0	.53	.72	1.59	.92	.59	.89	.69	.79	.64	.57	.79	.86	.45	.69	.55	.94	.74	.51	.62	.79
1.28	.66	.71	1.29	1.20	.46	.31	.87	.81	1.26	.18	1.95	.80	.58	.65	1.55	.72	.45	1.27	1.56	.98	.72	.95	1.43	1.40	.54	.57	.78	.78	1.68	
.61	1.21	1.37	.44	.56	.57																									
49	.7725	.2412	17.18	594	27	769	1.7	37675	83.7	82.9	.54	.73	1.60	.92	.61	.90	.70	.82	.66	.59	.80	.87	.46	.71	.56	.97	.75	.53	.63	.80
1.30	.67	.72	1.35	1.22	.48	.32	.88	.82	1.28	.19	2.01	.81	.59	.66	1.57	.73	.46	1.33	1.58	.99	.75	.96	1.45	1.46	.56	.58	.79	.79	1.69	
.63	1.23	1.41	.45	.58	.58																									
50	.8309	.2419	17.10	601	27	436	1.0	38111	84.7	84.2	.55	.74	1.62	.93	.62	.90	.72	.86	.67	.60	.81	.88	.48	.72	.58	1.00	.76	.54	.65	
.80	1.32	.68	.73	1.41	1.24	.49	.33	.88	.83	1.29	.19	2.07	.82	.61	.67	1.59	.74	.48	1.39	1.60	1.01	.77	.98	1.47	1.51	.57	.60	.80	.80	
1.70	.64	1.25	1.45	.47	.59	.60																								
51	.8895	.2426	16.99	608	27	767	1.7	38878	86.4	85.6	.57	.75	1.64	.93	.64	.91	.73	.89	.68	.61	.82	.88	.49	.73	.59	1.03	.77	.55	.66	
.81	1.34	.70	.74	1.47	1.26	.51	.35	.89	.84	1.31	.20	2.13	.82	.62	.68	1.61	.75	.49	1.45	1.62	1.03	.79	1.00	1.49	1.57	.59	.61	.81	.81	
1.72	.65	1.27	1.49	.48	.61	.61																								
52	.9486	.2434	16.88	614	27	755	1.7	39633	88.1	87.3	.58	.76	1.65	.94	.65	.91	.74	.93	.70	.63	.83	.89	.51	.74	.61	1.07	.78	.57	.67	
.82	1.36	.71	.75	1.54	1.27	.52	.36	.89	.85	1.33	.21	2.19	.83	.63	.70	1.62	.76	.50	1.51	1.64	1.04	.81	1.02	1.51	1.63	.60	.63	.82	.82	
1.73	.67	1.29	1.53	.50	.62	.63																								
53	1.0080	.2443	16.75	621	28	0	0	39633	88.1	88.1	.60	.77	1.67	.94	.66	.92	.75	.97	.71	.64	.84	.89	.52	.75	.62	1.11	.79	.58	.69	.83
1.38	.72	.76	1.60	1.29	.54	.37	.90	.86	1.35	.22	2.25	.84	.65	.71	1.64	.77	.52	1.57	1.65	1.06	.83	1.04	1.53	1.69	.62	.64	.83	.83		
1.75	.68	1.31	1.57	.51	.63	.64																								
54	1.0680	.2453	16.62	628	28	958	2.1	40591	90.2	89.2	.61	.78	1.68	.94	.68	.92	.76	1.01	.72	.65	.84	.90	.54	.76	.64	1.15	.80	.60	.70	
.84	1.41	.73	.77	1.67	1.31	.55	.39	.90	.86	1.37	.23	2.31	.85	.66	.72	1.66	.78	.53	1.64	1.67	1.08	.85	1.06	1.55	1.75	.63	.65	.84	.84	
1.76	.69	1.33	1.61	.53	.65	.65																								
55	1.1284	.2464	16.47	635	28	325	.7	40916	90.9	90.6	.63	.79	1.69	.95	.69	.92	.77	1.05	.73	.67	.85	.90	.55	.77	.65	1.19	.81	.61	.71	
.85	1.43	.74	.78	1.73	1.33	.57	.40	.91	.87	1.38	.25	2.36	.86	.67	.73	1.67	.79	.55	1.71	1.69	1.09	.88	1.08	1.56	1.81	.64	.67	.85	.84	
1.77	.70	1.34	1.66	.54	.66	.67																								
56	1.1894	.2476	16.31	641	28	859	1.9	41775	92.9	91.9	.64	.80	1.71	.95	.70	.93	.78	1.09	.74	.68	.86	.91	.57	.78	.66	1.23	.82	.63	.72	
