



Examination Report

Refraction Certificate Examination

May 2021

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1 Introduction

There were 171 candidates for the May 2021 sitting of the Refraction Certificate. The examination consisted of 10 objective structured clinical examination (OSCE) stations, covering a range of skills required to assess visual acuity, refractive error and the prescription of spectacles.

1.1 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

1.2 Examination structure

The examination consists of 10 OSCE stations. Each station contributes 15 marks to the overall total. The stations used for the examination were:

1. Simulated retinoscopy (SR1)
2. Simulated retinoscopy (SR2)
3. Simulated retinoscopy (SR3)
4. Simulated retinoscopy (SR4)
5. Simulated retinoscopy (SR5)
6. Simulated retinoscopy (SR6)
7. Simulated retinoscopy (SR7)
8. Simulated retinoscopy (SR8)
9. Simulated retinoscopy (SR9)
10. Lens neutralisation (LN)

2 Summary

This sitting of the refraction certificate had 10 OSCE stations. The reliability of the examination is above the desired acceptable level (Cronbach's alpha 0.83, desired level > 0.8).

The Hofstee method of standard setting was used to identify the pass mark for this examination, which was 106.1/150 (70.7 per cent). Three stations achieved high mean scores, stations 3, 4 and 7. The station with the lowest mean score was station 6. The overall pass rate was 57 per cent with a higher pass rate in OST at 58 per cent. Candidates in training appear to be equally prepared for the exam compared to their non-trainee counterparts (achieving a 58 per cent compared with a 59 per cent pass rate).

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.

3.1 Hofstee method

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:

- The maximum credible pass mark for the examination = 75 per cent
- The maximum credible pass rate for the examination = 70 per cent
- The minimum credible pass mark for the examination = 60 per cent
- The minimum credible pass rate for the examination = 30 per cent

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 coordinates intersects the cumulative function curve is used to identify the pass mark.

The Hofstee pass mark for this examination was 106.1/150 (70.7 per cent).

4 Results

Table 1: Results summary

Statistic	Value	Percentage
Number of candidates	171	
Maximum possible mark	150	
Mean candidate mark	105.74	70.5%
Median candidate mark	111.00	74.0%
Standard deviation	23.63	15.8%
Highest candidate mark	138	92.0%
Lowest candidate mark	27	18.0%
Reliability	0.83	
Standard error of measurement (SEM)	9.87	6.6%
Hofstee pass mark	106.1/150	70.7%
Pass rate	98/171	57.3%
Pass rate in OST	42/72	58.3%

