

Examination Report

June 2014 Refraction Certificate Examination



The ROYAL COLLEGE of
OPHTHALMOLOGISTS

Contents:

1. Introduction, Blueprint and Structure	2
2. Summary and recommendations	3
3. Standard Setting	4
4. Results and Analysis	4
5. Breakdown of Results	7
6. Appendix 1: Candidate Feedback	8

1 Introduction

The Refraction Certificate examination is now offered in Malaysia and was held at UNIMAS in Kuching, for the first time, on 17 and 18 June 2014. 24 candidates presented themselves for the examination. The examination consisted of a 12 station OSCE covering a range of skills required to assess visual acuity, refractive error and the prescription of spectacles.

Examination blueprint

The Refraction Certificate (RCert) is designed to assess the following learning outcomes from the Royal College of Ophthalmologists curriculum for ophthalmic specialist training (OST):

CA2	Vision
CA7	Motility
PM1	Management plan
PM14	Spectacles
PS2	Refraction
PS21	Hand hygiene
C1	Rapport
C2	Communication
C12	Records
BCS6	Optics
BCS14	Instrument technology
AER16	Time management

Examination Structure

The examination consists of 12 OSCE stations. Each station contributes a possible 15 marks to the overall total. The stations for the examination were:

1. Cycloplegic Retinoscopy (CR1)
2. Cycloplegic Retinoscopy (CR2)
3. Subjective Refraction Cylinder (SRC)
4. Cycloplegic Retinoscopy (CR3)
5. Cycloplegic Retinoscopy (CR4)
6. Lens Neutralisation (LN)
7. Non Cycloplegic Retinoscopy (NCR1)
8. Non Cycloplegic Retinoscopy (NCR2)
9. Visual acuity and IPD measurement (VA)
10. Subjective Refraction Sphere (SRS)
11. Binocular balance (BB)
12. Near Addition (NA)

2 Summary and recommendations

This is the first report on the Malaysian sitting of the Refraction Certificate examination. The entry criteria, standard setting and stations are the same as the examination sat in the UK.

It is notable that even though only 24 candidates took the examination, the reliability was high at 0.8, in marked contrast to the reliability of the July 2014 examination in the UK. The pass mark and pass rate were slightly lower than the UK sitting.

The most discriminating stations were SRC, CR3 and NCR1. The least discriminating were VA and near add.

Candidates whose first language was English performed better than those whose first language was other than English. There was no difference in performance based upon gender or country of qualification.

Mr Michael Nelson BSc (Hons) FRCOphth MAEd
Education Adviser

September 2014

3 Standard setting

Candidates must be able to accurately assess visual acuity, measure refractive error and recommend an appropriate spectacle correction to pass the RCert. The pass mark was identified using two different methods:

Borderline candidate method (BCM)

Examiners marked the station they were supervising according to the marking guidance provided. In addition they were asked to rate the candidates overall performance as a pass, a fail or borderline. The median mark allocated to the borderline candidates then becomes the pass mark for that station. The sum of the borderline marks for each station is the examination pass mark.

Hofstee method (see appendix 1 for details)

In advance of the examination, members of the College's Examinations Committee were asked to nominate the values for the following:

1. The maximum credible pass mark for the examination
2. The maximum credible pass rate for the examination
3. The minimum credible pass mark for the examination
4. The minimum credible pass rate for the examination

The cumulative fail rate as a function of the pass mark and the co-ordinates derived from the four values above were plotted on a graph. The point where a line joining the two co-ordinates intersects the cumulative function curve is used to identify the pass mark. The Hofstee pass mark used to compare the difficulty of successive examinations.

