PSYCHOMETRIC
SOLUTIONS
GROUP

Examination Report

Refraction Certificate Examination

Birmingham – May 2025

Sian Williams, Kiran Sanghara & Lucy Foard

Contents

1 Introduction

One hundred and fifty-two candidates sat the Refraction Certificate exam in Birmingham, held on the 12th to the 16th May 2025. The examination consists 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 Assess vision

PM14 To use spectacle lenses and prisms when indicated

PS2 Perform a refractive assessment and provide an optical prescription

C1 Establish a good rapport with patients and relatives

C11 Keep clinical records

BCS6 Optics and Medical physics

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:

- SR1 - SR4: Simulated retinoscopy
- NR1 - NR2: Non-cycloplegic retinoscopy
- SC: Subjective refraction: Cylinder
- LN: Lens neutralisation
- SS: Subjective refraction: Sphere
- BB: Binocular balancing / Further refinement

2 Summary

The Hofstee method of standard setting was used to generate the pass mark for this examination, with a final rounded pass mark of 105/150 (70%) being applied. On average, candidates scored highest in the Simulated Retinoscopy 1 (SR1), 2 (SR2) and 3 (SR3) stations. On average, candidates scored lowest in the Binocular Balancing (BB) stations. The overall exam pass rate was 75%, with 114/152 of the candidates successful.

The reliability of the exam was α=0.78, with all stations contributing positively. Ten out of ten station scores correlated well with overall total exam scores. In particular, Simulated Retinoscopy 2 (SR2) station showed the strongest discriminative power.

3 Standard setting

The pass mark for the Refraction Certificate exam is generated 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%
- The minimum credible pass mark for the examination = 60%
- The maximum credible pass rate for the examination = 100%
- The minimum credible pass rate for the examination = 0%

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. This pass mark is rounded to the nearest achievable mark.

4 Results

Table 1: Results summary

Statistic	Value	Percentage
Number of candidates	152	
Maximum possible mark	150	
Mean candidate mark	111.36	74.2%
Median candidate mark	116.50	77.7%
Standard deviation	22.45	15.0%
Highest candidate mark	145	96.7%
Lowest candidate mark	35	23.3%
Reliability	0.782	
Standard error of measurement	10.48	7%
Hofstee pass mark (final, rounded)	105/150	70%
Pass rate*	114/152	75%

**Please note that the pass rate presented reflects any adjustments to candidates' scores. All other analyses are based on original, unadjusted data.*

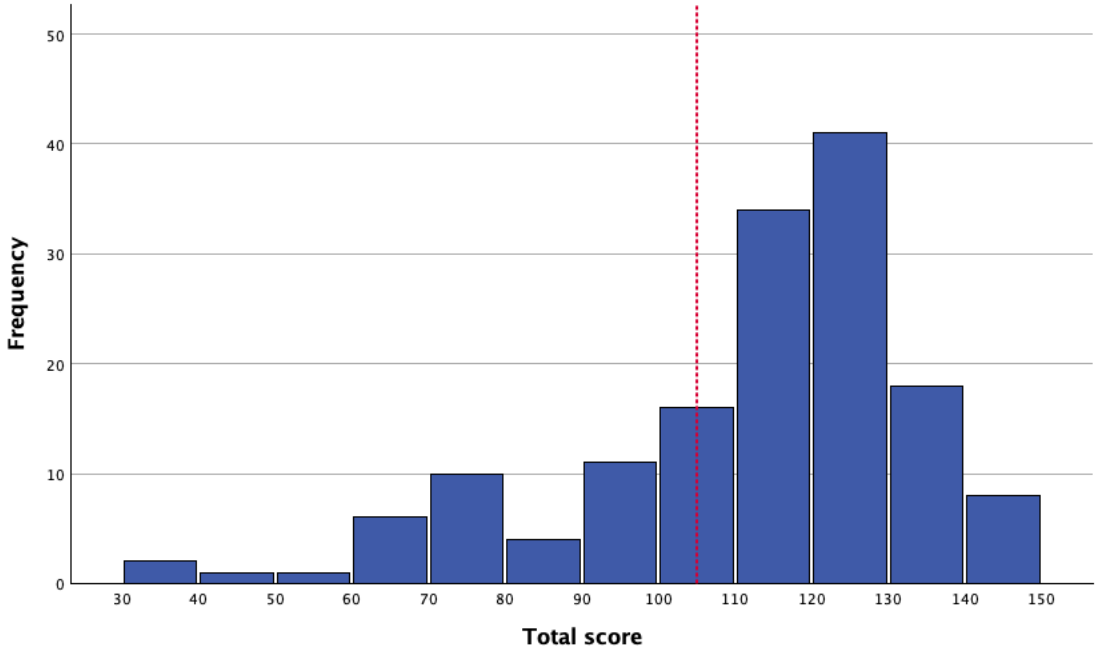

Figure 1: Distribution of marks

The dotted red vertical line denotes the point on the score distribution where the pass mark lies

