

# Examination Report

## January 2016 Refraction Certificate Examination



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Michael Nelson BSc FRCOphth MEd

## 1 Introduction

The 16th Refraction Certificate examination in the format was held on 4 - 6 January 2016. Seventy 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 used 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

This is the 9<sup>th</sup> sitting of the refraction certificate with 12 OSCE stations. The reliability of the examination has risen since the last sitting (Cronbach alpha 0.8) and meets the expectations of the GMC.

The Hofstee method of standard setting was used to identify the pass mark for this examination, which was 70%. Previous Hofstee calculations have been based upon a 'standard' set of parameters. Now that this method of standard setting has been approved by the GMC, the examiners provide an updated set of parameters based upon the difficulty of the examination.

The pass rate remains at around 60% with the same pass rate in OST at 60%.

## 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 is identified using the Hofstee method:

### **Hofstee method (see appendix 1 for details)**

After the examination, examiners were asked to review the parameters for the standard setting based upon their judgment of the difficulty of the stations. The following values were used to set the pass mark:

1. The maximum credible pass mark for the examination 75%
2. The maximum credible pass rate for the examination 70% (minimum fail rate 30%)
3. The minimum credible pass mark for the examination 60%
4. The minimum credible pass rate for the examination 30% (maximum fail rate 70%)

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.

#### 4. Results (table 1)

Number of candidates	70	
Maximum possible mark	180	
Mean candidate mark	128	71%
Median candidate mark	132.5	73.6%
Standard deviation	22.7	12.6%
Highest candidate mark	165	91.6%
Lowest candidate mark	48	26.6%
Reliability	0.8	
Standard error of measurement (SEM)	10.2	5.6%
Hofstee pass mark	126/180	70%
Pass rate	42/70	60%
Pass rate in OST	34/57	60%

#### Distribution of marks (table 2)

Score	Distribution	Total
<51	/	1
51-60		0
61-70		0
71-80	/	1
81-90	////	4
91-100	//	2
101-110	///// /	6
111-120	///// //	7
121-130	///// / // //	12
131-140	///// // // //	12
141-150	///// // // // //	15
151-160	///// //	8
161-170	//	2
171-180		0
Total		

/ Candidate failed / candidate passed

#### Statistics for each station (table 3)

		Mean	Median	Standard deviation	Minimum	Maximum
1	CR1	9.5	10	4.4	1	15
2	CR2	9.8	10	3.7	1	15
3	SRC	10.9	13	4.0	1	15
4	CR3	12.3	14	3.0	2	15
5	CR4	11.2	13	4.0	0	15
6	LN	11.0	11.5	3.4	0	15
7	NCR1	9.8	9.5	4.0	1	15
8	NCR2	9.4	9	4.2	0	15
9	VA	12.9	13	1.6	8	15
10	SRS	11.1	12	3.2	2	15

11	BB	10.4	12	3.8	0	15
12	NA	11.5	12	3.4	2	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	Median mark
Retinoscopy	6	50%	10
Subjective	3	25%	12
Other	3	25%	12

#### Correlation between stations (table 4)

	CR1	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB
CR1											
CR2	0.52										
SRC	0.47	0.24									
CR3	0.14	0.14	0.02								
CR4	0.28	0.23	0.28	0.44							
LN	0.46	0.19	0.34	-0.04	0.32						
NCR1	0.11	0.15	0.30	-0.01	0.23	0.07					
NCR2	0.14	0.12	0.36	0.11	0.27	0.07	0.48				
VA	0.15	0.09	0.16	-0.11	0.17	0.18	0.25	0.17			
SRS	0.32	0.40	0.40	0.02	0.00	0.11	0.32	0.15	0.11		
BB	0.24	0.19	0.33	0.01	-0.07	0.17	0.24	0.18	0.02	0.75	
NA	0.36	0.22	0.08	0.18	-0.13	0.13	-0.03	-0.04	-0.10	0.34	0.32

Median correlation between the cycloplegic refraction stations = 0.26

- There was good correlation between CR1 and CR2, and CR3 and CR4.
- There was moderate correlation between CR1 and CR3 and CR4

Correlation between non-cycloplegic refraction stations = 0.48

Best correlation between Binocular balance and subjective refraction of the sphere

Poorest correlation between visual acuity and CR3

#### Correlation between each station and the total score (table 5)

CR1	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB	NA
0.7	0.6	0.7	0.3	0.5	0.5	0.5	0.5	0.3	0.6	0.5	0.4

