PUBLIC RELEASE

Technical Report: March 2019 CKE 2

Human Resources Professionals Association

3 April 2019

ICKETT
MEASUREMENT SYSTEMS

Contents

List of Tables

List of Figures

Executive Summary[1]

Note that this technical report covers only the primary new form or forms administered during an administration, and not detailed results for all forms used (which may include previously used forms, scrambled forms, and other modifications to maintain exam and score integrity).

The Comprehensive Knowledge Exam 2 (CKE 2) was administered to 231 candidates using computer-based testing at Prometric test centres March 4–18, 2019, inclusive. The examination comprised 250 four-option multiple choice items and had a 5-hour time limit.

As per the CKE 2 blueprint, the exam was scored using the 220–230 best-performing items (while adhering to the prescribed distribution across functional areas). The mean score for first-time candidates (n=179[2]) was 154.6 (67.2%), and for all candidates it was 148.6 (64.6%), out of 230 scored items. Reliability was strong at .92. The final set of scored items adhered to the blueprint parameters.

The pass mark was set using equating back to the March, June and October 2018 CKE 2 administrations, yielding an integer pass mark of 138. Equating was conducted to compensate for minor changes in exam form difficulty so that any given candidate has an equivalent hurdle regardless of when they write the CKE 2. This pass mark resulted in a pass rate for first-time candidates of 76.5% and a pass rate for all candidates of 65.8%.

This report, the analyses performed, and the processes followed are consistent with NCCA standards[3] and ISO 17024 standards.[4]

[1] This technical report is an abbreviated version of the full report. Information has been excluded that if known to candidates could negatively affect the validity of future candidate test score interpretations. This includes item-level statistics, some information about the construction of test forms, and some specific details concerning equating.

[2] Excludes those who had failed an HRPA examination in the past, who were identified as being statistical outliers, or who had written an alternative test form.

[3] National Commission for Certifying Agencies (2014). *Standards for the accreditation of certification programs*. Washington, DC: Institute for Credentialing Excellence.

[4] International Organization for Standardization (2012). *ISO/IEC 17024:2012 Conformity assessment – General requirements for bodies operating certification of persons*. Geneva: International Organization for Standardization.

Administration

Form Setting

Using only validated test items, Wickett Measurement Systems prepared one 250-item test form (using a combination of scored and experimental test items). Wickett constructed the final test form according to the following parameters:

1. Including only items validated by the validation panel in the past 2 years
2. Fitting the total item count of 250
3. Excluding enemy items
4. Matching the blueprint target value (+/− 2%) for each functional area
5. Maximizing spread across competencies
6. Reducing item exposure
7. Selecting items with perceived psychometric effectiveness, using statistics from previous administrations as available

Wickett proofed the final form for text errors and detection of potential enemy items. Items flagged as enemies were replaced.

The final form composition for the primary March 2019 CKE 2 form is shown in Table 1. All functional areas are within 2 items of their targets, and as such, the form reflects the blueprint (see Appendix A for the CKE 2 blueprint).

Note that at any administration, HRPA makes use of previously validated and administered test forms along with new test forms, in addition to employing other mechanisms to maintain the integrity of the exams and candidate scores.

Table 1: Test form as administered

	Functional Area	Actual Items	Target	Variance
10	Strategy	27	27–28	—
20	Professional Practice	28	27–28	—
30	Organizational Effectiveness	34	35	−1
40	Workforce Planning & Talent Management	35	35	—
50	Labour & Employee Relations	23	22–23	—
60	Total Rewards	25	25	—
70	Learning & Development	26	27–28	−1
80	Health, Wellness & Safe Workplace	22	20	+2
90	HR Metrics, Reporting & Financial Management	30	30	—
	TOTAL	**250**	**250**	**—**

Testing Window

The examination was administered via computer-based testing at Prometric test sites primarily in Ontario. The testing window was March 4–18, 2019, inclusive, and 231 candidates wrote the exam.

Candidates had access to a basic-function calculator on screen. No other aids or resources were allowed.

Analysis

Data Cleaning and Integrity Checks

Prometric provided data in .xml format via a secure ftp site. Candidate files were provided as candidates completed the examination throughout the testing window. These files were extracted to Microsoft Excel for processing. They contained identifying information for each candidate, form information, start and stop times, answer string, key string, candidate total score, item comments if the candidate made any, and time spent per item.

The data files received were reconciled against the roster provided by Prometric to ensure that all .xml files had been received. Further, each candidate total score as computed by Prometric was reconciled with that computed by Wickett for the full set of 250 items to verify key accuracy. Comments on items were also reviewed to identify any specific item-level issues. No problems were encountered.

The average time taken by all candidates was assessed to detect potential examination timing concerns. The distribution is shown in Figure 1. The mean was 3 hours, 44 minutes (7 minutes less than in October 2018). The time limit on the CKE 2 was 5 hours, suggesting that time was not a factor in scores across candidates. (Note that 2 candidates exceeded the time limit; these candidates were granted additional time in advance of the administration as an accommodation and are not included in the mean time reported in this paragraph.)

Eleven candidates (5%) took the full 5 hours, suggesting that those candidates may have wanted more time, and 2 candidates (1%) left at least 1 item blank, suggesting that those candidates timed out of the exam before being able to complete it. These metrics will continue to be monitored, but at present do not appear problematically high.

The correlation between scores on the 250 items and time spent writing the examination was negligible at a value of −.02, suggesting no relation between time spent on items and performance.

Candidate scores were computed across the window to look for any evidence of item exposure. As shown in Figure 2, there was little variation across the window. The difference between the first 3 days and the last 3 days was an increase of 7.5 marks out of 250. This 3.0% change is not considered meaningful, though close monitoring will be necessary in future administrations.

As a matter of interest, candidate volumes were also examined across the window; these are also shown in Figure 2. The usual pattern of increased sittings at the end of the window was in evidence.