Table 2: Station summary

Station	Category	Mean	Median	Standard deviation	Minimum	Maximum
1	**SR1**	12.98	14.5	3.17	3	15
2	**SR2**	12.36	14.0	3.55	0	15
3	**SR3**	12.33	14.0	3.29	1	15
4	**SR4**	11.71	14.0	4.14	0	15
5	**NR1**	11.10	13.0	4.10	0	15
6	**NR2**	10.07	11.0	4.52	0	15
7	**SC**	10.35	12.0	4.21	0	15
8	**LN**	11.70	13.0	4.11	0	15
9	**SS**	10.14	11.0	3.16	0	15
10	**BB**	8.64	9.0	4.21	0	15

The stations with the highest mean scores are highlighted in green (SR1 followed by SR2 and SR3). The stations highlighted in red have the lowest mean scores (BB followed by NR2). The NR2 station saw the greatest variation in candidate performance, and the SS and SR1 stations saw the least variation in candidate performance.

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

Table 3: Weights for each skill

Clinical Skill	Number of stations	Contribution to total marks	Median mark
Retinoscopy	6	60%	14.0
Subjective	3	30%	11.0
Other	1	10%	13.0

Table 4: Correlation between stations

	SR1	SR2	SR3	SR4	NR1	NR2	SC	LN	SS
SR2	0.59								
SR3	0.38	0.34							
SR4	0.40	0.41	0.48						
NR1	0.20	0.17	0.31	0.19					
NR2	0.28	0.28	0.17	0.15	0.54				
SC	0.28	0.22	0.28	0.22	0.10	0.11			
LN	0.26	0.36	0.29	0.44	0.25	0.29	0.32		
SS	0.30	0.34	0.25	0.33	0.05	0.02	0.18	0.26	
BB	0.28	0.36	0.16	0.33	-0.01	0.05	0.24	0.28	0.65

Within Table 4, cells are highlighted green if the correlation is ≥ 0.50 and orange if the correlation is between 0 and 0.20 (inclusive). Negative correlations between stations are highlighted in light red.

The median correlation between all stations was 0.28. There weas 1/45 instances of a negative correlation between stations, 12/45 instances of a weak correlation (orange), and 3/45 instances of a strong relationship between stations (green). The n*egative* correlation was seen between the NR1 station and the BB station. The strongest *positive* correlation was seen between the SS and BB stations.

Table 5: Correlation between each station score and total score

Station	SR1	SR2	SR3	SR4	NR1	NR2	SC	LN	SS	BB
Correlation with total score	0.56	0.57	0.50	0.55	0.34	0.35	0.35	0.53	0.44	0.41

Table 5 shows the corrected station-total correlations. This is the correlation between the station score and the overall total score without the score of that specific station included. Ten out of ten correlations were positive and 10/10 were of an acceptable strength (correlation ≥0.20). Data suggests that the Simulated Retinoscopy 2 (SR2) station had the strongest relationship with total scores and was therefore the better discriminator.

5 Breakdown of results

Table 6: Breakdown of results by demographic groups

Demographics	Passed	Total	Pass rate
Ethnicity (grouped)			
Arab	14	18	77.8%
Asian/Asian British	48	69	69.6%
Black/Black British	8	10	80.0%
Mixed	2	3	66.7%
White/White British	32	36	88.9%
Other	1	3	33.3%
Unknown	9	13	69.2%
PMQ			
OS	46	76	60.5%
UK	55	59	93.2%
Unknown	13	17	76.5%
Gender			
Female	49	64	76.6%
Male	61	82	74.4%
Unknown	4	6	66.7%
Attempt			
1st Attempt	93	126	73.8%
2nd Attempt	16	21	76.2%
3rd Attempt	3	3	100%
4th Attempt	2	2	100%
Training			
In OST	68	76	89.5%
Not in OST	46	76	60.5%

