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PSYCHOMETRIC  
SOLUTIONS  
GROUP

# Examination Report

Refraction Certificate Examination

Cairo - November 2024

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# 1 Introduction

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30 candidates sat the Cairo Refraction Certificate exam, held on the 23<sup>rd</sup> November 2024. 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

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The Hofstee method of standard setting was used to generate the pass mark for this examination, with a final rounded pass mark of 104/150 (69.3%) being applied. On average, candidates scored highest in the Binocular balancing (BB) and Subjective refraction: Sphere (SS) stations. On average, candidates scored lowest in the Subjective refraction: Cylinder (SC) and Lens neutralisation (LN) stations. The overall exam pass rate was 73.3%, with 22 of the 30 candidates successful.

The reliability of the exam was  $\alpha=0.48$ , with most stations contributing positively. 5/10 station scores correlated well with overall total exam scores. In particular, the Binocular balancing (BB), Subjective refraction: Sphere (SS) and Lens neutralisation (LN) stations showed strong discriminative power.

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## 3 Standard setting

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The exam pass mark 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.

The raw Hofstee pass mark (before rounding) for this examination was 104.3/150 (69.5%).

## 4 Results

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*Table 1: Results summary*

Statistic	Value	Percentage
Number of candidates	30	
Maximum possible mark	150	
Mean candidate mark	108.57	72.4%
Median candidate mark	111.00	74.0%
Standard deviation	13.93	9.3%
Highest candidate mark	134	89.3%
Lowest candidate mark	71	47.3%
Reliability	0.481	
Standard error of measurement	10.04	6.7%
Hofstee pass mark (final; rounded)	104/150	69.3%
Pass rate*	22/30	73.3%

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

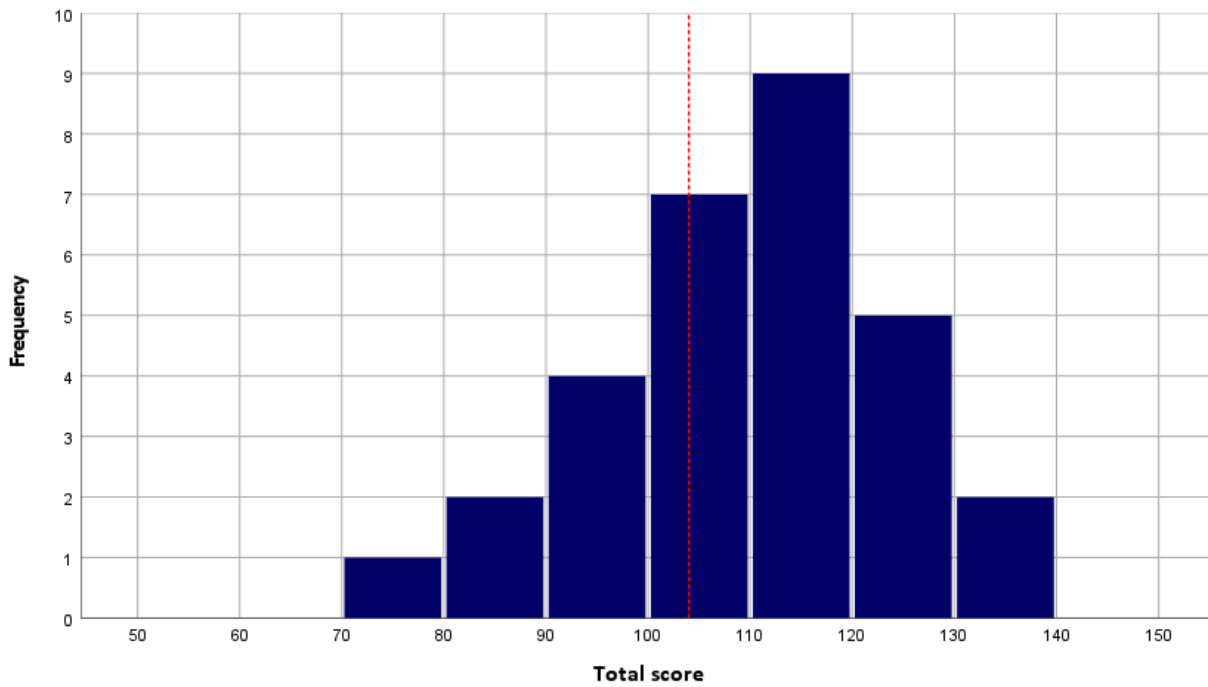


Figure 1: Distribution of marks

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	10.6	12.0	3.51	2	15
2	SR2	10.5	11.0	3.86	0	15
3	SR3	10.3	9.5	2.76	5	15
4	SR4	10.9	11.0	2.65	3	14
5	NR1	11.2	13.5	4.04	3	15
6	NR2	11.2	12.5	3.64	1	15
7	SC	9.8	11.5	4.57	1	15
8	LN	10.2	11.0	3.18	0	15
9	SS	11.8	12.5	2.51	7	15
10	BB	12.0	12.0	2.28	7	15