4. Results Table 1

Number of candidates	24
Maximum possible mark	180
Mean candidate mark	130.8 (73%)
Median candidate mark	135.5 (75%)
Standard deviation	22.2 (12.3%)
Highest candidate mark	158 (88%)
Lowest candidate mark	66 (37%)
Reliability	0.8
Standard error of measurement (SEM)	10 (5.6%)
BCM pass mark	117 (65%)
Pass mark used (BCM + 1 SEM)	127 (70.5%)
Pass rate	15/24 (63%)

Distribution of marks Table 2

Score	Distribution	Total
61-70	/	1
71-80		0
81-90		0
91-100	/	1
101-110	/	1
111-120	////	4
121-130	///	3
131-140	////	4
141-150	////	4
151-160	/////	6
Total		

/ Candidate failed / candidate passe

Statistics for each station Table 3

		Mean	Median	Standard deviation	Minimum	Maximum
1	CR1	12.9	14	3.1	4	15
2	CR2	13.3	14.5	2.5	7	15
3	SRC	11.3	12	4.1	1	15
4	CR3	11.5	13	2.9	6	15
5	CR4	12.1	13	3.0	3	15
6	LN	10.1	11	4.3	0	15
7	NCR1	8.3	8.5	4.8	1	15
8	NCR2	7.0	7	3.8	1	14
9	VA	12.5	13	2.1	8	15
10	SRS	10.3	11	2.9	3	14
11	BB	10.1	11.5	3.5	2	15
12	NA	11.3	11	2.5	5	15

The relative weights for each skill in refraction (based upon the number of stations is:

Clinical skill	Number of stations	Contribution to total marks
Retinoscopy	6	50%
Subjective	3	25%
Other	3	25%

Correlation between stations Table 4

	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB	NA
CR1	0.58	0.18	0.40	0.18	0.33	0.43	0.53	0.47	-0.07	0.12	0.15
CR2		0.72	0.19	-0.04	0.34	0.45	0.41	0.45	-0.05	0.20	0.10
SRC			-0.05	0.00	0.49	0.36	0.29	0.23	0.22	0.17	0.07
CR3				0.49	-0.02	0.29	0.03	0.24	0.26	0.40	0.39
CR4					0.35	0.01	0.06	0.31	0.32	0.53	0.15
LN						-0.15	0.04	0.00	0.05	0.15	-0.02
NCR1							0.68	0.37	0.35	0.31	0.45
NCR2								0.53	0.27	0.32	0.30
VA									0.07	0.37	0.22
SRS										0.62	0.49
BB											0.63

Median correlation between the cycloplegic refraction stations = 0.295

Correlation between non-cycloplegic refraction stations = 0.68

Best correlation between CR2 and SRC (0.72) and NCR1 and NCR2 (0.68)

Poorest correlation between LN and NCR1 (-0.15)

Correlation between each station and the total score Table 5

CR1	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB	NA
0.62	0.64	0.58	0.48	0.46	0.41	0.68	0.67	0.58	0.51	0.68	0.55

Item discrimination and facility

33% item discrimination has a value between -1.00 and +1.00. If the candidates who score well in the examination overall score well in the station, the item discrimination index will be close to +1.00. If the candidates who score poorly in the examination overall score well in the station, the item discrimination index will be close to -1.00. Ideally the station item discrimination value should be greater than 0.400. The facility of each station estimates how easy the candidates found the task to complete.

Utility of each question Table 6

Pass or fail on marks for each station

	Station	33% item discrimination	Item facility (%)
1.	Cycloplegic Retinoscopy (CR1)	0.375	75
2.	Cycloplegic Retinoscopy (CR2)	0.250	79
3.	Subjective Refraction Cylinder (SRC)	0.625	63
4.	Cycloplegic Retinoscopy (CR3)	0.625	71
5.	Cycloplegic Retinoscopy (CR4)	0.375	79
6.	Lens Neutralisation (LN)	0.250	63
7.	Non Cycloplegic Retinoscopy (NCR1)	0.625	54
8.	Non Cycloplegic Retinoscopy (NCR2)	0.250	58
9.	Visual acuity and IPD measurement (VA)	0.125	96
10.	Subjective Refraction Sphere (SRS)	0.375	88
11.	Binocular balance (BB)	0.500	83
12.	Near Addition (NA)	0.125	96

Standard setting and global judgments for each station Table 7

		Pass	Borderline	Fail	% Pass	BCM mark*	%
1	CR1	15	7	2	63	13	87
2	CR2	15	8	1	63	12	80
3	SRC	10	8	6	42	12	80
4	CR3	10	12	2	42	10	67
5	CR4	11	11	2	46	11	73
6	LN	11	7	6	46	11	73
7	NCR1	9	9	6	38	8	53
8	NCR2	6	11	7	25	7	47
9	VA	19	5	0	79	9	60
10	SRS	15	7	2	63	8	53
11	BB	16	3	5	67	7	47
12	NA	15	5	4	63	9	60

*BCM mark = median mark for borderline candidates for each station.