Figure 1: Examination time distribution for all candidates

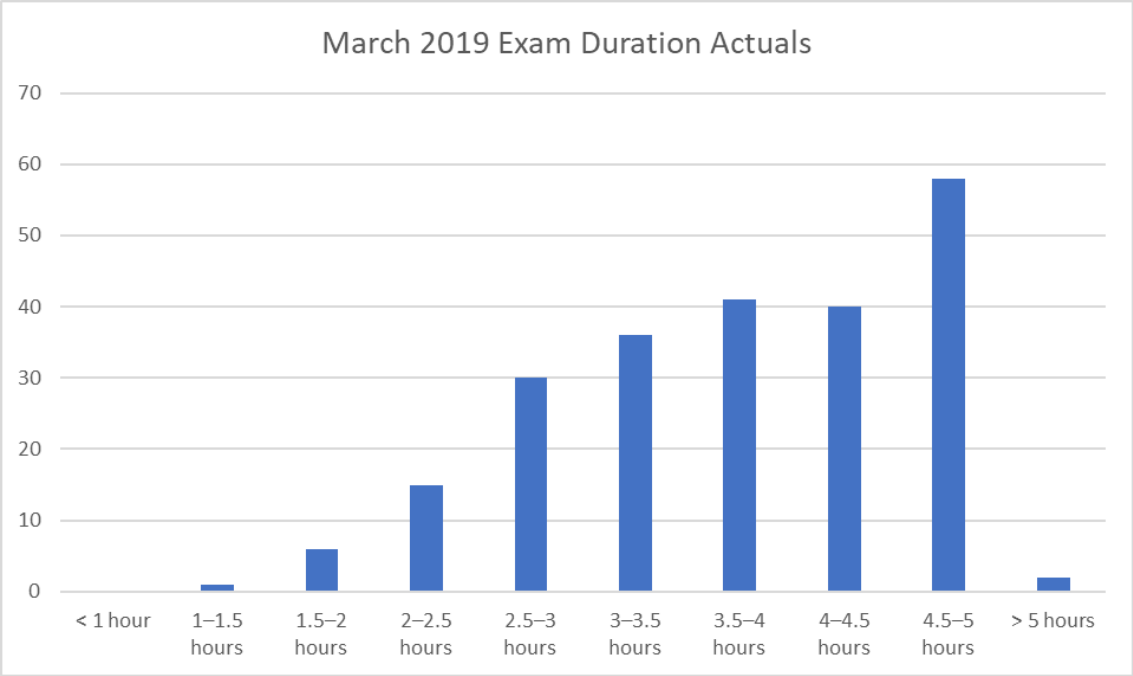
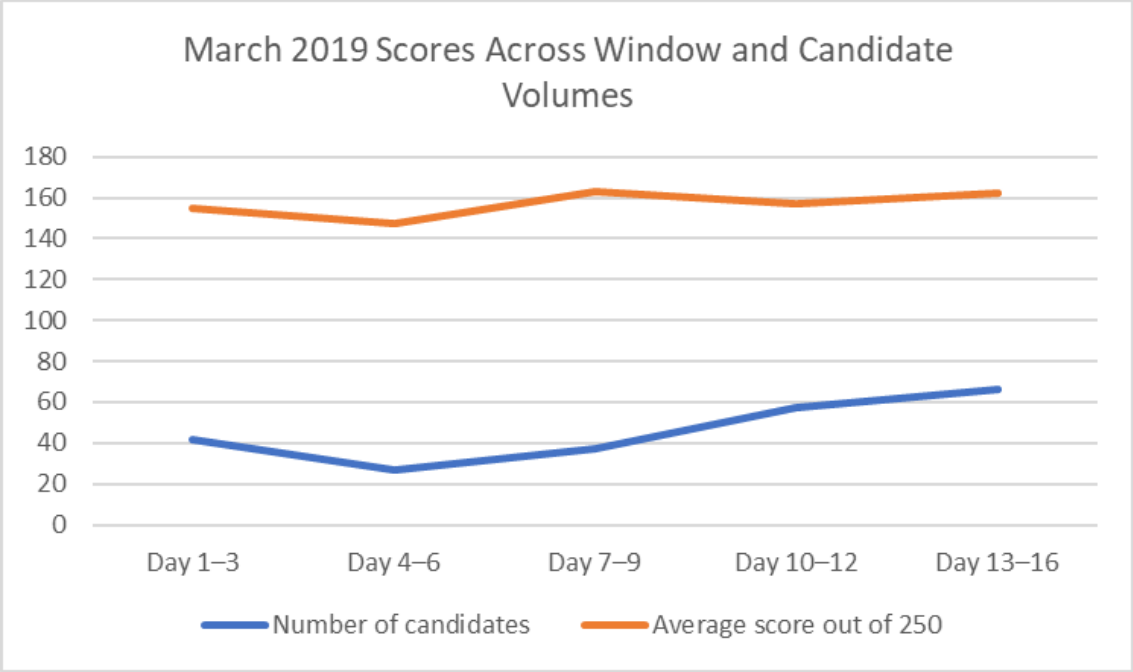


Figure 2: Candidate volume and score trends across testing window



After removing candidates who were administered a previously used test form (who were scored using the same decisions employed at the time that form was originally used), scores were calculated for all remaining candidates based on the full set of 250 items. Two candidates were flagged for an abnormally low or high score (*z* value outside +/− 3.0). Also, the 250 items

were arbitrarily broken into blocks of 25 items for each candidate; the 10 resulting subscores for each candidate were evaluated for outliers as well. For candidates with any subscore more than 3 standard deviations (SD) from their average *z*-score, the .xml file was examined closely for any issues. All outliers were removed from initial analyses; candidates with abnormal response patterns were also removed. Candidates who left more than 5 blanks were also removed from analysis. To be conservative, candidates who had been granted a testing accommodation were also removed from the main analysis (simply because their testing conditions were not the same as the main group of candidates, even though each accommodation was granted on the premise that it would make the testing experience equivalent in terms of opportunity to demonstrate competence). As a result of all of these factors, 7 candidates were removed from analysis.

Candidates who had failed a previous HRPA examination (CKE, CKE 1, or CKE 2) scored lower than did those who had not (55.3% and 65.2%, respectively, on the full exam of 250 items). This difference was meaningful and significant ($t(99)=8.00$, $p<.001$). In keeping with standard procedures, these candidates were removed from subsequent analyses. The CKE 2 analysis proceeded with 179 candidates.

Owing to the modest number of candidates, all subsequent analyses were interpreted with caution.

Post-Examination Survey

Candidates were provided access to the post-examination survey immediately after submitting their responses to the CKE 2; 221 responses were obtained from candidates (response rate, 95.7%).

Table 2 shows the responses to the administration-related questions. Note that candidates were generally very positive about the administration experience. Table 3 shows the content-related questions; there was a tendency to more neutrality on these questions. The rating for perceived fairness (Question 14) warrants monitoring as it continues to be low.

Candidates were asked to express their opinion regarding whether completing the examination on a computer affected their performance. Table 4 shows that most candidates felt it made no difference, and that where a preference was expressed it was roughly equally split between those who preferred using a computer and those who did not.

An open-ended question was also posed to candidates asking for any additional comments. Those comments were provided to HRPA for information and consideration. Nothing in the comments or survey data raised concerns about item analysis or scoring.

Table 2: Administration-related post-examination survey questions*

	Question	SA	A	N	D	SD	Score	Agreement
1.	I was able to book a seat to write the examination at a time that was convenient for me.	97	64	23	30	7	4.0	73%
2.	I was well informed about what documents to bring to the exam location.	133	82	3	2	1	4.6	97%
3.	Proctors enforced the exam-day rules and the security procedures at the test centre were what I expected.	133	76	4	3	3	4.5	95%
4.	Proctors were professional and courteous.	140	74	3	1	1	4.6	98%
5.	The tutorial helped me understand how to complete the examination on the computer.	120	83	13	0	0	4.5	94%
6.	Navigation through the examination was easy and intuitive.	117	85	10	6	1	4.4	92%

*Response categories: SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SD = Strongly Disagree.