## 5 Breakdown of results

### Breakdown of results by training (table 8)

	Failed	Passed	Total
In OST	23	34 (60%)	57
Not in OST	5	8 (62%)	13
Total	28	42 (60%)	70

These differences are not statistically significant (1 Fishers exact)

### Breakdown of results by deanery (table 9)

Deanery	Failed	Passed	Total
East Midlands	2	2	4
East of England	2	3	5
East of Scotland	0	1	1
KSS	1	2	3
London	5	8	13
Mersey	1	0	1
North Scotland	0	0	0
North West	4	1	5
Northern	0	1	1
Northern Ireland	1	0	1
Oxford	1	2	3
Peninsula	0	1	1
Severn	0	2	2
South East Scotland	0	0	0
Wales	0	1	1
Wessex	3	2	5
West Midlands	2	4	6
West Scotland	1	1	2
Yorkshire	0	3	3
Total	23	34	57

### Breakdown of results by stage of training (table 10)

Stage (includes FTSTA)	Failed	Passed	Total
ST1	19	21	40
ST2	0	5	5
ST3	0	3	3
ST4	0	0	0
Total*	19	29	48

\*Level at examination unknown for 9 candidates

### Breakdown of results by number of previous attempts (table 11)

Attempts	Failed	Passed	Total
1 (First)	24	29	53
2	4	11	15
3	0	1	1
4	0	0	0
5	0	1	1
Any resit	4	13	17
Total	28	42	70

### 6 Comparison to previous examinations (table 12)

Date	Candidates	Pass mark	Pass rate	Pass rate in OST	% Candidates in OST	Reliability	SEM	Hofstee pass mark
Mar 10	43	69%	47%	58%	67%	0.6	9 (9%)	68%
July 10	47	75%	53%	60%	70%	0.6	8 (8%)	72%
Nov 10	53	74%	42%	44%	68%	0.6	7 (7%)	71%
Apr 11	57	71%	35%	47%	63%	0.6	6 (6%)	67%
July 11	41	67%	66%	72%	71%	0.4	6 (6%)	71%
Nov 11	69	65%	71%	75%	70%	0.6	8 (8%)	68%
Mar 12	54	73%	54%	66%	57%	0.6	8 (8%)	72%
July 12	44	71%	59%	67%	64%	0.5	9 (9%)	71%
Dec 12*	71	69%	75%	77%	55%	0.6	11(6%)	72%
Apr 13	64	74%	61%	64%	64%	0.8	11(6%)	74%
July 13	42	72%	74%	90%	48%	0.7	10(6%)	74%
Dec 13	75	72%	67%	76%	65%	0.7	10(6%)	71%
Apr 14	56	73%	84%	89%	66%	0.6	9.5(5%)	75%
July 14	34	74%	62%	55%	65%	0.4	11 (6%)	74%
Dec 14*	63	71%	68%	77%	68%	0.6	12 (7%)	71%
Apr 15*	57	77%	65%	73%	65%	0.4	11 (7%)	77%
June 15*	33	69%	58%	n/a^	0%	0.73	10 (6%)	69%
July 15*	31	66%	58%	55%	65%	0.65	9.4(5%)	66%
Jan 16*	70	70%	60%	60%	81%	0.8	10 (6%)	70%

\* Hofstee pass mark used for these examinations

^examination held in Kuching, no OST candidates.

**Performance of candidate by deanery for all examinations to date, where deanery is known (table 13)**

Deanery	Total passes	Total candidates	Pass rate %
East of Scotland	9	10	90
North Scotland	6	7	86
KSS	11	13	85
Oxford	9	11	82
South East Scotland	13	16	81
Mersey	22	29	76
Northern	14	19	74
London	100	139	72
Yorkshire	35	49	71
North West	24	36	67
Severn	14	21	67
West Midlands	37	55	67
East of England	25	38	66
East Midlands	20	31	65
Wessex	15	24	63
West Scotland	15	24	63
Northern Ireland	8	13	62
Wales	16	28	57
Peninsula	10	28	36
<b>Total</b>	<b>403</b>	<b>591</b>	<b>68</b>



## Appendix 1 Hofstee method for standard setting

### **Hofstee method**

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 75%
2. The maximum credible pass rate for the examination 70%
3. The minimum credible pass mark for the examination 60%
4. The minimum credible pass rate for the examination 30%

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 for this examination was 126/180 (70%).