5. Breakdown of results

Breakdown of results by gender Table 8

	Failed	Passed	Total
Female	3	9	12
Male	6	6	12
Total*	9	15	24

These differences are not statistically significant ($p = 0.4$)

Breakdown of results by country of qualification Table 9

	Failed	Passed	Total
UK	0	4	4
Outside UK	8	11	19
Total	8	15	23

These differences are not statistically significant ($p = 0.26$)

Breakdown of results by first language Table 10

	Failed	Passed	Total
English	1	13	14
Not English	6	2	9
Total*	7	15	22

*Unknown for 2 candidates

These differences are statistically significant ($p = 0.002$)

Breakdown of results by number of previous attempts Table 11

Attempts	Failed	Passed	Total
1 (First)	9	12	21
2	0	1	1
3	0	2	2
Any resit	0	3	3
Total	9	15	

Appendix 1 - Candidate Feedback

OSCE stations

Were you treated in a courteous manner by the examiners in this examination?

Yes 4/4

No 0/4

No comments

Were the patients you were asked to examine appropriate for the examination?

Yes 4/4

No 0/4

No comments

The OSCE overall

Was the OSCE well organized?

Yes 4/4

No 0/4

No comments

Were you given clear instructions about the OSCE?

Yes 2/4

No 2/4

Comments

- One of the examiners gave ambiguous instructions and I had to clarify three times to get the proper instructions out of her, this wasted 1 minute of my examination time. Instead of saying that the lens in the frame is your starting refraction or lens power of the lens in the frame are after subtracting working distance. She instructed that the lens power are the one you will put on frame.

Did you feel that the OSCE was a fair assessment of your knowledge?

Yes 2/4

No 3/4

(One candidate said yes and no)

Comments

- The focimeter station was too lengthy to do in the stipulated time. Glasses having bifocal lens and prism in both eyes needs more time to determine the exact power especially when you are getting used to the focimeter. I had used different brand of

focimeter. Overall there need to be more time allocation as speed comes over the course of time as the trainees will practice all their lives. The very purpose of the exam should to test the reliability and knowledge at reasonable speed not at superfast speed.

- Comments As time is a constraint, knowledge is not well reflected in 5 minutes. We may have more to offer if there was more time in the subjective stations
- Neutral.

Exam Preparation

Who helped you to develop competence in refraction? (Please tick the answer as appropriate)

- | | | |
|--------------------------|----------------------------|-----|
| <input type="checkbox"/> | Optometrist | 4/4 |
| <input type="checkbox"/> | Consultant ophthalmologist | 1/4 |
| <input type="checkbox"/> | Fellow trainee | 3/4 |
| <input type="checkbox"/> | Self-taught | 2/4 |
| <input type="checkbox"/> | Other (please list) | 0/4 |

Question 2

Approximately how many complete refractions (retinoscopy + subjective modification) did you carry out in your preparation for the examination?

- 1500
- Retinoscopy about 30 / Subjective about 30
- 25
- >100

Question 3

Please provide any other advice that you would like to share with future candidates.

- Practice according to exam format.
- Time is a factor. Especially when it comes to the subjective stations, it is difficult to complete the required job in 5 minutes when one has to listen and comprehend the subject's level of understanding and cooperation.

Please write any other comments you have about the Refraction Certificate Exam below.

- 6 minutes for each subjective station would suffice. The retinoscopy/objective stations are fine as it is.
- I do not have the same focimeter in my centre, and I could not perform the focimetry station well not because I do not know the principles, but because I do not know how to operate this particular machine model. I feel that it is not fair to assess us based on a machine that we have no idea how to use. Perhaps it may be more fair for us to be able to truly familiarize ourselves with the machine (there is no way to learn how to use a new model in 1 minute) before testing us with a pair of spectacles. Otherwise, the exam was very well conducted. Thank you.