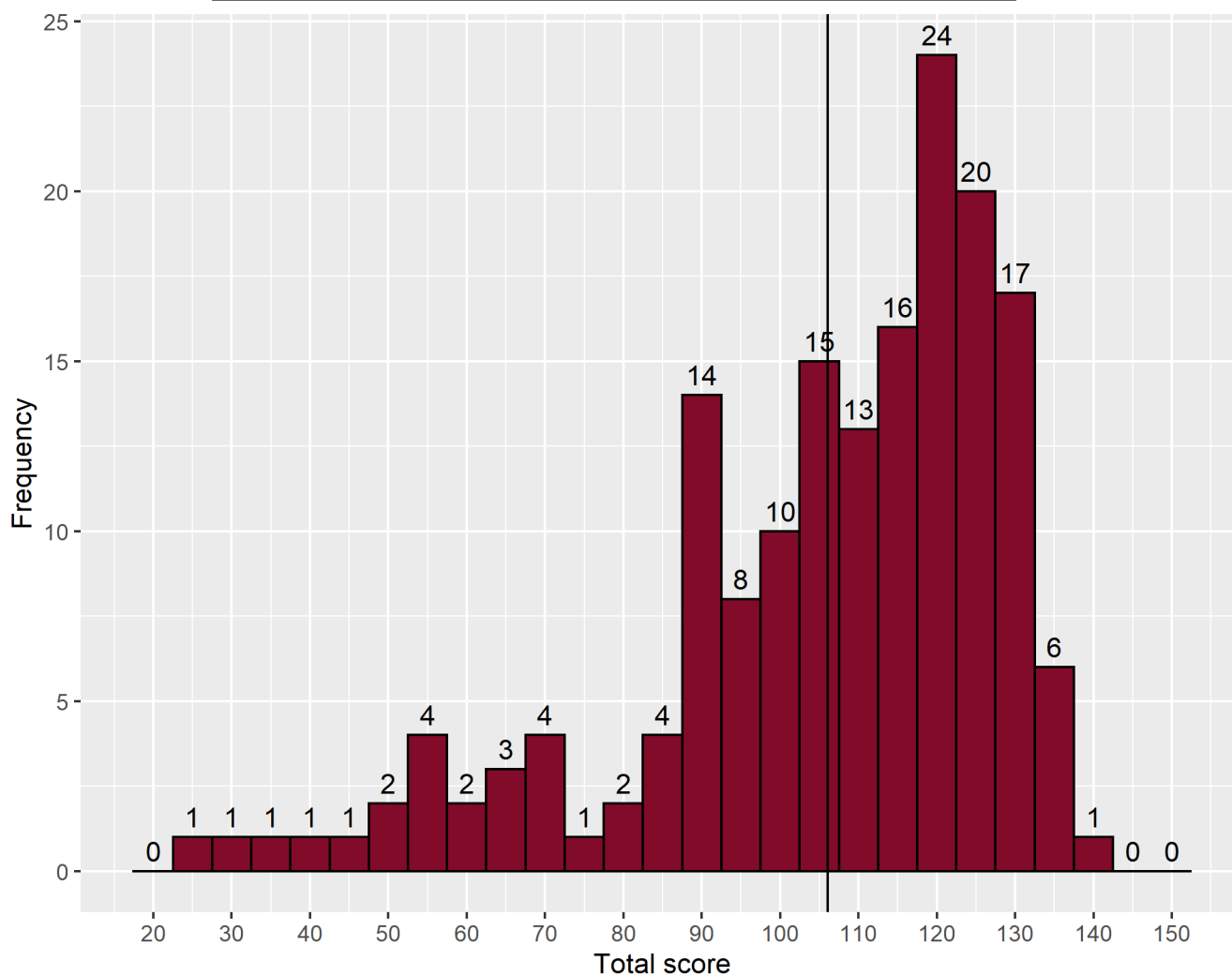


Figure 1: Distribution of marks

The vertical line denotes the point on the mark distribution where the pass mark lies.

Table 2: Station summary

Station	Category	Mean	Median	Standard deviation	Minimum	Maximum
1	SR1	10.94	13.00	4.37	1	15
2	SR2	10.34	11.00	4.35	0	15
3	SR3	12.73	14.00	2.60	4	15
4	SR4	12.01	14.00	3.41	0	15
5	SR5	9.27	11.00	4.34	0	15
6	SR6	7.21	6.50	3.33	1	15
7	SR7	12.33	14.00	3.52	1	15
8	SR8	11.09	13.00	4.12	0	15
9	SR9	8.93	9.00	3.06	1	14
10	LN	11.13	12.00	4.06	0	15

The relative weights for each skill in refraction (based upon the number of stations) are shown in table 3 below.

Table 3: Weights for each skill

Clinical Skill	Number of stations	Contribution to total marks	Median mark
Retinoscopy	9	90%	11
Other	1	10%	9

Table 4: Correlation between stations

	SR1	SR2	SR3	SR4	SR5	SR6	SR7	SR8	SR9
SR2	0.71								
SR3	0.42	0.33							
SR4	0.44	0.39	0.38						
SR5	0.34	0.40	0.23	0.23					
SR6	0.35	0.36	0.02	0.24	0.35				
SR7	0.45	0.37	0.23	0.38	0.37	0.24			
SR8	0.43	0.41	0.44	0.37	0.34	0.27	0.53		
SR9	0.23	0.21	0.35	0.21	0.11	0.13	0.31	0.32	
LN	0.23	0.35	0.12	0.27	0.25	0.16	0.28	0.35	0.14

The median correlation between the simulated refraction stations was 0.35. There was moderate correlation between all pairs of simulated refraction stations, except SR3 and SR6, SR5 and SR9, and SR6 and SR9. The best correlation was between CR1 and CR2 (0.71). The poorest correlation between any station was 0.02. All negative correlations are highlighted in red.

Table 5: Correlation between each station and the total score

Station	SR1	SR2	SR3	SR4	SR5	SR6	SR7	SR8	SR9	LN
Correlation with total score	0.75	0.76	0.53	0.62	0.60	0.51	0.67	0.72	0.46	0.54

5 Breakdown of results

Table 6: Breakdown of results by training

Training	Failed	Passed	Pass rate (%)	Total
In OST	30	42	58.3	72
Not in OST	28	41	59.4	69
Unknown	15	15	50.0	30
Total	73	98	57.3	171

Table 7: Breakdown of results by deanery

Country	Deanery	Failed	Passed	Total
UK	East Midlands	0	3	3
	East of England	2	3	5
	East of Scotland	1	2	3
	Kent, Surrey and Sussex	1	2	3
	London	8	7	15
	Mersey	1	1	2
	North of Scotland	0	1	1
	North Western	0	4	4
	Northern	1	4	5
	Northern Ireland	1	1	2
	Oxford	0	2	2
	South East of Scotland	0	1	1
	Wales	2	2	4
	Wessex	0	1	1
	West Midlands	3	4	7
	West of Scotland	3	1	4
Yorkshire	7	3	10	
	Total	30	42	72