.86	1.45	.76	.79	1.80	1.35	.58	.42	.91	.88	1.40	.26	2.42	.86	.69	.75	1.69	.80	.56	1.77	1.71	1.11	.90	1.10	1.58	1.87	.66	.68	.85	.85	
1.78	.72	1.36	1.70	.56	.68	.68																								
57	1.2511	.2489	16.14	648	28	255	.6	42030	93.4	93.1	.65	.81	1.72	.95	.71	.93	.79	1.14	.76	.69	.87	.91	.58	.79	.68	1.28	.83	.64	.74	
.86	1.47	.77	.80	1.86	1.37	.60	.43	.92	.88	1.42	.27	2.47	.87	.70	.76	1.70	.81	.58	1.85	1.72	1.13	.92	1.12	1.60	1.93	.67	.69	.86	.86	
1.79	.73	1.38	1.75	.57	.69	.69																								

58	1.3133	.2503	15.97	655	28	402	.9	42432	94.3	93.9	.67	.82	1.74	.95	.73	.94	.80	1.19	.77	.71	.87	.92	.60	.80	.69	1.33	.83	.66	.75
.87	1.49	.78	.81	1.93	1.39	.61	.45	.92	.89	1.44	.28	2.52	.88	.71	.77	1.72	.82	.59	1.92	1.74	1.15	.95	1.14	1.62	1.99	.68	.71	.87	.87
1.80	.74	1.40	1.80	.59	.70	.71																							
59	1.3763	.2517	15.78	662	28	280	.6	42712	94.9	94.6	.68	.83	1.75	.96	.74	.94	.81	1.24	.78	.72	.88	.92	.61	.81	.70	1.39	.84	.67	.76
.88	1.51	.79	.82	1.99	1.41	.63	.46	.93	.90	1.46	.29	2.57	.88	.73	.78	1.73	.83	.61	1.99	1.75	1.17	.97	1.16	1.63	2.05	.70	.72	.88	.87
1.81	.75	1.42	1.84	.60	.71	.72																							
60	1.4401	.2532	15.59	670	29	356	.8	43068	95.7	95.3	.70	.84	1.76	.96	.75	.94	.82	1.29	.79	.73	.89	.93	.63	.82	.72	1.45	.85	.68	.77
.88	1.53	.80	.83	2.06	1.43	.64	.48	.93	.90	1.48	.31	2.62	.89	.74	.79	1.75	.84	.62	2.07	1.76	1.18	1.00	1.18	1.65	2.11	.71	.73	.88	.88
1.82	.76	1.44	1.90	.62	.73	.73																							
61	1.5046	.2549	15.39	677	29	397	.9	43465	96.6	96.2	.71	.85	1.77	.96	.76	.95	.83	1.34	.80	.75	.89	.93	.64	.83	.73	1.51	.86	.70	.78
.89	1.55	.81	.84	2.12	1.45	.65	.50	.94	.91	1.49	.32	2.67	.90	.75	.80	1.76	.85	.64	2.14	1.78	1.20	1.02	1.20	1.67	2.17	.72	.74	.89	.89
1.83	.78	1.46	1.95	.63	.74	.75																							
62	1.5700	.2566	15.19	684	29	246	.5	43711	97.2	96.9	.72	.86	1.79	.96	.77	.95	.84	1.40	.81	.76	.90	.94	.66	.84	.74	1.58	.87	.71	.79
.90	1.57	.82	.85	2.18	1.47	.67	.51	.94	.91	1.51	.34	2.72	.90	.76	.81	1.77	.86	.65	2.22	1.79	1.22	1.04	1.22	1.68	2.23	.74	.76	.90	.89
1.84	.79	1.48	2.00	.65	.75	.76																							
63	1.6363	.2584	14.97	692	29	120	.3	43831	97.4	97.3	.74	.86	1.80	.97	.79	.95	.85	1.46	.82	.77	.91	.94	.67	.85	.75	1.65	.87	.72	.80
.90	1.59	.83	.86	2.25	1.49	.68	.53	.94	.92	1.53	.35	2.77	.91	.77	.82	1.78	.86	.67	2.30	1.80	1.24	1.07	1.24	1.70	2.29	.75	.77	.90	.90
1.85	.80	1.50	2.06	.66	.76	.77																							
64	1.7036	.2604	14.75	699	29	229	.5	44060	97.9	97.7	.75	.87	1.81	.97	.80	.96	.86	1.52	.83	.78	.91	.94	.69	.86	.77	1.72	.88	.74	.81
