

Examination Report

July 2015 Refraction Certificate Examination



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1 Introduction

The 16th Refraction Certificate examination in the format was held in Glasgow on 13 July 2015. Thirty-one 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 9th sitting of the refraction certificate with 12 OSCE stations. The reliability of the examination remains variable but has risen slightly since the last sitting (Cronbach alpha 0.7) but does not meet the expectations of the GMC.

The Hofstee method of standard setting was used to identify the pass mark for this examination, which was 66%, which is considerably lower than the last sitting. Previous Hofstee calculations have always 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 in June.

The pass rate has fallen slightly, in spite of the lower pass mark, at 58% with a slightly lower pass rate in OST at 55%.

There were no significant differences in performance based upon OST, gender, ethnicity, first language or country of qualification.

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)

At the conclusion 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 70%
2. The maximum credible pass rate for the examination 65% (minimum fail rate 35%)
3. The minimum credible pass mark for the examination 55%
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	31	
Maximum possible mark	180	
Mean candidate mark	120	67%
Median candidate mark	121	67%
Standard deviation	15.9	8.8%
Highest candidate mark	151	84%
Lowest candidate mark	91	51%
Reliability	0.65	
Standard error of measurement (SEM)	9.4	5%
Hofstee pass mark	119/180	66%
Pass rate	18/31	58%
Pass rate in OST	11/20	55%

Distribution of marks (table 2)

Score	Distribution	Total
91-95	//	2
96-100	//	2
101-105	////	4
106-110	/	1
111-115	//	2
116-120	///	4
121-125	////	4
126-130	//	2
131-135	////	4
136-140	///	3
141-145	//	2
146-150		0
151-155	/	1
156-160		0
161-165		0
166-170		0
Total		31

/ Candidate failed / candidate passed

Statistics for each station (table 3)

		Mean	Median	Standard deviation	Minimum	Maximum
1	CR1	11.3	14	4.3	3	15
2	CR2	8.6	8	4.8	2	15
3	SRC	7.6	7	3.4	1	15
4	CR3	10.1	11	.6	3	15
5	CR4	9.7	10	4.1	3	15
6	LN	12.3	12	2.0	8	15
7	NCR1	8.1	8	3.9	2	15
8	NCR2	7.9	9	4.4	0	15
9	VA	12.7	13	2.1	6	15
10	SRS	10.4	11	2.9	4	15

11	BB	8.4	9	3.7	0	14
12	NA	13.0	14	2.3	7	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%	9.5
Subjective	3	25%	9
Other	3	25%	13

Correlation between stations (table 4)

	CR1	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB
CR1											
CR2	0.27										
SRC	-0.10	0.14									
CR3	-0.09	-0.42	-0.49								
CR4	-0.10	-0.63	-0.39	0.80							
LN	-0.05	-0.46	-0.08	0.33	0.42						
NCR1	0.01	0.16	0.32	-0.22	-0.18	-0.31					
NCR2	0.10	0.09	0.31	-0.04	0.00	-0.45	0.66				
VA	0.24	0.18	0.20	0.13	0.10	0.04	-0.10	0.26			
SRS	0.21	0.07	-0.18	-0.01	0.10	0.04	0.25	0.25	0.15		
BB	0.24	-0.15	-0.38	0.18	0.30	0.20	0.08	0.12	0.16	0.74	
NA	-0.02	-0.17	0.20	0.18	0.19	0.05	0.40	0.48	0.26	0.13	0.11

Median correlation between the cycloplegic refraction stations = 0.1

- There was good correlation between CR3 and CR4.
- There was moderate correlation between CR1 and CR2
- **There was poor correlation between CR4 and CR1 and CR2 stations**

Correlation between non-cycloplegic refraction stations = 0.66

Best correlation between CR4 and CR3

Poorest correlation between CR3 and SRC

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

CR1	CR2	SRC	CR3	CR4	LN	NCR1	NCR2	VA	SRS	BB	NA
0.43	0.13	0.11	0.24	0.28	0.00	0.52	0.67	0.50	0.60	0.54	0.54

5. Breakdown of results

Breakdown of results by training (table 8)