Table 3: Content-related post-examination survey questions*

	Question	SA	A	N	D	SD	Score	Agreement
7.	The time allotted for this examination was sufficient.	117	83	5	9	5	4.4	91%
8.	Information available prior to exam day provided me with adequate details about the content and format of the exam.	42	84	45	29	17	3.5	58%
9.	I feel I was adequately prepared to write this examination.	18	79	67	41	13	3.2	44%
10.	The questions in the examination were clearly written.	24	90	58	33	12	3.4	53%
11.	The terminology used in the examination was accurate.	20	105	57	31	5	3.5	57%
12.	The situations presented in the examination were realistic.	27	127	48	10	6	3.7	71%
13.	The questions in the examination reflected the examination blueprint.	18	75	75	37	6	3.3	44%
14.	The examination was a fair assessment of my ability.	6	55	83	48	24	2.9	28%

*Response categories: SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SD = Strongly Disagree.

Table 4: Preference regarding computer-based testing versus pencil-and-paper

Question	Count	%
I feel that completing the examination on a computer improved my performance.	49	22%
I feel that completing the examination on a computer decreased my performance.	36	17%
I feel that completing the examination on a computer had no effect on my performance.	133	61%

Initial Analysis

The full CKE 2 examination was 250 items, of which approximately 225 were to be scored. The other 20–30 items were designated as experimental. However, because only one new form was administered, all items were potentially available for scoring and the focus of subsequent item analysis and key validation was on determining the best set of approximately 225 items that still reflected the examination blueprint.

The initial analysis summary statistics for the new form are presented in Table 5.

Table 5: Initial examination statistics

Index	CKE 2
Eligible items	250
Total candidates	231
Candidates in analysis	179
Mean	164.3 (65.7%)
Range	95–216 (38.0–86.4%)
Cronbach's alpha	.92
Mean r_{pb}*	.20

Standard classical test theory analysis was conducted to identify the following:

1. Item difficulty (percent obtaining correct result, *p*)
2. Item discrimination (corrected point-biserials, r_{pb}*)
3. Distractor quality (based primarily on distractor discrimination)

Wickett compiled these statistics, along with any comments made by candidates concerning flagged items, to identify items that may have been keyed incorrectly or that were performing poorly. Most emphasis was placed on the corrected point-biserials as evidence of item quality,

after removing excessively easy and excessively difficult items. Items were ranked from worst performing to best performing accordingly.

Key Validation

Key validation was conducted via web meeting on March 28, 2019, using members of the CHRL Examination Validation Committee (EVC). The EVC (Table 6) was first reminded of basic item and test analysis methods and was oriented to the main statistics used to evaluate the quality of the CKE 2. Note that fewer members were available than targeted, but that the discussion on each flagged item was robust.

Table 6: CHRL Examination Validation Committee members – Key validation

Member	Credential	Years of Relevant Experience	Start on EVC	Industry
Jennifer Borges	CHRL	10–14	2017	Manufacturing
Annette Dhanasar	CHRL	15–19	2017	Technology
Debbie Hynes	CHRL	10–14	2017	Government and public centre agencies
✓ **Christine Kelsey**	CHRL	1–4	2017	Entertainment
Jennifer King	CHRL	20–29	2017	Business and professional services
Nancy Richard	CHRL	15–19	2017	Regulation/public sector
Kristin Rivait	CHRL	15–19	2017	Healthcare
Lisa Scian	CHRL	15–19	2017	Information & communication technology
✓ **Laurie Torno**	CHRL	20–29	2018	Post-secondary education

✓Participated in the session.

The group was informed that test reliability, as measured by Cronbach's alpha, was .917 based on the set of 250 potentially scored items and that this was above the generally accepted threshold of .80.

The group was walked through the flagged items one at a time, with the recommendation that the worst-performing items be removed from scoring, but they were given less direction on those items with borderline statistics. Where available, candidates' comments about the items were also shown. The group made decisions based on content and the data through discussion; they removed 20 items that they felt were least appropriate to retain for scoring. Past item data

were also used where available, and the group was directed to consider these data as an addition to statistics from the March administration. Panel members' comments about specific items were recorded for future item revision activities.

Not all remaining items were strong-performing, and several items were retained that were very easy or very hard or that had a low corrected point-biserial. Most were moderate to strong items, however. The final alpha for the set of 230 scored items was .923. The difficulties ranged from 26.8% to 95.0%, with a mean of 67.2%. The r_{pb}* values ranged from −.05 to .50 with a mean of .22.

Table 7 presents the scored CKE 2's final fit to the examination blueprint. In all cases, the final number of scored items in a functional area fit within the established range.

The group endorsed the final set of items for use in scoring the March 2019 CKE 2 candidates who took this form.

Table 7: Final scored examination fit to blueprint

	Functional Area	Actual	Min.	Target	Max.	Blueprint Range
10	**Strategy**	24	21	25	29	11% ± 2%
20	**Professional Practice**	27	21	25	29	11% ± 2%
30	**Organizational Effectiveness**	30	28	32	36	14% ± 2%
40	**Workforce Planning & Talent Management**	32	28	32	36	14% ± 2%
50	**Labour & Employee Relations**	20	17	21	25	9% ± 2%
60	**Total Rewards**	24	19	23	27	10% ± 2%
70	**Learning & Development**	25	21	25	29	11% ± 2%
80	**Health, Wellness & Safe Workplace**	19	14	18	23	8% ± 2%
90	**HR Metrics, Reporting & Financial Management**	29	23	28	32	12% ± 2%
Total		**230**				

Establishing the Pass Mark: Equating

Equating, as per Kolen and Brennan (2014),[5] was used to establish the pass mark for the March 2019 CKE 2. The goal of this process was to set a pass mark for the March 2019 CKE 2 that would be equivalent to that set for previous CKE 2 administrations; that is, to set a pass mark that would give each candidate the same probability of passing regardless of which form they took.

[5] Kolen, M.J., & Brennan, R.L. (2014). *Test equating, scaling, and linking.* New York, NY: Springer.

The passing standard for the CKE 2 was originally set after the November 2015 offering of the CKE 2 using the Modified Angoff method. General details on that method can be found in Appendix B. Specific information on the standard-setting session is provided in the Technical Report issued for the November 2015 administration.

To pass the CKE 2, a candidate must meet or surpass the overall test pass mark and meet or surpass the threshold set for each of the 9 functional areas. These thresholds are set independently and are described in turn.