Table 8: Breakdown of results by stage of training

Training	Failed	Passed	Pass rate (%)	Total
FY2	5	11	68.8	16
Medical Student	4	0	0.0	4
OST1	6	9	60.0	15
OST2	11	12	52.2	23
OST3	3	10	76.9	13
OST4	1	0	0.0	1
Total	42	58.3	72	

6 Comparison to previous examinations

Table 9: Comparison to previous years' exams

Date	Candidates	Pass mark	Pass rate	Pass rate in OST	Per cent of candidates in OST	Reliability	SEM	Hofstee pass mark
Nov 2010	53	74%	42%	44%	68%	0.6	7 (7%)	71%
Apr 2011	57	71%	35%	47%	63%	0.6	6 (6%)	67%
Jul 2011	41	67%	66%	72%	71%	0.4	6 (6%)	71%
Nov 2011	69	65%	71%	75%	70%	0.6	8 (8%)	68%
Mar 2012	54	73%	54%	66%	57%	0.6	8 (8%)	72%
Jul 2012	44	71%	59%	67%	64%	0.5	9 (9%)	71%
Dec 2012*	71	69%	75%	77%	55%	0.6	11 (6%)	72%
Apr 2013	64	74%	61%	64%	64%	0.8	11 (6%)	74%
Jul 2013	42	72%	74%	90%	48%	0.7	10 (6%)	74%
Dec 2013	75	72%	67%	76%	65%	0.7	10 (6%)	71%
Apr 2014	56	73%	84%	89%	66%	0.6	9.5 (5%)	75%
Jul 2014	34	74%	62%	55%	65%	0.4	11 (6%)	74%
Dec 2014*	63	71%	68%	77%	68%	0.6	12 (7%)	71%
Apr 2015*	57	77%	65%	73%	65%	0.4	11 (7%)	77%
Jun 2015*	33	69%	58%	n/a^	n/a^	0.73	10 (6%)	69%
Jul 2015*	31	66%	58%	55%	65%	0.65	9.4 (5%)	66%
Jan 2016*	70	70%	60%	60%	81%	0.8	10 (6%)	70%
Mar 2016*	57	77%	81%	83%	70%	0.9	7.7 (4%)	77%
Jun 2016*	23	70%	57%	n/a^	n/a^	0.7	11 (6%)	70%
Jul 2016*	64	70%	64%	67%	67%	0.6	12 (7%)	70%
Jan 2017*	62	72%	63%	64%	90%	0.6	10 (6%)	72%
Apr 2017*	63	73%	67%	69%	62%	0.7	11 (6%)	73%
Jul 2017*	62	72%	61%	68%	60%	0.7	12 (6%)	72%
Dec 2017*	63	71%	56%	59%	65%	0.72	11 (6%)	71%
Apr 2018*	60	75%	68%	73%	75%	0.55	10 (6%)	75%
Jun 2018*	39	75%	74%	n/a^	n/a^	0.69	10 (5%)	75%
Jul 2018*	64	75%	67%	77%	55%	0.74	11 (6%)	75%
Dec 2018*	68	72%	54%	70%	63%	0.7	11 (6%)	72%
Apr 2019*	87	72%	59%	68%	51%	0.54	12 (6%)	72%
Jun 2019*	40	70%	57%	n/a	n/a	0.73	11 (7%)	70%
Jun 2019*	52	74%	67%	n/a^	n/a^	0.76	9 (6%)	74%
Dec 2020*	141	70%	57%	72%	56%	0.81	11 (8%)	70%
May 2021*	171	71%	57%	58%	42%	0.83	10 (7%)	71%

* Hofstee pass mark used for these examinations

^ Examination held in Kuching, Malaysia

Table 10: Performance of candidates by deanery for all examinations to date, where deanery is known

Country	Deanery	Total passes	Total candidates	Pass rate %
UK	East Midlands	39	53	73.6
	East of England	46	68	67.6
	East of Scotland	14	19	73.7
	Kent, Surrey and Sussex	2	3	66.7
	London	178	244	73.0
	Mersey	41	56	73.2
	North of Scotland	5	5	100.0
	North Western	16	19	84.2
	Northern	31	43	72.1
	Northern Ireland	18	26	69.2
	Oxford	21	28	75.0
	South East of Scotland	8	9	88.9
	Wales	32	60	53.3
	Wessex	30	46	65.2
	West Midlands	62	91	68.1
	West of Scotland	13	17	76.5
	Yorkshire	60	90	66.7
	KSS (Kent, Surrey and Sussex)	33	42	78.6
	North Scotland	8	9	88.9
	Overseas	North West	28	38
Peninsula (South West)		21	49	42.9
	Severn	20	34	58.8
	South East Scotland	14	17	82.4
	West Scotland	19	29	65.5
	Eire	1	2	50.0
	Europe and Overseas	2	7	28.6
Total		762	1,104	69.0