	Failed	Passed	Total
In OST	9	11	20
Not in OST	4	7	11
Total	13	18	31

These differences are not statistically significant (0.72 Fishers exact)

Breakdown of results by deanery (table 9)

Deanery	Failed	Passed	Total
East Midlands	1	0	1
East of England	0	0	0
East of Scotland	0	0	0
KSS	1	1	2
London	1	1	2
Mersey	0	0	0
North Scotland	0	1	1
North West	1	1	2
Northern	0	0	0
Northern Ireland	0	0	0
Oxford	0	1	1
Peninsula	0	0	0
Severn	0	1	1
South East Scotland	0	0	0
Wales	0	1	1
Wessex	0	1	1
West Midlands	2	1	3
West Scotland	1	1	2
Yorkshire	2	1	3
Total	9	11	20

Breakdown of results by stage of training (table 10)

Stage (includes FTSTA)	Failed	Passed	Total
ST1	0	1	1
ST2	4	3	7
ST3	1	4	5
ST4	0	1	1
Total*	5	9	14

* Level unknown for 6 candidates

Breakdown of results by gender (table 11)

	Failed	Passed	Total
Female	8	12	20
Male	5	5	10
Total	13	17	30

Unknown 1

These differences are not statistically significant ($p = 0.71$ Fishers exact)

Breakdown of results by country of qualification (table 12)

	Failed	Passed	Total
UK	6	9	15
Outside UK	6	7	13
Total	12	16	28

Unknown 3

These differences are not statistically significant ($p = 1.0$ Fishers exact)

Breakdown of results by first language (table 13)

	Failed	Passed	Total
English	2	2	4
Not English	4	1	5
Total*	6	3	9

*Unknown for 22 candidates

Breakdown of results by stated ethnicity (table 14)

	Failed	Passed	Total
Non-white	8	10	18
White	3	6	9
Total*	11	16	27

*Unknown for 3 candidates

These differences are not statistically significant ($p = 0.69$ Fishers exact)

Breakdown of results by number of previous attempts (table 15)

Attempts	Failed	Passed	Total
1 (First)	11	9	20
2	2	6	8
3	0	3	3
4	0	0	0
Any resit	2	9	11
Total	13	18	31

6 Comparison to previous examinations (table 16)

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%
July 15*	31	66%	58%	55%	65%	0.7	9 (5%)	66%

* Hofstee pass mark used for these examinations

Performance of candidate by deanery for all examinations to date, where deanery is known (table 17)

Deanery	Total passes	Total candidates	Pass rate %
East of Scotland	8	9	89
Oxford	8	9	89
North Scotland	7	8	88
KSS	10	12	83
South East Scotland	13	16	81
Mersey	22	28	79
London	93	128	73
North West	24	33	73
Northern	13	18	72
Wessex	14	20	70
East of England	22	33	67
Northern Ireland	8	12	67
Yorkshire	33	49	67
Severn	13	20	65
West Midlands	34	52	65
East Midlands	18	28	64
West Scotland	15	24	63
Wales	16	28	57
Peninsula	9	27	33
Total	380	554	69