Total Score Pass Mark

Three equating procedures were conducted back to different administrations (March, June and October 2018). Two procedures were planned, and the third was conducted because the first two were generating an averaged pass mark very close to an integer; the third was conducted to gain confidence on which side of the integer the pass mark should lie. The intention following these equating runs was to average them to arrive at a final pass mark for the March 2019 CKE 2. These administrations were chosen because they were the most recent administration and the administration corresponding to the same administration month the previous year.

Equating Back to the October 2018 Administration

Linear equating was the chosen method for setting the pass mark. Linear equating is preferred with more than 100 candidates, and equipercentile equating is preferred with more than 1,000 candidates. With candidate samples of fewer than 100, mean or circle arc equating is most prudent.

All candidates in the analysis (i.e., no repeat candidates or outliers) were used in the equating process. Delta plot analysis was used to identify anchor items showing substantial deviations (generally, although not exclusively, greater than 3 SD units) from expected difficulty values, with an emphasis on establishing an anchor set with difficulty equivalent to that of the full form (and equivalent within each functional area) that adhered to the blueprint. Items with an increase or decrease of 10% in terms of difficulty were also removed as anchors. Further, items with very high or low difficulty values and those with low corrected point-biserials were also flagged for potential removal from the anchor set. The goal was a strong midi-test (i.e., moderate range of difficulty, moderate to high discrimination, fit to blueprint) of sufficient length to estimate candidate ability.

The selected set of anchor items had a mean difficulty of 0.67 and a mean corrected point-biserial of .23 (for March 2019 candidates).

Table 8 shows the fit of the set of anchor items to the blueprint, as percentages. The actual counts are well-aligned with targets and reflect the scope and approximate weighting across the full exam.

Table 8: Anchor item fit to blueprint – To October 2018

Area*	Actual	Target
10	10%	11%
20	12%	11%
30	14%	14%
40	14%	14%
50	10%	9%
60	10%	10%
70	11%	11%
80	10%	8%
90	12%	12%

*See Table 7 for the full name of each functional area.

The mean, Tucker, Levine observed-score, and circle arc methods were computed to ascertain concordance of solutions. Given the sample sizes and similarities of test parameters, Tucker equating was considered the preferred method.

Table 9 shows some of the parameters used to derive the equating estimates, along with other parameters describing the test forms. Of note is that on the anchor items, the population taking the March 2019 CKE 2 scored modestly worse than the population taking the October 2018 CKE 2 (67.3% vs. 68.2%, respectively; $t(432)=0.80$, *ns*). Because the March 2019 CKE 2 candidates scored modestly worse (based on the anchors), they would likely have a modestly lower pass rate than was seen in June, non-significance notwithstanding.

The equating analysis bears this out (Table 10). All methods indicate a pass mark of 138. The pass rate based on this equating run is, as expected, somewhat lower than what was seen in October 2018. The Tucker equating value of 137.28 was extracted from this analysis for use in setting the final pass mark.

Table 9: Equating parameter table – Total pass mark, to October 2018

		Oct. 2018	Mar. 2019
	N	255	179
	Scored items	229	230
Mean score	Total	66.2%	67.2%
	Anchors	68.2%	67.3%

Table 10: Equating outcome table – Total pass mark, to October 2018

	Pass Mark		Pass Rate	
Method	**Precise**	**Integer**	**All**	**First-time**
Equating Oct. 2018	**132.91**	**133**	**73.4%**	**78.8%**
Tucker	137.28	138	*65.8%*	*76.5%*
Levine observed	137.19	138	*65.8%*	*76.5%*
Circle Arc 1	137.88	138	*65.8%*	*76.5%*
Circle Arc 2	137.84	138	*65.8%*	*76.5%*
Mean	137.75	138	*65.8%*	*76.5%*

Equating Back to the March 2018 Administration

Linear equating was the chosen method for setting the pass mark, given the sample sizes involved.

All candidates in the analysis (i.e., no repeat candidates or outliers) were used in the equating process. Delta plot analysis was used to identify anchor items showing substantial deviations (generally, although not exclusively, greater than 3 SD units) from expected difficulty values, with an emphasis on establishing an anchor set with difficulty equivalent to that of the full form (and equivalent within each functional area) that adhered to the blueprint. Items with an increase or decrease of 10% in terms of difficulty were also removed as anchors. Further, items with very high or low difficulty values and those with low corrected point-biserials were also flagged for potential removal from the anchor set. The goal was a strong midi-test (i.e., moderate range of difficulty, moderate to high discrimination, fit to blueprint) of sufficient length to estimate candidate ability.

The selected set of anchor items had a mean difficulty of 0.67 and a mean corrected point-biserial of .24 (for March 2019 candidates).

Table 11 shows the fit of the set of anchor items to the blueprint, as percentages. The actual counts are well-aligned with targets and reflect the scope and approximate weighting across the full exam.

Table 11: Anchor item fit to blueprint – To March 2018

Area*	Actual	Target
10	11%	11%
20	11%	11%
30	14%	14%
40	14%	14%
50	10%	9%
60	10%	10%
70	11%	11%
80	10%	8%
90	12%	12%

*See Table 7 for the full name of each functional area.

The mean, Tucker, Levine observed-score, and circle arc methods were computed to ascertain concordance of solutions. Given the sample sizes and similarities of test parameters, Tucker equating was considered the preferred method.

Table 12 shows some of the parameters used to derive the equating estimates, along with other parameters describing the test forms. Of note is that on the anchor items, the population taking the March 2019 CKE 2 scored negligibly higher than the population taking the March 2018 CKE 2 (67.2% vs. 67.0%, respectively; $t(320)=0.10$, *ns*). Because the March 2019 CKE 2 candidates scored about the same (based on the anchors), they would likely have about the same pass rate as was seen in March 2018.

The equating analysis bears this out (Table 13), for the most part though with a suggested modest increase in the pass rate. All equating methods indicate a pass mark of 139. The pass rate based on this equating run is somewhat higher than in March 2018, contrary to expectations. However, this appears to be due primarily to a subset of candidates scoring just below the pass mark in March 2018, thereby reducing the pass rate without meaningfully reducing the average performance of the cohort.

The Tucker equating value of 138.65 was extracted from this analysis for use in setting the final pass mark. When averaged with the 137.28 from the equating run back to October 2018, the resulting 137.97 was very close to the integer, and so rather than relying on the 2 equating runs alone, a third was run back to June 2018 to determine confidently which side of 138 the pass mark lay on.

Table 12: Equating parameter table – Total pass mark, to March 2018

		Mar. 2018	Mar. 2019
	N	143	179
	Scored items	225	230
Mean score	Total	67.0%	67.2%
Mean score	Anchors	67.0%	67.2%

Table 13: Equating outcome table – Total pass mark, to March 2018

	Pass Mark		Pass Rate	
Method	**Precise**	**Integer**	**All**	**First-time**
Equating Mar. 2018	**134.77**	**135**	**64.1%**	**72.7%**
Tucker	138.65	139	*65.4%*	*76.0%*
Levine observed	138.56	139	*65.4%*	*76.0%*
Circle Arc 1	138.04	139	*65.4%*	*76.0%*
Circle Arc 2	138.04	139	*65.4%*	*76.0%*
Mean	138.33	139	*65.4%*	*76.0%*

Equating Back to the June 2018 Administration

Linear equating was the chosen method for setting the pass mark, given the sample sizes involved.