.91	1.60	.84	.87	2.31	1.51	.70	.54	.95	.92	1.55	.37	2.81	.91	.79	.83	1.80	.87	.68	2.38	1.82	1.26	1.10	1.27	1.71	2.35	.76	.78	.91	.91
1.86	.81	1.52	2.12	.68	.78	.78																							
65	1.7720	.2625	14.51	707	30	180	.4	44240	98.3	98.1	.76	.88	1.82	.97	.81	.96	.87	1.58	.84	.79	.92	.95	.70	.87	.78	1.80	.89	.75	.82
.91	1.62	.85	.87	2.37	1.53	.71	.56	.95	.93	1.57	.38	2.86	.92	.80	.84	1.81	.88	.70	2.46	1.83	1.28	1.12	1.29	1.73	2.41	.77	.79	.91	.91
1.87	.82	1.54	2.18	.69	.79	.79																							
66	1.8415	.2648	14.26	715	30	122	.3	44362	98.6	98.5	.77	.89	1.83	.97	.82	.96	.87	1.64	.85	.80	.92	.95	.71	.87	.79	1.89	.90	.76	.83
.92	1.64	.86	.88	2.43	1.55	.73	.58	.95	.93	1.59	.40	2.90	.92	.81	.85	1.82	.89	.71	2.54	1.84	1.30	1.15	1.31	1.74	2.48	.79	.80	.92	.92
1.88	.83	1.56	2.24	.71	.80	.80																							
67	1.9122	.2673	14.00	723	30	136	.3	44498	98.9	98.8	.79	.89	1.84	.97	.83	.96	.88	1.71	.86	.82	.93	.95	.73	.88	.80	1.98	.90	.78	.84
.92	1.66	.86	.89	2.49	1.57	.74	.60	.96	.94	1.61	.42	2.95	.93	.82	.86	1.83	.89	.73	2.62	1.85	1.32	1.17	1.33	1.76	2.54	.80	.81	.92	.92
1.89	.84	1.58	2.30	.72	.81	.81																							
68	1.9844	.2700	13.71	731	30	71	.2	44569	99.1	99.0	.80	.90	1.85	.98	.84	.97	.89	1.78	.87	.83	.93	.96	.74	.89	.81	2.08	.91	.79	.85
.93	1.68	.87	.90	2.55	1.59	.75	.61	.96	.94	1.62	.43	2.99	.93	.83	.87	1.84	.90	.74	2.70	1.86	1.34	1.20	1.36	1.77	2.60	.81	.82	.93	.93
1.89	.85	1.60	2.37	.73	.82	.83																							
69	2.0581	.2731	13.41	739	31	152	.3	44721	99.4	99.0	.81	.91	1.86	.98	.85	.97	.90	1.86	.87	.84	.94	.96	.76	.90	.82	2.18	.91	.80	.86
.93	1.70	.88	.90	2.61	1.61	.77	.63	.96	.94	1.64	.45	3.03	.94	.84	.87	1.85	.91	.76	2.77	1.87	1.36	1.23	1.38	1.78	2.66	.82	.83	.93	.93
1.90	.86	1.62	2.44	.75	.83	.84																							
70	2.1336	.2765	13.08	748	31	33	.1	44754	99.5	99.0	.82	.91	1.87	.98	.86	.97	.90	1.94	.88	.85	.94	.96	.77	.90	.84	2.28	.92	.81	.87
.94	1.71	.89	.91	2.67	1.63	.78	.65	.96	.95	1.66	.47	3.07	.94	.85	.88	1.86	.91	.77	2.85	1.88	1.39	1.26	1.40	1.80	2.72	.83	.85	.94	.94
1.91	.87	1.64	2.51	.76	.84	.85																							
71	2.2111	.2803	12.73	757	32	75	.2	44829	99.6	99.0	.83	.92	1.88	.98	.87	.97	.91	2.02	.89	.86	.94	.97	.78	.91	.85	2.39	.93	.82	.88
.94	1.73	.90	.91	2.73	1.65	.79	.67	.97	.95	1.68	.49	3.11	.95	.86	.89	1.87	.92	.78	2.93	1.89	1.41	1.28	1.43	1.81	2.79	.84	.85	.94	.94
1.91	.88	1.65	2.58	.78	.85	.86																							
72	2.2909	.2847	12.34	766	32	20	.0	44849	99.7	99.0	.84	.92	1.89	.98	.88	.98	.92	2.10	.90	.87	.95	.97	.80	.92	.86	2.50	.93	.83	.89