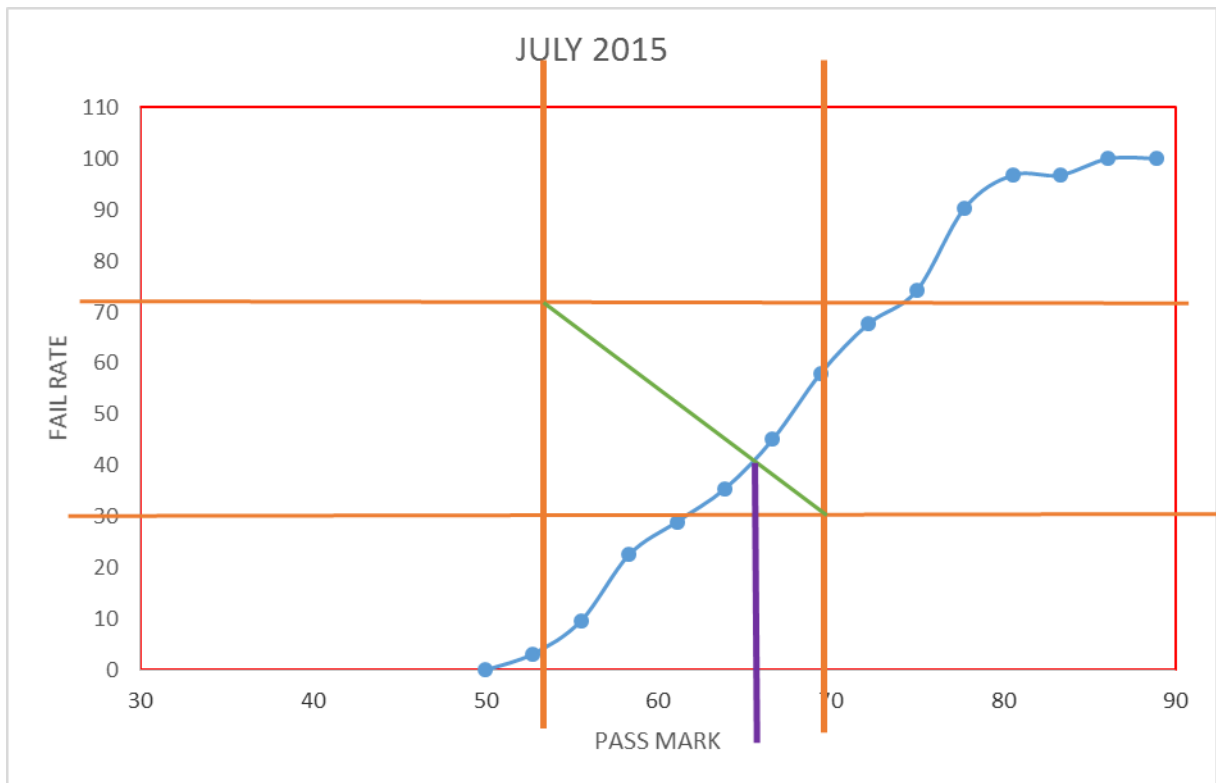
Hofstee method

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

5. The maximum credible pass mark for the examination 70%
6. The maximum credible pass rate for the examination 65% (minimum fail rate 35%)
7. The minimum credible pass mark for the examination 55%
8. The minimum credible pass rate for the examination 30% (maximum fail rate 70%)

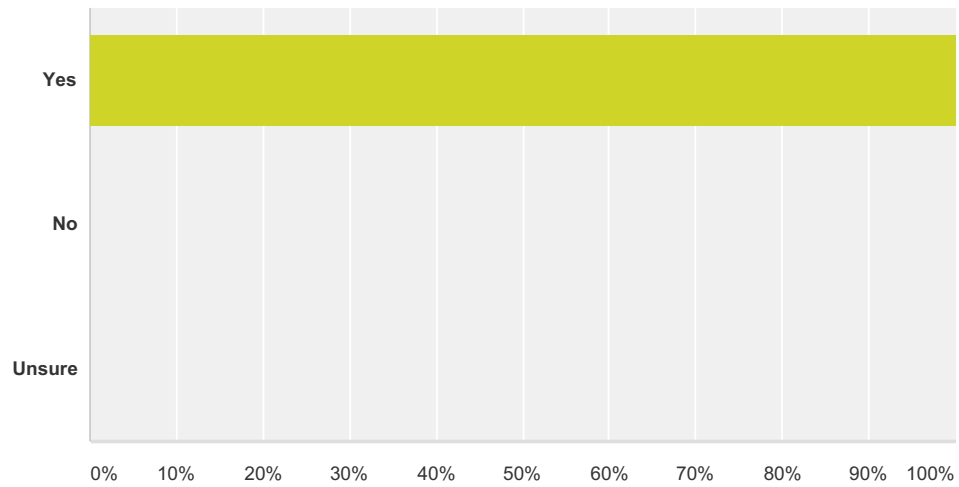
The cumulative fail rate as a function of the pass mark and the co-ordinates derived from the four values above were plotted on a graph. The point where a line joining the two co-ordinates intersects the cumulative function curve is used to identify the pass mark.