All candidates in the analysis (i.e., no repeat candidates or outliers) were used in the equating process. Delta plot analysis was used to identify anchor items showing substantial deviations (generally, although not exclusively, greater than 3 SD units) from expected difficulty values, with an emphasis on establishing an anchor set with difficulty equivalent to that of the full form (and equivalent within each functional area) that adhered to the blueprint. Items with an increase or decrease of 10% in terms of difficulty were also removed as anchors. Further, items with very high or low difficulty values and those with low corrected point-biserials were also flagged for potential removal from the anchor set. The goal was a strong midi-test (i.e., moderate range of difficulty, moderate to high discrimination, fit to blueprint) of sufficient length to estimate candidate ability.

The selected set of anchor items had a mean difficulty of 0.67 and a mean corrected point-biserial of .24 (for March 2019 candidates).

Table 14 shows the fit of the set of anchor items to the blueprint, as percentages. The actual counts are well-aligned with targets and reflect the scope and approximate weighting across the

full exam. Though this equating run was not planned into the test form, there were sufficient items across all functional areas to run the equating procedure.

Table 14: Anchor item fit to blueprint – To June 2018

Area*	Actual	Target
10	11%	11%
20	10%	11%
30	15%	14%
40	14%	14%
50	10%	9%
60	10%	10%
70	11%	11%
80	10%	8%
90	12%	12%

*See Table 7 for the full name of each functional area.

The mean, Tucker, Levine observed-score, and circle arc methods were computed to ascertain concordance of solutions. Given the sample sizes and similarities of test parameters, Tucker equating was considered the preferred method.

Table 15 shows some of the parameters used to derive the equating estimates, along with other parameters describing the test forms. Of note is that on the anchor items, the population taking the March 2019 CKE 2 scored slightly lower than the population taking the June 2018 CKE 2 (67.1% vs. 67.7%, respectively; $t(410)=0.50$, *ns*). Because the March 2019 CKE 2 candidates scored slightly lower (based on the anchors), they would likely have a slightly lower pass rate that was seen in June 2018, non-significance notwithstanding.

The equating analysis bears this out (Table 16). The Tucker and Levine observed methods indicate a pass mark of 138, while the mean and circle arc methods suggest a lower pass mark at 137. The pass rate derived from the recommended method (Tucker) is just marginally lower than was seen for June 2018 candidates, as would be expected based on the difference in anchor performance.

The Tucker equating value of 137.19 was extracted from this analysis for use in setting the final pass mark.

Table 15: Equating parameter table – Total pass mark, to June 2018

		June 2018	Mar. 2019
	N	233	179
	Scored items	229	230
Mean score	Total	66.4%	67.2%
Mean score	Anchors	67.7%	67.1%

Table 16: Equating outcome table – Total pass mark, to June 2018

	Pass Mark		Pass Rate	
Method	**Precise**	**Integer**	**All**	**First-time**
Equating June 2018	**132.85**	**133**	**72.7%**	**77.7%**
Tucker	137.19	138	*65.8%*	*76.5%*
Levine observed	137.19	138	*65.8%*	*76.5%*
Circle Arc 1	136.44	137	*68.0%*	*78.8%*
Circle Arc 2	136.43	137	*68.0%*	*78.8%*
Mean	136.41	137	*68.0%*	*78.8%*

Combined Results

Table 17 shows the pass mark values across the 3 equating runs. The value highlighted in green is the one that would be selected based on population parameters at each equating run. The simple mean (137.7076) of the 3 identified values was the recommended pass mark for the March 2019 CKE 2. Note that the mean of each method is almost the same, providing strong support for the final recommended value.

Using the established convention for this testing program, the mean combined value was rounded up to a cut score of 138. The resulting pass rate of 76.5% for first-time candidates is approximately the same as the average of the pass rates from the last three administrations, as would fit the general closeness in performance on the anchor sets (see Table 18). The pass rate for all candidates was 65.8%.

Table 17: Equating outcome table – Combined results, total pass mark

	Oct. 18	June 18	Mar. 18
Tucker	137.3	137.2	138.6
Levine observed	137.2	137.2	138.6
Circle arc 1	137.9	136.4	138.0
Circle arc 2	137.8	136.4	138.0
Mean	137.8	136.4	138.3

Table 18: Historical pass rates – Total pass mark

	All	1st time
Mar. 17	59.4%	72.9%
June 17	70.0%	75.9%
Oct. 17	69.3%	75.7%
Mar. 18	64.1%	72.7%
June 18	72.7%	77.7%
Oct. 18	73.4%	78.8%
Mar. 19	**65.8%**	**76.5%**

Functional Area Minimum Thresholds

The original functional area minimum thresholds were established in November 2015 to identify candidates who scored egregiously low on any individual functional area (see Appendix C for a conference presentation regarding this method). Since that time, equating has been employed to produce equivalent thresholds on subsequent administrations.

Tucker equating was employed for each functional area when equating back to March, June and October 2018 as this was the method selected for the total test score equating in those equating runs. The decisions outlined above to finalize anchor selection for the total test score equating were made so that they would also be appropriate to equating at the functional area level.

Table 19 shows alignment between anchor performance and full exam functional area score. The goal of close alignment was sufficiently achieved.

The resulting thresholds across each equating run are shown in Table 20.

Table 21 shows the outcomes and other relevant information related to equating of functional area thresholds. Note that zero (0) candidates failed the exam based solely on having missed the threshold for a functional area.

Table 22 shows the outcomes for each decision criterion. About 40% of the failing candidates failed at both the total score level and the functional area level; the remainder failed based only on the total score pass mark.

Table 19: Alignment between difficulty of anchors and full exam

Area*	Oct. 2018 Anchors	June 2018 Anchors	Mar. 2018 Anchors	Full Exam
10	71%	70%	65%	67%
20	70%	67%	75%	71%
30	68%	67%	69%	69%
40	67%	66%	68%	66%
50	63%	67%	65%	65%
60	70%	68%	72%	70%
70	63%	68%	65%	67%
80	68%	67%	68%	68%
90	65%	63%	58%	62%

*See Table 7 for the full name of each functional area.