.95	1.75	.90	.92	2.79	1.67	.81	.68	.97	.96	1.70	.51	3.15	.95	.87	.90	1.88	.92	.80	3.00	1.89	1.43	1.31	1.45	1.82	2.85	.85	.86	.95	.95
1.92	.88	1.67	2.66	.79	.86	.87																							

73	2.3733	.2897	11.92	775	33	42	.1	44891	99.8	99.0	.85	.93	1.89	.98	.88	.98	.92	2.19	.90	.87	.95	.97	.81	.92	.87	2.61	.94	.85	.90	
.95	1.76	.91	.93	2.85	1.69	.82	.70	.97	.96	1.71	.53	3.20	.95	.88	.91	1.89	.93	.81	3.07	1.90	1.46	1.34	1.48	1.84	2.92	.86	.87	.95	.95	
1.93	.89	1.69	2.73	.80	.87	.87																								
74	2.4589	.2954	11.46	785	33	38	.1	44929	99.9	99.0	.86	.94	1.90	.98	.89	.98	.93	2.28	.91	.88	.96	.97	.82	.93	.88	2.73	.94	.86	.90	
.95	1.78	.92	.93	2.91	1.71	.83	.72	.97	.96	1.73	.55	3.24	.96	.89	.91	1.90	.94	.82	3.14	1.91	1.48	1.37	1.50	1.85	2.98	.87	.88	.95	.95	
1.93	.90	1.71	2.81	.82	.88	.88																								
75	2.5481	.3020	10.96	795	34	20	.0	44949	99.9	99.0	.87	.94	1.91	.99	.90	.98	.93	2.37	.92	.89	.96	.98	.84	.93	.88	2.84	.95	.87	.91	
.96	1.79	.92	.94	2.97	1.72	.84	.74	.98	.96	1.75	.57	3.28	.96	.90	.92	1.91	.94	.83	3.21	1.92	1.51	1.40	1.53	1.86	3.05	.88	.89	.96	.96	
1.94	.91	1.73	2.89	.83	.89	.89																								
76	2.6415	.3097	10.43	805	35	7	.0	44956	99.9	99.0	.88	.95	1.92	.99	.91	.98	.94	2.47	.93	.90	.96	.98	.85	.94	.89	2.96	.95	.88	.92	.96
1.81	.93	.94	3.03	1.74	.86	.75	.98	.97	1.77	.60	3.32	.96	.90	.93	1.91	.95	.85	3.28	1.92	1.53	1.43	1.56	1.87	3.11	.89	.90	.96	.96	.96	
1.94	.92	1.75	2.98	.84	.90	.90																								
77	2.7402	.3186	9.85	816	36	2	.0	44958	99.9	99.0	.89	.95	1.92	.99	.92	.98	.94	2.58	.93	.91	.97	.98	.86	.94	.90	3.07	.95	.89	.93	.97
1.83	.94	.95	3.09	1.76	.87	.77	.98	.97	1.79	.62	3.36	.97	.91	.93	1.92	.95	.86	3.35	1.93	1.56	1.47	1.58	1.88	3.18	.90	.91	.97	.96	.96	
1.95	.92	1.77	3.06	.85	.91	.91																								
78	2.8450	.3291	9.23	828	37	7	.0	44965	99.9	99.0	.90	.96	1.93	.99	.92	.99	.95	2.68	.94	.92	.97	.98	.87	.95	.91	3.18	.96	.90	.93	.97
1.84	.94	.95	3.16	1.78	.88	.79	.98	.97	1.80	.64	3.40	.97	.92	.94	1.93	.96	.87	3.41	1.94	1.59	1.50	1.61	1.89	3.25	.91	.92	.97	.97	.97	
1.95	.93	1.79	3.14	.87	.92	.92																								
79	2.9573	.3415	8.57	841	39	8	.0	44973	100.0	99.0	.91	.96	1.94	.99	.93	.99	.95	2.79	.94	.93	.97	.98	.88	.96	.92	3.28	.96	.91	.94	.97
1.86	.95	.96	3.22	1.80	.89	.81	.98	.98	1.82	.67	3.45	.97	.93	.95	1.94	.96	.88	3.47	1.94	1.62	1.53	1.64	1.90	3.32	.92	.93	.97	.97	.97	
1.96	.94	1.81	3.23	.88	.92	.93																								
80	3.0789	.3564	7.87	854	40	6	.0	44979	100.0	99.0	.92	.96	1.95	.99	.94	.99	.96	2.91	.95	.93	.98	.99	.90	.96	.93	3.38	.97	.92	.95	.98