The Hofstee pass mark for this examination was 119/180 (66%).



Q1 Were you treated in a courteous manner by the examiners in this examination?

Answered: 17 Skipped: 0

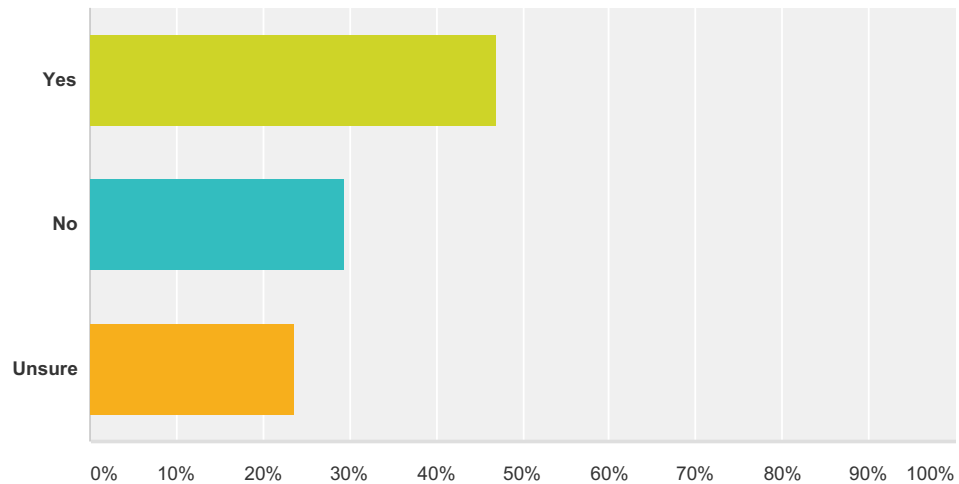


Answer Choices	Responses
Yes	100.00% 17
No	0.00% 0
Unsure	0.00% 0
Total	17

#	Comments	Date
1	examiners should be able to tell candidates in the station how many minutes left for the station instead of telling them they don't know and will hear from outside when there is one minute left. in an exam situation it is difficult for a candidate to keep track of time and demonstrate technique so if asked by candidate, examiner can indicate 3 mins left, or 5 mins left, etc.	8/2/2015 6:06 PM
2	Very friendly environment. All the staff were very helpful. I was very satisfied with the information and instructions given to me during the examintion.	7/27/2015 11:09 PM
3	Very courteous examiners	7/26/2015 1:43 PM

Q2 Were the patients you were asked to examine appropriate for the examination?