Table 20: Equating outcome table – Combined results, functional area thresholds

		10	20	30	40	50	60	70	80	90
To Oct. 18	Tucker	9.43	11.37	11.87	11.61	7.58	9.30	9.99	6.65	9.23
To June 18	Tucker	9.29	10.66	11.87	11.29	7.44	9.45	9.67	6.32	10.20
To Mar. 18	Tucker	9.59	11.27	11.80	10.90	7.52	10.16	10.29	6.46	9.78
	Average	9.44	11.10	11.85	11.27	7.51	9.64	9.98	6.48	9.73
	Integer	10	12	12	12	8	10	10	7	10

Table 21: Equating summary table – Functional area thresholds

Area*	Cut[i]	Integer[ii]	Items	Cut as %	Previous Cut %[iii]	Alpha[iv]	Mean	Unique Fails[v]
10	**9.44**	10	24	39%	44%	.64	15.6	**0**
20	**11.10**	12	27	41%	33%	.53	18.4	**0**
30	**11.85**	12	30	39%	37%	.69	19.9	**0**
40	**11.27**	12	32	35%	37%	.58	20.1	**0**
50	**7.51**	8	20	38%	29%	.37	12.6	**0**
60	**9.64**	10	24	40%	36%	.57	16.2	**0**
70	**9.98**	10	25	40%	37%	.65	16.0	**0**
80	**6.48**	7	19	34%	31%	.46	12.4	**0**
90	**9.73**	10	29	34%	32%	.51	17.3	**0**

*See Table 7 for the full name of each functional area.

[i]Threshold set through equating.

[ii]Rounded-up value of cut score as used for making candidate decisions.

[iii]Threshold set on previous administration.

[iv]Cronbach's alpha for functional area.

[v]Number of candidates failing based on not meeting the functional area threshold who would have passed at the total score level.

Table 22: Passing decisions – Total pass mark and functional areas

Fails	Both measures	31	13.4%
	Total score only	48	20.8%
	Functional area score only	0	0.0%
Passes	Neither	152	65.8%

Pass Mark Approval

The total score pass mark, the thresholds for all functional areas, and the process used to derive them were presented to the CHRL EVC (Table 23) via teleconference on April 2, 2019. The committee approved the process and cut scores (which were presented along with the consequent pass rate) for recommendation to HRPA. The HRPA Registrar accepted the recommendation from the committee (via direction to staff on the call) on the same call, and the total and functional area cut scores were formally established.

Table 23: CHRL Examination Validation Committee members – Pass mark approval

Member	Credential	Years of Relevant Experience	Start on EVC	Industry
✓ **Jennifer Borges**	CHRL	10–14	2017	Manufacturing
Annette Dhanasar	CHRL	15–19	2017	Technology
Debbie Hynes	CHRL	10–14	2017	Government and public centre agencies
Christine Kelsey	CHRL	1–4	2017	Entertainment
✓ **Jennifer King**	CHRL	20–29	2017	Business and professional services
✓ **Nancy Richard**	CHRL	15–19	2017	Regulation/public sector
✓ **Kristin Rivait**	CHRL	15–19	2017	Healthcare
Lisa Scian	CHRL	15–19	2017	Information & communication technology
Laurie Torno	CHRL	20–29	2018	Post-secondary education

✓Participated in the session.

Scoring

To finalize the scoring, repeat and outlier candidates who were not included in the item and form analysis were reinserted into the dataset. Scores for each of the 9 functional areas were also computed for each candidate. An Excel file with the final candidate results was provided to HRPA.

Table 24 provides the means and standard deviations for the functional areas and for the total score, using all candidates who took the new March 2019 CKE 2 form. Table 25 provides the correlations between all functional areas. Caution should be exercised in interpreting differences between correlations. Variation can be explained largely by the number of items making up each functional area score. That is, functional areas with fewer items on the exam have lower correlations with the other functional areas. Figure 3 shows the distribution of scores for all candidates, along with the pass mark.

Table 24: Total and functional area scores for all candidates

	Functional Area	Percentage	Mean	SD*
10	**Strategy**	65%	15.6	3.5
20	**Professional Practice**	68%	18.4	3.4
30	**Organizational Effectiveness**	66%	19.9	4.4
40	**Workforce Planning & Talent Management**	63%	20.1	4.1
50	**Labour & Employee Relations**	63%	12.6	2.6
60	**Total Rewards**	68%	16.2	3.4
70	**Learning & Development**	64%	16.0	3.9
80	**Health, Wellness & Safe Workplace**	65%	12.4	2.7
90	**HR Metrics, Reporting & Financial Management**	60%	17.3	3.8
Total score		64.6%	148.6	25.5

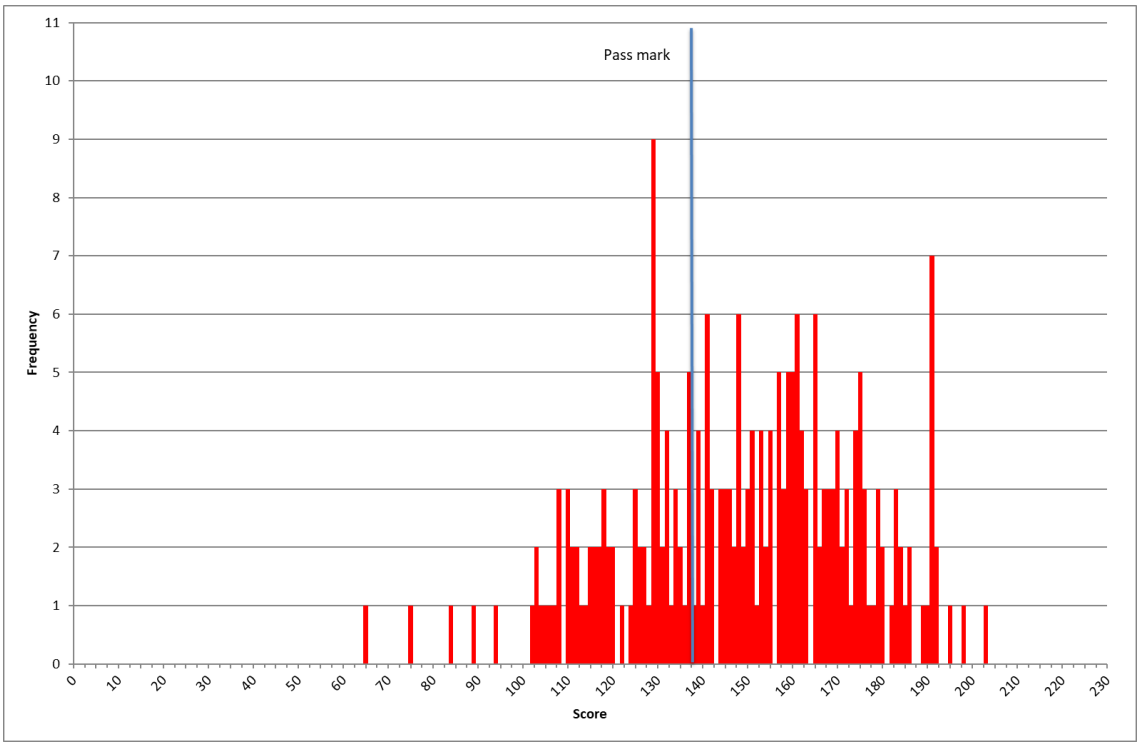
*SD = Standard deviation.