1.87	.95	.96	3.29	1.82	.90	.83	.99	.98	1.84	.70	3.49	.98	.94	.95	1.94	.96	.90	3.53	1.95	1.65	1.57	1.67	1.91	3.38	.93	.93	.97	.97	.97	
1.96	.94	1.82	3.32	.89	.93	.93																								
81	3.2123	.3744	7.13	870	42	6	.0	44985	100.0	99.0	.93	.97	1.95	.99	.95	.99	.96	3.03	.96	.94	.98	.99	.91	.96	.94	3.47	.97	.93	.95	.98
1.89	.96	.97	3.36	1.84	.91	.84	.99	.98	1.86	.72	3.54	.98	.94	.96	1.95	.97	.91	3.59	1.96	1.68	1.61	1.70	1.92	3.45	.94	.94	.98	.98	.98	
1.97	.95	1.84	3.40	.90	.94	.94																								
82	3.3606	.3967	6.35	886	45	0	.0	44985	100.0	99.0	.94	.97	1.96	.99	.95	.99	.97	3.15	.96	.95	.98	.99	.92	.97	.95	3.56	.98	.94	.96	.98
1.90	.96	.97	3.43	1.86	.92	.86	.99	.98	1.87	.75	3.59	.98	.95	.96	1.96	.97	.92	3.65	1.96	1.71	1.65	1.73	1.93	3.52	.94	.95	.98	.98	.98	
1.97	.96	1.86	3.49	.92	.95	.95																								
83	3.5289	.4249	5.54	905	48	1	.0	44986	100.0	99.0	.95	.98	1.96	.99	.96	.99	.97	3.27	.97	.96	.98	.99	.93	.97	.95	3.64	.98	.95	.96	.98
1.91	.97	.98	3.50	1.88	.93	.88	.99	.99	1.89	.78	3.63	.99	.96	.97	1.96	.98	.93	3.70	1.97	1.75	1.69	1.77	1.94	3.59	.95	.96	.98	.98	.98	
1.98	.96	1.88	3.57	.93	.96	.96																								
84	3.7248	.4618	4.69	927	52	3	.0	44989	100.0	99.0	.96	.98	1.97	1.00	.97	.99	.98	3.40	.97	.96	.99	.99	.94	.98	.96	3.72	.98	.95	.97	.97
.99	1.93	.97	.98	3.57	1.90	.95	.90	.99	.99	1.91	.81	3.69	.99	.97	.97	1.97	.98	.94	3.76	1.97	1.78	1.73	1.80	1.95	3.66	.96	.96	.99	.99	
1.98	.97	1.90	3.66	.94	.96	.96																								
85	3.9609	.5125	3.81	954	58	0	.0	44989	100.0	99.0	.97	.98	1.98	1.00	.97	1.00	.98	3.52	.98	.97	.99	.99	.95	.98	.97	3.79	.99	.96	.98	.98
.99	1.94	.98	.98	3.65	1.92	.96	.92	.99	.99	1.93	.85	3.74	.99	.97	.98	1.98	.98	.95	3.81	1.98	1.82	1.78	1.84	1.96	3.73	.97	.97	.99	.99	
1.98	.98	1.92	3.73	.95	.97	.97																								
86	4.2609	.5877	2.89	988	66	1	.0	44990	100.0	99.0	.97	.99	1.98	1.00	.98	1.00	.99	3.65	.98	.98	.99	1.00	.97	.99	.98	3.85	.99	.97	.98	.98
.99	1.96	.99	.99	3.73	1.94	.97	.94	1.00	.99	1.94	.88	3.80	.99	.98	.98	1.98	.99	.97	3.86	1.98	1.86	1.83	1.87	1.97	3.80	.98	.98	.99	.99	
.99	1.99	.98	1.94	3.81	.96	.98	.98																							
87	4.6783	.7153	1.95	1035	81	0	.0	44990	100.0	100.0	.98	.99	1.99	1.00	.99	1.00	.99	3.77	.99	.99	1.00	1.00	.98	.99	.98	3.90	.99	.98	.99	.99
.99	1.97	.99	.99	3.82	1.96	.98	.96	1.00	1.00	1.96	.92	3.86	1.00	.99	.99	1.99	.99	.98	3.91	1.99	1.90	1.88	1.91	1.98	3.87	.98	.99	.99	.99	
.99	1.99	.99	1.96	3.88	.98	.99	.99																							

88	5.3829	1.0057	.99	1114	113	0	.0	44990	100.0	100.0	.99	1.00	1.99	1.00	.99	1.00	1.00	3.89	.99	.99	1.00	1.00	.99	1.00	.99	3.95	1.00	.99	