Answered: 17 Skipped: 0



Answer Choices	Responses	
Yes	47.06%	8
No	29.41%	5
Unsure	23.53%	4
Total		17

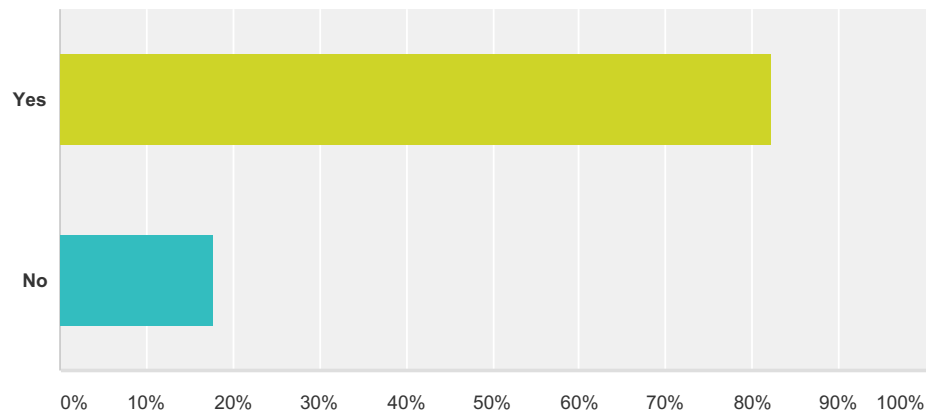
#	Comments	Date
1	In the 5 minute VA check, trial frame station I felt my patient was slow to repond in reading the vision chart, which unecessarily took longer than required and left me with no time to load the lens in the trial frame hence I lost vital marks.	8/6/2015 12:51 AM
2	Patient in non cyclopepic refraction had small pupils!	8/5/2015 12:44 PM
3	Most patients were appropriate but the lady used for the cyl refinement station was not. She had a starting visual acuity of 6/19 and I was taught that in cases where the visual acuity is worse than 6/18 then a +/-1.00D JCC should be used. This equipment was not available, only a +/-0.25D and +/- 0.50D. This threw me but I used the +/-0.50D JCC and despite her giving seemingly appropriate responses her VA ended up worse than her starting VA.	8/2/2015 9:12 PM
4	some patients were slow in giving responses to questions, thus using valuable time for a timed station	8/2/2015 6:06 PM
5	patient was for non cyclopepic examination was having senile meosis. difficult to visualize reflex and get the end point.	7/28/2015 3:50 PM
6	Dilated retinoscopy young woman-split reflex BE, very hard to assess. Undilated retinoscopy man - small pupils and with dirty lenses not really possible to see much. Binocular balance lady - wasn't giving clear responses, was confusing in her responses Refining cylinder man- vision not better than 0,3 logMar even with refined cyl, difficult to assess cylinder	7/27/2015 9:56 PM
7	One of the patients (in the sphere refinement and binocular balance station) read out the letters agonisingly slowly. The examiner also kept on standing in front of the visual acuity screen and she wouldn't say - she would say "oh I can't see anything", leading to confusion, after a while she would say "because he's in front of the screen". It was really a nightmare and meant I ran out of time on that station, as well as many other candidates. I felt frustrated because I felt in a real life situation, to get a good refraction, some patients need more time than others, and that a good refractionist will take that time. However, to perform well in the exam, I felt that you had to deliberately not refract well by hurrying the patient through so that you could demonstrate to the examiner that you knew how to do binocular balance, for example.	7/26/2015 1:43 PM
8	Overall yes but in my one station patient attitude was not good and that was my bad station.	7/24/2015 5:21 PM

Refraction Certificate 13-14 July 2015 CANDIDATE FEEDBACK OSCE stations

9	There was one patient with very dim reflex (non cycloplegic ret), I could not determinbe whether he had Myopia or Hypermetropia? Possbly he had Cataract and his pupils were really small. I thought this was very difficult station and not sure if this was suitable for the exam?	7/24/2015 3:26 PM
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Q3 Was the OSCE well organised overall?