Table 25: Correlations between functional area scores for all candidates

Area*	10	20	30	40	50	60	70	80	90
10		.59	.71	.65	.57	.62	.63	.46	.66
20			.62	.61	.54	.60	.62	.46	.59
30				.65	.58	.65	.71	.50	.68
40					.53	.63	.60	.48	.65
50						.57	.54	.45	.58
60							.64	.50	.67
70								.48	.68
80									.53
90									

*See Table 24 for the full name of each functional area.

Figure 3: Score distribution for all candidates



Key Examination Metrics

Table 26 shows the key examination metrics for candidates included in the main analysis; that is, only first-time candidates, with outliers removed. Past metrics are provided for reference.

Note that as of June 2018 the number of scored items was free to vary from 220 to 230 based on the number of experimental items and the work of the CHRL EVC during key validation.

Table 26: Key examination metrics – Candidates included in analysis only

Index	March 2019	October 2018	June 2018	March 2018	October 2017
Scored items	230	229	229	225	225
Candidates	179	255	233	143	235
Mean	154.6 (67.2%)	151.6 (66.2%)	152.2 (66.4%)	150.7 (67.0%)	148.5 (66.0%)
Median	158 (68.7%)	152 (66.4%)	155 (67.7%)	152 (67.6%)	150 (66.7%)
Skewness	−0.458	−0.257	−0.399	−0.132	−0.403
Kurtosis[i]	−0.135	−0.466	−0.424	−0.555	0.108
Range	84–203 (36.5–88.3%)	83–199 (36.2–86.9%)	81–202 (35.4–88.2%)	88–204 (39.1–90.7%)	78–203 (34.7–90.2%)
Standard deviation	23.39	24.28	25.22	24.53	22.98
Cronbach's alpha	.92	.93	.93	.93	.92
Mean r_{pb}*	.22	.23	.24	.23	.21
SEM[ii]	6.50	6.46	6.48	6.43	6.52
SEM at the pass mark	6.95	6.92	6.96	6.89	6.94
Decision consistency (uncorrected)[iii]	.92	.91	.93	.89	.90
Perceived fairness[iv]	28%	28%	30%	27%	28%
Pass mark	137.708	132.914	132.849	134.772	132.371
Effective pass mark	138	133	133	135	133
Pass rate	76.5%	78.8%	77.7%	72.7%	75.3%

[i]Excess

[ii]SEM = standard error of measurement.

[iii]Subkoviac method.

[iv]Based on responses to the post-examination survey. Value here differs from that presented in main body of report because this value includes only candidates in the analysis.

Related Development Activities

Since the last administration of the CKE 2 in October 2018, the following exam development activities have taken place.

Validation

To provide sufficient items for upcoming administrations, a 2½-day validation session was held March 5–7, 2019, at HRPA's offices. The CHRL EVC who participated are listed in Table 27. This session involved the review of CHRL ELE items as well.

Table 27: CHRL Examination Validation Committee members – Validation

Member	Credential	Years of Relevant Experience	Start on EVC	Industry
✓ **Jennifer Borges**	CHRL	10–14	2017	Manufacturing
✓ **Annette Dhanasar**	CHRL	15–19	2017	Technology
Debbie Hynes	CHRL	10–14	2017	Government and public centre agencies
✓ **Christine Kelsey**	CHRL	1–4	2017	Entertainment
Jennifer King	CHRL	20–29	2017	Business and professional services
✓ **Nancy Richard**	CHRL	15–19	2017	Regulation/public sector
✓ **Kristin Rivait**	CHRL	15–19	2017	Healthcare
Lisa Scian	CHRL	15–19	2017	Information & communication technology
✓ **Laurie Torno**	CHRL	20–29	2018	Post-secondary education

✓Participated in the session.

The EVC members received advance materials outlining:

- Purpose of the session
- Description of the CHRL credential
- CKE 2 and CHRL ELE blueprints
- Criteria for good test items
- Validation process
- Relevant legislation

The committee members received refresh training on the validation activity, and then worked primarily individually reviewing items to make sure they reflected current practice and were suitable to make decisions about who should receive the CHRL credential. Where committee members proposed changes, these were discussed by the group before implementation.

For each item, the committee was asked to either

- Validate the item for use in the next 2 years to make decisions about who would be certified as an HR professional in Ontario (at the CHRL level),
- Move the item to the CKE 1 or CHRL ELE bank,
- Revise the item to make it suitable for use, or
- Declare the item unsound and send it back for revision or removal from the bank.

The bulk of the session saw the committee members reviewing items independently and submitting their assessments in blocks of approximately 10–20 items. Those assessments were tabulated and any items that were not validated as is by the full committee were discussed until there was agreement on changes and the future use of the item.

The committee reviewed and validated 60 items as suitable for CKE 2 and moved 1 item to the CHRL ELE bank. Four items were revised prior to validation. The committee also verified the functional area and competency for all items, and added rationales and references where missing, incomplete, or not current.

Very few items were revised as the items had gone through considerable review before getting to the committee for validation, and for the most part these items were selected as timing out on their validation period (and so had good historical statistics).

Appendix A

Blueprint

Comprehensive Knowledge Examination 2

Human Resources Professionals Association
Version 2.0

Approved by CHRL Exam Validation Committee March 13, 2018
Approved by HRPA Registrar March 14, 2018
Effective June 2018 administration

Credentials

Passing the Comprehensive Knowledge Examination 2 (CKE 2) is a requirement for certification for CHRL candidates. The examination reflects the *HRPA Professional HR Competency Framework* (2014).

Purpose

The CKE 2 assesses whether a candidate has the level of discipline-specific knowledge necessary to practice human resources management at the CHRL level in a manner that is consistent with the protection of the public interest. Knowledge related exclusively to employment and workplace legislation is assessed on the CHRL Employment Law Examination.

The CHRL credential requires candidates to demonstrate competence across all nine functional areas, and the CKE 2 operationalizes this by requiring demonstration of proficiency at both the total score level and on each functional area. Very low performance on any functional area (as defined through standard setting with a confidence threshold adjustment at the 95% level) is taken as evidence of not demonstrating the required level of competence to earn the CHRL.

Structure

The structural variables provide high-level guidance as to what the examination will be like.

Table 28: CKE 2 Blueprint structural variables

Item types	Independent 4-option multiple choice
Length	250 items in total
	20–30 experimental items
Duration	Up to 5 hours
Delivery mode	Computer-based testing in proctored test centres
Frequency	3 windows per year

Content Weighting

The functional area weights were set in 2014 through a national survey and modified slightly in 2018 to remove weighting for competencies most appropriately tested on the CHRL Employment Law Examination. Within each functional area, items are distributed roughly evenly across the related competencies.