.99	1.00	1.99	1.00	1.00	3.91	1.98	.99	.98	1.00	1.00	1.98	.96	3.93	1.00	.99	.99	1.99	1.00	.99	3.95	2.00	1.95	1.94	1.96	1.99	3.94	.99	.99	
1.00	1.00	2.00	.99	1.98	3.94	.99	.99	.99																					
89	6.7776	2.0028	.25	1272	226	0	.0	44990	100.0	100.0	1.00	1.00	2.00	1.00	1.00	1.00	1.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	1.00	1.00	
1.00	1.00	2.00	1.00	1.00	4.00	2.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	4.00	1.00	1.00	1.00	2.00	1.00	1.00	4.00	2.00	2.00	2.00	2.00	2.00	4.00	1.00	1.00
1.00	1.00	1.00	2.00	1.00	2.00	4.00	1.00	1.00	1.00																				

## Appendix E – Comparison of Files Output (Science Grade 4)

All RSSS Differences – Science Grade 4

subject	grade	form	rs	pearson_theta	pearson_se	humrro_theta	humrro_se	theta_diff	se_diff
SC	04	1	0	-5.1168	2.0201	-5.1168	2.0201	0	0
SC	04	1	1	-3.67	1.0393	-3.67	1.0393	0	0
SC	04	1	2	-2.8972	0.761	-2.8972	0.761	0	0
SC	04	1	3	-2.4131	0.6416	-2.4131	0.6416	0	0
SC	04	1	4	-2.0475	0.5724	-2.0475	0.5724	0	0
SC	04	1	5	-1.747	0.5265	-1.747	0.5265	0	0
SC	04	1	6	-1.4876	0.4935	-1.4876	0.4935	0	0
SC	04	1	7	-1.2566	0.4688	-1.2566	0.4688	0	0
SC	04	1	8	-1.046	0.4496	-1.046	0.4496	0	0
SC	04	1	9	-0.8509	0.4344	-0.8509	0.4344	0	0
SC	04	1	10	-0.6676	0.4222	-0.6676	0.4222	0	0
SC	04	1	11	-0.4936	0.4124	-0.4936	0.4124	0	0
SC	04	1	12	-0.3269	0.4045	-0.3269	0.4045	0	0
SC	04	1	13	-0.1658	0.3983	-0.1658	0.3983	0	0
SC	04	1	14	-0.0092	0.3935	-0.0092	0.3935	0	0
SC	04	1	15	0.1443	0.3901	0.1443	0.3901	0	0
SC	04	1	16	0.2955	0.3879	0.2955	0.3879	0	0
SC	04	1	17	0.4456	0.387	0.4456	0.387	0	0
SC	04	1	18	0.5954	0.3873	0.5954	0.3873	0	0
SC	04	1	19	0.746	0.3889	0.746	0.3889	0	0
SC	04	1	20	0.8981	0.3915	0.8981	0.3915	0	0
SC	04	1	21	1.0527	0.395	1.0527	0.395	0	0
SC	04	1	22	1.2104	0.3993	1.2104	0.3993	0	0
SC	04	1	23	1.3717	0.404	1.3717	0.404	0	0
SC	04	1	24	1.537	0.409	1.537	0.409	0	0
SC	04	1	25	1.7064	0.4143	1.7064	0.4143	0	0
SC	04	1	26	1.8806	0.4205	1.8806	0.4205	0	0
SC	04	1	27	2.0607	0.4287	2.0607	0.4287	0	0
SC	04	1	28	2.2492	0.4406	2.2492	0.4406	0	0



subject	grade	form	rs		pearson_theta	pearson_se	humrro_theta	humrro_se	theta_diff	se_diff
SC	04		1	29	2.4508	0.4586	2.4508	0.4586	0	0
SC	04		1	30	2.673	0.486	2.673	0.486	0	0
SC	04		1	31	2.9288	0.5283	2.9288	0.5283	0	0
SC	04		1	32	3.2422	0.5963	3.2422	0.5963	0	0
SC	04		1	33	3.6663	0.7177	3.6663	0.7177	0	0
SC	04		1	34	4.3705	1.0034	4.3705	1.0034	0	0
SC	04		1	35	5.7594	2	5.7594	2	0	0
SC	04		2	0	-4.9746	2.0169	-4.9746	2.0169	0	0
SC	04		2	1	-3.5374	1.0335	-3.5374	1.0335	0	0
SC	04		2	2	-2.776	0.754	-2.776	0.754	0	0
SC	04		2	3	-2.3018	0.6342	-2.3018	0.6342	0	0
SC	04		2	4	-1.9452	0.5649	-1.9452	0.5649	0	0