Answered: 17 Skipped: 0

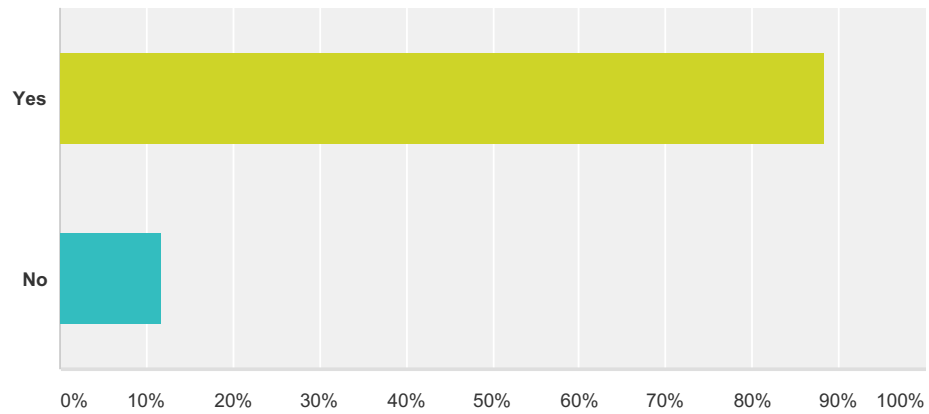


Answer Choices	Responses
Yes	82.35% 14
No	17.65% 3
Total	17

#	Comments	Date
1	Instructions mentioned that candidates were able to bring their own equipment, however I found in some stations that there was no place to put my lens kit due to limited space, and had to use the lens kit provided rather than my own equipment which I was familiar with. In the future it would be appreciated if this could be taken into account, and space be generated for candidate to place their own equipment if they want to use their own kit.	8/6/2015 12:51 AM
2	late start, delayed by more than 30 mins with no one informing candidates at the site that there was a delay and how long it would be	8/2/2015 6:06 PM
3	There are two things I would like to point out. 1- The lens sets that were provided in exam were different in different rooms making it more confusing to the candidates. Specially when we are running against time it is easy to pick a wrong lens what we actually have in mind. I recommend a standard lens set that should be exactly the same in each room. 2- It really annoyed me that in almost all rooms the VA charts were also different. One roomshad 6/6 chart, one had 20/20 and other had logMar. All had different remote controls with different coverstion charts. Some had charts hanged over the wall and some had pasted on the remote it self. I recommend providing a simple VA chart that would be common to all rooms. Although enough time was given for us to get ourself use to these sort of things, i would have felt more comfortable if we had more standard tools to use.	7/27/2015 11:09 PM
4	Dirty lenses!!! Some broken holders of sphere lenses, therefore confusion with cylinders! Patient's chairs not allowed to be put up or down by some examiners, some examiners didn't even know how to put it up or down Occluders with pin holes leavers not available (in contrary to the exam at Moorfields) ! No buzzer/bleep/timer announcing the start and the end of the exam - not equal conditions to everyone! Focimeter station - no cross available to check quickly for prisms/spheres Not allowed to put just one by one line on a reading chart by the examiner, therefore patients sometimes reading from the top again and again No space to put our belongings - everything was put on a floor, no hangers	7/27/2015 9:56 PM
5	Generally well organised but the fact that they used the decimal system for the visual acuity and then asked us to convert it into Snellen put more pressure on in what was already a very time pressured exam. This is a fairly easy thing to do but when you're harassed and stressed, easy mistakes creep in, and it's a shame to fail an exam for a simple conversion error that you only made because someone's shouting out "time's up!", not because of lack of ability or preparation!	7/26/2015 1:43 PM
6	Each station used a different scale of visual acuity which was confusing and unsettling. The candidate guide said that either logmar or snellen only would be used. However there were 4 different scales used which is inappropriate.	7/24/2015 5:42 PM
7	Running slightly late, but practical exam with patients so to be expected	7/24/2015 5:07 PM

Q4 Were you given clear instructions about the OSCE?

Answered: 17 Skipped: 0

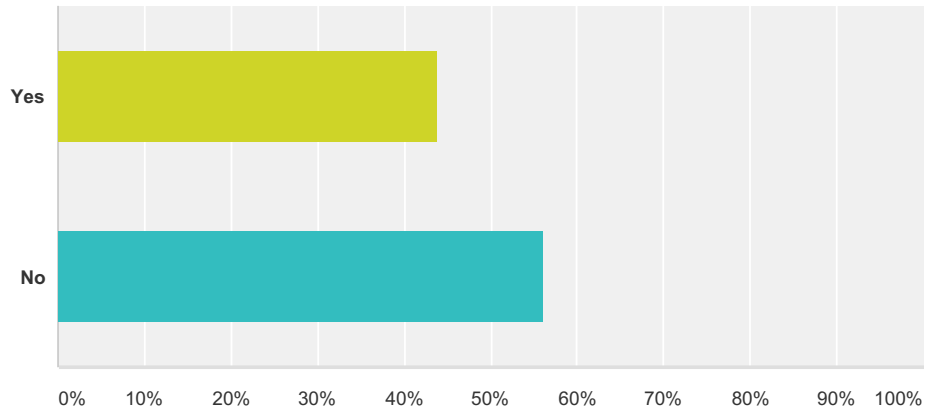


Answer Choices	Responses
Yes	88.24% 15
No	11.76% 2
Total	17

#	Comments	Date
1	Except about hand washing (see below).	8/6/2015 12:51 AM
2	was not clear that examiners would not be aware of timing in exam station	8/2/2015 6:06 PM
3	As above, the guidance said only logmar or snellen scales would be used to assess visual acuity, this was untrue and misleading.	7/24/2015 5:42 PM
4	Not in all stations	7/24/2015 3:26 PM

Q5 Did you feel that the OSCE was a fair assessment of your knowledge?