6 Comparison to previous examinations

Table 7: Comparison to previous years' exams

Date	Centre	Number of Candidates	Pass mark	Pass rate	Pass rate in OST	% of candidates in OST	Reliability (alpha)	SEM (rounded)
May -25	**Birmingham**	**152**	**70%**	**75%**	**89%**	**50%**	**0.78**	**10 (7%)**
Apr -25	Crete	6	65%	33%	n/a	n/a	-	-
Feb-25	Dubai	16	65%	44%	n/a	0%	0.85	10 (7%)
Jan-25	Mumbai	13	64%	46%	n/a	n/a	0.22	11 (8%)
Jan-25	Singapore	16	68%	63%	78%	56%	0.53	10 (7%)
Dec -24	Birmingham	95	70%	78%	100%	2%*	0.65	10 (7%)
Nov-24	Cairo	30	69%	73%	n/a	n/a	0.48	10 (7%)
Sept-24	Malaysia	22	69%	68%	n/a	n/a	0.65	11 (7%)
May-24	Birmingham	100	69%	67%	n/a	n/a	0.76	11 (7%)
Feb-24	Rawalpindi	18	71%	72%	n/a	n/a	0.67	10 (7%)
Feb-24	Chennai	21	67%	52%	n/a	n/a	0.72	12 (8%)
Jan-24	Singapore	14	72%	93%	n/a	n/a	0.40	7 (5%)
Dec-23	Birmingham	75	71%	79%	n/a	n/a	0.70	10 (7%)
Nov-23	Cairo	10	69%	80%	n/a	n/a	0.81	9 (6%)
Sept-23	Birmingham	58	67%	55%	n/a	n/a	0.66	11 (8%)
June-23	Kuching	44	69%	75%	n/a	n/a	0.41	11 (7%)
May-23	Birmingham	75	70%	71%	n/a	n/a	0.79	10 (7%)
Jan-23	Singapore	22	71%	82%	100%	5%	0.54	9 (6%)
Dec-22	London	63	69%	62%	86%	22%	0.73	11 (7%)
Jul-22	Glasgow	109	72%	81%	n/a	n/a	0.85	9 (6%)
May-22	Birmingham	83	72%	80%	94%	20%	0.77	9 (6%)
May-22	Delhi	33	66%	39%	n/a	n/a	0.81	11 (7%)
Apr-22	Cairo	36	73%	86%	n/a	n/a	0.76	8 (5%)
Dec-21	Singapore	131	72%	79%	80%	31%	0.78	10 (6%)
May-21		171	71%	57%	58%	42%	0.83	10 (7%)
Jan-21		39	74%	92%	n/a	n/a	0.51	9 (6%)
Dec-20		141	70%	57%	72%	56%	0.81	11 (8%)
Jun-19		40	70%	57%	n/a	n/a	0.73	11 (7%)
Jun-19		52	74%	67%	n/a^	n/a^	0.76	9 (6%)
Apr-19		87	72%	59%	68%	51%	0.54	12 (6%)
Dec-18		68	72%	54%	70%	63%	0.7	11 (6%)
Jul-18		64	75%	67%	77%	55%	0.74	11 (6%)
Jun-18		39	75%	74%	n/a	n/a	0.69	10 (5%)
Apr-18		60	75%	68%	73%	75%	0.55	10 (6%)
Dec-17		63	71%	56%	59%	65%	0.72	11 (6%)
Jul-17		62	72%	61%	68%	60%	0.7	12 (6%)
Apr-17		63	73%	67%	69%	62%	0.7	11 (6%)
Jan-17		62	72%	63%	64%	90%	0.6	10 (6%)
Jul-16		64	70%	64%	67%	67%	0.6	12 (7%)
Jun-16		23	70%	57%	n/a	n/a	0.7	11 (6%)
Mar-16		57	77%	81%	83%	70%	0.9	7.7 (4%)
Jan-16		70	70%	60%	60%	81%	0.8	10 (6%)
Jul-15		31	66%	58%	55%	65%	0.65	9.4 (5%)

*Limited OST data available

Table 8: Performance of candidate by deanery for all examinations to date, where deanery is known

Deanery	Pass	Total	Pass rate (%)
London	262	346	75.7
East Midlands	59	81	72.8
East of England	71	97	73.2
East of Scotland	20	26	76.9
Kent, Surrey, and Sussex	65	83	78.3
Mersey	57	74	77.0
North of Scotland	18	23	78.3
Northwest	28	38	73.7
Northwestern	41	50	82.0
Northern	52	70	74.3
Northern Ireland	20	30	66.7
Oxford	36	46	78.3
Peninsula (Southwest)	35	70	50.0
Severn	30	44	68.2
Southeast of Scotland	28	32	87.5
South Yorks & Humber	7	11	63.6
Wales	52	87	59.8
Wessex	43	65	66.2
West Midlands	99	137	72.3
West of Scotland	45	61	73.8
Yorkshire	86	124	69.4
Eire	4	12	33.3
Europe and overseas	43	73	58.9
Unknown; N/A	119	200	59.5
Total	1320	1880	70.2