The stations with the highest mean scores are highlighted in green (BB and SS). The stations highlighted in light red have the lowest mean scores (SC and LN). The SC station also saw the largest 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%	11.50
Subjective	3	30%	12.00
Other	1	10%	11.00

**Table 4: Correlation between stations**

	SR1	SR2	SR3	SR4	NR1	NR2	SC	LN	SS
SR2	0.78								
SR3	-0.14	-0.09							
SR4	0.04	0.11	0.08						
NR1	0.16	0.00	-0.18	-0.16					
NR2	0.22	-0.09	-0.18	-0.09	0.34				
SC	-0.04	-0.02	0.20	-0.07	-0.12	-0.19			
LN	0.14	0.21	0.37	-0.24	0.11	0.07	0.21		
SS	0.06	0.25	0.26	0.27	0.26	-0.25	0.03	0.26	
BB	0.11	0.31	0.32	-0.09	0.30	-0.36	0.28	0.51	0.72

Within Table 4, cells are highlighted green if the correlation is  $\geq 0.50$  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 0.11. There were 16/45 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 strongest *negative* correlation was seen between the NR2 station and the BB station. The strongest *positive* correlation was seen between the SR1 and SR2 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	0.39	0.35	0.11	-0.05	0.16	-0.07	0.03	0.41	0.41	0.53

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. 8/10 correlations were positive and 5/10 were of an acceptable strength (correlation  $\geq 0.20$ ). Data suggests that the Binocular balancing (BB), Subjective refraction: Sphere (SS) and Lens neutralisation (LN) stations had the strongest relationships with total scores and were therefore the better discriminators.

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## 5 Breakdown of results

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Table 6: Breakdown of results by demographic groups

Demographics	Passed	Total	Pass rate
<b>Ethnicity (grouped)</b>			
Arab	16	20	80.0%
Asian/Asian British – Pakistani	0	1	0%
Mixed	2	3	66.7%
White – Other	1	3	33.3%
Unknown	3	3	100%
<b>PMQ</b>			
OS	20	27	74.1%
UK	1	2	50.0%
Unknown	1	1	100%
<b>Gender</b>			
Female	6	8	75.0%
Male	14	20	70.0%
Unknown	2	2	100%
<b>Attempt</b>			
1 <sup>st</sup> Attempt	21	28	75.0%
2 <sup>nd</sup> Attempt	1	2	50.0%

## 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)
<b>Nov-24</b>	<b>Cairo</b>	<b>30</b>	<b>69%</b>	<b>73%</b>	<b>n/a</b>	<b>n/a</b>	<b>0.48</b>	<b>10 (7%)</b>
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	TBC
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%)
Jun-15		33	69%	58%	n/a^	n/a^	0.73	10 (6%)
Apr-15		57	77%	65%	73%	65%	0.4	11 (7%)
Dec-14		63	71%	68%	77%	68%	0.6	12 (7%)
Jul-14		34	74%	62%	55%	65%	0.4	11 (6%)
Apr-14		56	73%	84%	89%	66%	0.6	9.5 (5%)
Dec-13		75	72%	67%	76%	65%	0.7	10 (6%)
Jul-13		42	72%	74%	90%	48%	0.7	10 (6%)
Apr-13		64	74%	61%	64%	64%	0.8	11 (6%)



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

Deanery	Pass	Total	Pass rate (%)
London	234	311	75.2
East Midlands	51	68	75.0
East of England	62	85	72.9
East of Scotland	15	21	71.4
Kent, Surrey, and Sussex	51	66	77.3
Mersey	53	69	76.8
North of Scotland	16	21	76.2
Northwest	28	38	73.7
Northwestern	26	33	78.8
Northern	43	59	72.9
Northern Ireland	19	29	65.5
Oxford	28	36	77.8
Peninsula (Southwest)	31	63	49.2
Severn	26	40	65.0
Southeast of Scotland	25	29	86.2
South Yorks & Humber	3	6	50.0
Wales	39	69	56.5
Wessex	38	58	65.5
West Midlands	86	122	70.5
West of Scotland	42	57	73.7
Yorkshire	76	112	67.9
Eire	2	6	33.3
Europe and Overseas	35	54	64.8
Unknown; N/A	78	130	60.0
<b>Total</b>	<b>1107</b>	<b>1582</b>	<b>70.0</b>