Answered: 16 Skipped: 1

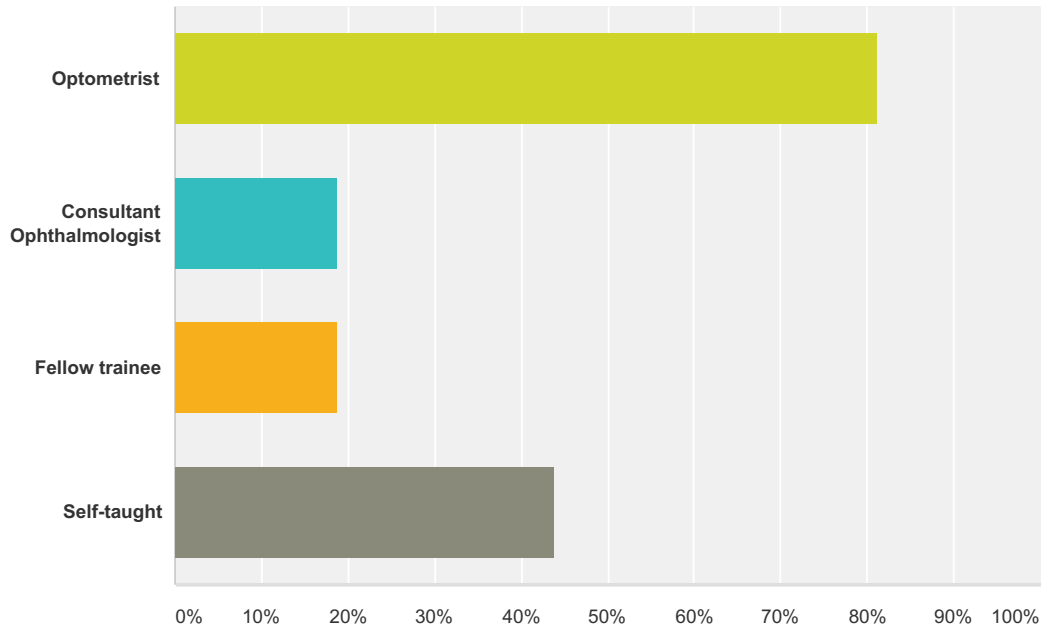


Answer Choices	Responses
Yes	43.75% 7
No	56.25% 9
Total	16

#	Comments	Date
1	Non cyclo ret patient the examiner was supposed to give information prior to starting the station. Information was not given-examiner wrote the unaided visual acuity on the back of the answer sheet! Under exam conditions would you expect the candidate to flip over the answer sheet? Also examiner did not prompt to give the relevant information	8/5/2015 12:44 PM
2	No. Combining the subjective refinement of sphere and binocular balance stations without a warning when it is time to switch over meant that I completely missed out the binocular balance station. I was therefore not able to demonstrate my knowledge of that station purely due to time management rather than a lack of knowledge which I think is unfair. The requirement to convert between different visual acuity chart types, operate complex remote controls and use a European decimal format that I am not used to also adds unnecessary pressure to the OSCE.	8/2/2015 9:12 PM
3	doesn't adequately allow demonstration of proper understanding of techniques	8/2/2015 6:06 PM
4	Require more time to familiarise to the focimeter should be given as they vary widely between centres	7/30/2015 9:52 AM
5	Some of the patients not appropriate for the exam, some equipment not prepared/available and not in a good condition	7/27/2015 9:56 PM
6	As said above, I completed lots of full refractions under time pressure, with high accuracy, for practice, but in the exam I felt it in no way reflected my ability to refract, instead you had to have a special technique for the exam that was based on hurrying through, demonstrating certain skills quickly, and not actually optimising the patient's refraction.	7/26/2015 1:43 PM
7	Difficult to say	7/24/2015 5:21 PM
8	Yes, apart from this double station of the non cycloplegic ret	7/24/2015 3:26 PM

Q6 Who helped you to develop competence in refraction? (Please select the answer as appropriate)

Answered: 16 Skipped: 1



Answer Choices	Responses
Optometrist	81.25% 13
Consultant Ophthalmologist	18.75% 3
Fellow trainee	18.75% 3
Self-taught	43.75% 7
Total Respondents: 16	

#	Other (please specify)	Date
1	refraction course	8/2/2015 6:06 PM
2	Attend a course	7/24/2015 5:21 PM

Q7 Approximately how many complete refractions (retinoscopy + subjective modification) did you carry out in your preparation for the examination?