SC	04		2	5	-1.6528	0.519	-1.6528	0.519	0	0
SC	04		2	6	-1.4011	0.4859	-1.4011	0.4859	0	0
SC	04		2	7	-1.1774	0.4608	-1.1774	0.4608	0	0
SC	04		2	8	-0.9744	0.4411	-0.9744	0.4411	0	0
SC	04		2	9	-0.787	0.4251	-0.787	0.4251	0	0
SC	04		2	10	-0.6121	0.4119	-0.6121	0.4119	0	0
SC	04		2	11	-0.447	0.401	-0.447	0.401	0	0
SC	04		2	12	-0.2899	0.392	-0.2899	0.392	0	0
SC	04		2	13	-0.1393	0.3846	-0.1393	0.3846	0	0
SC	04		2	14	0.0064	0.3788	0.0064	0.3788	0	0
SC	04		2	15	0.1482	0.3745	0.1482	0.3745	0	0
SC	04		2	16	0.2873	0.3716	0.2873	0.3716	0	0
SC	04		2	17	0.4247	0.37	0.4247	0.37	0	0
SC	04		2	18	0.5614	0.3698	0.5614	0.3698	0	0
SC	04		2	19	0.6985	0.3708	0.6985	0.3708	0	0
SC	04		2	20	0.8367	0.373	0.8367	0.373	0	0
SC	04		2	21	0.9771	0.3764	0.9771	0.3764	0	0
SC	04		2	22	1.1203	0.3806	1.1203	0.3806	0	0
SC	04		2	23	1.2671	0.3857	1.2671	0.3857	0	0
SC	04		2	24	1.418	0.3914	1.418	0.3914	0	0
SC	04		2	25	1.5736	0.3976	1.5736	0.3976	0	0

subject	grade	form	rs		pearson_theta	pearson_se	humrro_theta	humrro_se	theta_diff	se_diff
SC	04		2	26	1.7345	0.4046	1.7345	0.4046	0	0
SC	04		2	27	1.9014	0.4129	1.9014	0.4129	0	0
SC	04		2	28	2.0761	0.4235	2.0761	0.4235	0	0
SC	04		2	29	2.2613	0.4381	2.2613	0.4381	0	0
SC	04		2	30	2.4621	0.4593	2.4621	0.4593	0	0
SC	04		2	31	2.6867	0.4905	2.6867	0.4905	0	0
SC	04		2	32	2.9493	0.5374	2.9493	0.5374	0	0
SC	04		2	33	3.2761	0.6109	3.2761	0.6109	0	0
SC	04		2	34	3.7232	0.7375	3.7232	0.7375	0	0
SC	04		2	35	4.4635	1.0249	4.4635	1.0249	0	0
SC	04		2	36	5.8897	2.014	5.8897	2.014	0	0
SC	04		3	0	-4.9798	2.0138	-4.9798	2.0138	0	0
SC	04		3	1	-3.5519	1.0274	-3.5519	1.0274	0	0
SC	04		3	2	-2.803	0.7456	-2.803	0.7456	0	0
SC	04		3	3	-2.3415	0.6241	-2.3415	0.6241	0	0
SC	04		3	4	-1.9974	0.5538	-1.9974	0.5538	0	0
SC	04		3	5	-1.7173	0.5071	-1.7173	0.5071	0	0
SC	04		3	6	-1.4775	0.4738	-1.4775	0.4738	0	0
SC	04		3	7	-1.2651	0.4488	-1.2651	0.4488	0	0
SC	04		3	8	-1.0726	0.4294	-1.0726	0.4294	0	0
SC	04		3	9	-0.8949	0.4141	-0.8949	0.4141	0	0
SC	04		3	10	-0.7287	0.4018	-0.7287	0.4018	0	0
SC	04		3	11	-0.5714	0.3917	-0.5714	0.3917	0	0
SC	04		3	12	-0.4212	0.3836	-0.4212	0.3836	0	0
SC	04		3	13	-0.2767	0.377	-0.2767	0.377	0	0
SC	04		3	14	-0.1366	0.3717	-0.1366	0.3717	0	0
SC	04		3	15	0	0.3676	0	0.3676	0	0
SC	04		3	16	0.1339	0.3645	0.1339	0.3645	0	0
SC	04		3	17	0.266	0.3624	0.266	0.3624	0	0
SC	04		3	18	0.3968	0.3611	0.3968	0.3611	0	0
SC	04		3	19	0.5269	0.3606	0.5269	0.3606	0	0
SC	04		3	20	0.657	0.3608	0.657	0.3608	0	0
SC	04		3	21	0.7874	0.3617	0.7874	0.3617	0	0

subject	grade	form	rs		pearson_theta	pearson_se	humrro_theta	humrro_se	theta_diff	se_diff
SC	04		3	22	0.9187	0.3631	0.9187	0.3631	0	0