Table 29: Functional area weights on the CKE 2

		CKE 2	
Functional Area		**Weight**	**Range**
10	Strategy	11%	+/– 2%
20	Professional Practice	11%	+/– 2%
30	Organizational Effectiveness	14%	+/– 2%
40	Workforce Planning & Talent Management	14%	+/– 2%
50	Labour & Employee Relations	9%	+/– 2%
60	Total Rewards	10%	+/– 2%
70	Learning & Development	11%	+/– 2%
80	Health, Wellness & Safe Workplace	8%	+/– 2%
90	Human Resources Metrics, Reporting & Financial Management	12%	+/– 2%

Table 30: Competencies not eligible on the CKE 2

FA	Comp
20	C035
	C036
	C037
50	C117
60	C139
80	C177
	C179
90	C204
	C205

Minor amendments made October 22, 2018 by CHRL EVC, with approval by Registrar.

Appendix B

MODIFIED ANGOFF METHOD

WHAT IT IS → The Modified Angoff method of setting cut scores is the most popular method used with high-stakes examinations. With this method, experts evaluate each item on a test for difficulty and judge how likely it is that someone who is borderline in performance will get each item correct. Borderline candidates have, by definition, just enough competence to be considered competent (e.g., to pass the test). Any candidate showing the same or a higher level of performance as a borderline candidate is thus a "passing" candidate, and any candidate showing performance below the level of a borderline candidate is a "failing" candidate. The method has been successfully defended in court as being a fair method of setting cut scores that are used to make high-stakes decisions about candidates.

HOW IT'S DONE → The Modified Angoff method typically requires 5 to 15 experts in the field and is facilitated by a psychometrician. There are many variations of the Modified Angoff method used in practice, but generally the process begins with detailed training on how to apply ratings, followed by development of a description of the borderline candidate. Once training is complete (including a calibration exercise to make sure all raters have fully grasped the method), ratings are applied individually by each rater and compiled by the psychometrician. Discrepancies across raters are identified and flagged for discussion. Raters then have an opportunity to discuss their ratings and to rerate any items if the new information is considered cause to do so. In some cases, the psychometrician will introduce data from previous administrations of the item to further refine judgments. Once all items have been rated, an average Angoff rating for the exam is calculated by simply taking the average of all item ratings. The result is the cut score for the exam as a whole.

WHY IT'S USED → The benefit of the Modified Angoff method is that the resulting cut scores set an objective hurdle for candidates. Candidates who demonstrate performance above the borderline level (as systematically established by experts) are considered to have sufficient competence, and those below that level are considered to have insufficient competence. The proportion of candidates deemed below or above the cut score is not arbitrary and depends only on the actual ability of those candidates. For examinations resulting in pass/fail decisions, the implication of this is that all candidates would pass if they all showed better than the minimal accepted level of competence (i.e., above the borderline), or they would all fail if they all showed less than the minimal accepted level of competence. What is important is whether each candidate scores above or below the cut score, with that cut score being set based on the actual difficulty of the test and the expected performance of candidates showing the lowest level of acceptable performance. Because of this, the Modified Angoff method fairly assesses individual candidates on their own merits.

References

Cizek, G.J, & Bunch, M.B. (2007). *Standard setting: A guide to establishing and evaluating performance standards on tests*. Thousand Oaks, CA: Sage Publications.

Plake, B.S., & Cizek, G.J. (2012). Variations on a theme: The modified Angoff, extended Angoff, and yes/no standard setting methods. In G.J. Cizek (Ed.), *Setting performance standards* (pp. 181–199). New York, NY: Routledge.

Smith, I.L., & Springer, C.C. (2009). Standard setting. In Institute for Credentialing Excellence, *Certification: The ICE handbook* (pp. 235–264). Washington, DC: Institute for Credentialing Excellence.

WICKETT

Appendix C

Human Resources Professionals Association

ICKETT

Requiring candidates to pass all sub-tests on a certification exam (aka, non-compensatory scoring of certification exams)

Claude Balthazard, Vice-President, Regulatory Affairs and Registrar, Human Resources Professionals Association

John Wickett, Lead consultant and Principal, Wickett Measurement Systems Inc.

The challenge	Directive to require candidates to achieve thresholds in nine functional areas, in addition to an overall threshold, before a pass result will be granted. A candidate who passes overall, but who fails just one of nine functional areas, will fail and must retake the entire test.
The facts	1. Brand new high-stakes certification exam. 2. Exam with 225 scored four-option multiple-choice items. 3. Each functional area has 18 to 31 items, depending on blueprint weight.
The issues	1. Pass/fail decisions will need to be made based on subscores with as few as 18 items. 2. Decisions need to be defensible and candidate appeal must be anticipated.
What we did	1. Standard two-round Modified Angoff with eight judges conducted after initial administration. 2. Overall pass mark established using mean of all Angoffed values, with no adjustments. Pass mark was 138.5 out of 225, yielding a pass rate of 68.8%. 3. To calculate threshold for each functional area: a. Calculate the conditional standard error of measurement around the mean Angoff value for the functional area using the Lord method.[1] b. Multiply the CSEM by 2.417 to provide 95% one-tailed confidence across all nine comparisons.[2] This is equivalent to 99.22% confidence for each independent comparison. c. Subtract the resulting value from the mean Angoff value for the functional area. d. Use the rounded-up integer of this resulting value as the cut score for that functional area. 4. Based on only the functional area thresholds, nine additional candidates failed the exam. Thresholds ranged from 30% to 50% across functional areas, well below the mean performances (ranging from 57% to 73%).
What this accomplished	1. Candidates cannot pass the examination if they are ***substantially*** unknowledgeable in any one area. The format forces candidates to be generalists to at least some extent and not rely on strengths in a few areas. 2. Candidates who know their stuff across the board, with no areas of extreme weakness, will pass . . . exactly in line with the goals of the program.
Considerations for others	1. Consider explicitly how pass/fail decisions will be prioritized. a. In this case, for the overall score, a balance was struck where errors on either side of the pass mark were balanced. b. For the functional area thresholds, however, the priority was placed on ***not*** failing someone based on any one function area unless we were more than 95% sure. 2. The functional areas all had lower reliabilities (.44 to .71) than the overall score (.92), but this was accounted for by the CSEM adjustment. So while it is true that making decisions solely on subscores with so few items would be problematic, doing so in conjunction with an appropriate overall score pass mark may help achieve program goals.

[1] Feldt, L.S., Steffen, M. & Gupta, N.C. (1985). A comparison of five methods for estimating the standard error of measurement at specific score levels. *Applied Psychological Measurement, 9, 251-361.*

[2] Gupta, S.S. (1963). Probability integrals of multivariate normal and multivariate t. *The Annals of Mathematical Statistics, 34, 792-828.*