Answered: 17 Skipped: 0

#	Responses	Date
1	70	8/10/2015 9:04 PM
2	Approximately 50	8/6/2015 12:51 AM
3	30	8/5/2015 12:44 PM
4	Retinoscopy on ~140 eyes Subj modification on ~70 eyes	8/2/2015 9:12 PM
5	60	8/2/2015 6:06 PM
6	50	7/30/2015 9:52 AM
7	50	7/28/2015 3:50 PM
8	Appx 50	7/27/2015 11:09 PM
9	75	7/27/2015 9:56 PM
10	15	7/27/2015 3:14 PM
11	60-80	7/26/2015 1:43 PM
12	100	7/25/2015 12:18 AM
13	40	7/24/2015 5:42 PM
14	More than 50	7/24/2015 5:21 PM
15	25	7/24/2015 5:07 PM
16	70	7/24/2015 3:31 PM
17	around 50	7/24/2015 3:26 PM

Q8 Please provide any other advice that you would like to share with future candidates.

Answered: 10 Skipped: 7

#	Responses	Date
1	Practise on patients which are challenging to refract, such as non-cycloplegic and high myopia, patients with atigmatism.	8/6/2015 12:51 AM
2	Practice all the stations under timed conditions.	8/2/2015 9:12 PM
3	examine within the time limit in the clinic	7/28/2015 3:50 PM
4	Pratice is the key to able to perform smooth retinoscopy. Practice more on real patients than your own colleague or other AHP.	7/27/2015 11:09 PM
5	Bring all your equipment with you, even a cloth for cleaning the lenses Don't expect to see common refraction patients, expect to see tricky patients and expect to be able to assess them in inappropriate conditions	7/27/2015 9:56 PM
6	Attend a good course then spend a week in an optometry practice. I attended the Cardiff 3-day course then spent the week before the exam with a highstreet optometrist.	7/27/2015 3:14 PM
7	The timing is extremely tight. Bring your own watch as they will not tell you when you're halfway through in a 10 minute station. Spend at least the last minute writing down your answers because you'll be really annoyed if you make a stupid error under pressure, having refracted correctly.	7/26/2015 1:43 PM
8	Practice with time because the five minute stations seems like 1 minute during exam.	7/25/2015 12:18 AM
9	Practical exam needs more and more practice	7/24/2015 5:21 PM
10	I'll wait to see if I pass before passing on any helpful advice.	7/24/2015 5:07 PM

Q9 Please write any other comments you have about the Refraction Certificate Exam below.

Answered: 7 Skipped: 10

#	Responses	Date
1	I asked about hand washing before going into the exam, and I was told this was not to be worried about, yet in one of my stations I was subtly encouraged to use the alcohol gel inbetween retinoscopy of each eye. Would have been better if this was clarified at the beginning of the exam, as I felt that I had made a significant error and it was very off putting in the station.	8/6/2015 12:51 AM
2	some stations that had trial frames fitted, didn't have it on the patient and candidate had to wait until time started to fit trial frame for patient. Varied depending on examiner.	8/2/2015 6:06 PM
3	N/A	7/27/2015 11:09 PM
4	Honestly enourmously disappointed by the quality of this Royal College exam.	7/27/2015 9:56 PM
5	the examiners should always give a correct guide during exam.	7/25/2015 12:18 AM
6	Inform the candidate about the range of refraction and axis which could be consider as correct	7/24/2015 5:21 PM
7	I felt that in one or two instances the examiners didn't understand what I was doing, and felt that if an optometrist were examining then they would have understood what I was doing if it's not just the standard textbook approach.	7/24/2015 5:07 PM