SC	04		3	23	1.0513	0.3651	1.0513	0.3651	0	0
SC	04		3	24	1.1854	0.3674	1.1854	0.3674	0	0
SC	04		3	25	1.3214	0.3702	1.3214	0.3702	0	0
SC	04		3	26	1.4596	0.3734	1.4596	0.3734	0	0
SC	04		3	27	1.6005	0.3772	1.6005	0.3772	0	0
SC	04		3	28	1.7445	0.3819	1.7445	0.3819	0	0
SC	04		3	29	1.8925	0.3879	1.8925	0.3879	0	0
SC	04		3	30	2.0459	0.3959	2.0459	0.3959	0	0
SC	04		3	31	2.2069	0.4071	2.2069	0.4071	0	0
SC	04		3	32	2.3787	0.4228	2.3787	0.4228	0	0
SC	04		3	33	2.5665	0.4451	2.5665	0.4451	0	0
SC	04		3	34	2.7783	0.4773	2.7783	0.4773	0	0
SC	04		3	35	3.0279	0.5247	3.0279	0.5247	0	0
SC	04		3	36	3.3402	0.5981	3.3402	0.5981	0	0
SC	04		3	37	3.7704	0.7249	3.7704	0.7249	0	0
SC	04		3	38	4.4904	1.0142	4.4904	1.0142	0	0
SC	04		3	39	5.8995	2.0081	5.8995	2.0081	0	0
SC	04		4	0	-5.0831	2.0139	-5.0831	2.0139	0	0
SC	04		4	1	-3.6549	1.0276	-3.6549	1.0276	0	0
SC	04		4	2	-2.9056	0.7458	-2.9056	0.7458	0	0
SC	04		4	3	-2.4438	0.6243	-2.4438	0.6243	0	0
SC	04		4	4	-2.0995	0.5539	-2.0995	0.5539	0	0
SC	04		4	5	-1.8194	0.5072	-1.8194	0.5072	0	0
SC	04		4	6	-1.5796	0.4737	-1.5796	0.4737	0	0
SC	04		4	7	-1.3674	0.4486	-1.3674	0.4486	0	0
SC	04		4	8	-1.1751	0.4291	-1.1751	0.4291	0	0
SC	04		4	9	-0.9977	0.4136	-0.9977	0.4136	0	0
SC	04		4	10	-0.8319	0.4011	-0.8319	0.4011	0	0
SC	04		4	11	-0.6752	0.391	-0.6752	0.391	0	0
SC	04		4	12	-0.5257	0.3826	-0.5257	0.3826	0	0
SC	04		4	13	-0.3819	0.3758	-0.3819	0.3758	0	0
SC	04		4	14	-0.2428	0.3702	-0.2428	0.3702	0	0

subject	grade	form	rs		pearson_theta	pearson_se	humrro_theta	humrro_se	theta_diff	se_diff
SC	04		4	15	-0.1075	0.3658	-0.1075	0.3658	0	0
SC	04		4	16	0.025	0.3622	0.025	0.3622	0	0
SC	04		4	17	0.1552	0.3596	0.1552	0.3596	0	0
SC	04		4	18	0.2838	0.3578	0.2838	0.3578	0	0
SC	04		4	19	0.4115	0.3569	0.4115	0.3569	0	0
SC	04		4	20	0.5388	0.3568	0.5388	0.3568	0	0
SC	04		4	21	0.6663	0.3576	0.6663	0.3576	0	0
SC	04		4	22	0.7948	0.3593	0.7948	0.3593	0	0
SC	04		4	23	0.9248	0.362	0.9248	0.362	0	0
SC	04		4	24	1.0571	0.3657	1.0571	0.3657	0	0
SC	04		4	25	1.1926	0.3706	1.1926	0.3706	0	0
SC	04		4	26	1.3321	0.3767	1.3321	0.3767	0	0
SC	04		4	27	1.4767	0.3842	1.4767	0.3842	0	0
SC	04		4	28	1.6277	0.3934	1.6277	0.3934	0	0
SC	04		4	29	1.7869	0.4047	1.7869	0.4047	0	0
SC	04		4	30	1.9562	0.4188	1.9562	0.4188	0	0
SC	04		4	31	2.1388	0.4365	2.1388	0.4365	0	0
SC	04		4	32	2.339	0.4594	2.339	0.4594	0	0
SC	04		4	33	2.5638	0.4903	2.5638	0.4903	0	0
SC	04		4	34	2.825	0.5345	2.825	0.5345	0	0
SC	04		4	35	3.1456	0.6028	3.1456	0.6028	0	0
SC	04		4	36	3.578	0.7237	3.578	0.7237	0	0
SC	04		4	37	4.2914	1.0085	4.2914	1.0085	0	0
SC	04		4	38	5.6887	2.0031	5.6887	2.0031	0	0