

# Examination Report

## October 2014 Part 1 FRCOphth Examination



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## Summary

The twenty-fifth Part 1 FRCOphth examination took place on 6 October 2014. An unprecedented 232 candidates sat the examination, of whom 102 (44%) fulfilled the criteria required to pass the examination overall. The pass rate is average for the examination, and the same as the last October examination.

Both parts of the examination had a high reliability ( $>0.90$ ) and had an acceptable correlation (0.76).

The pass rate in the MCQ paper increased from the last sitting to 62%. The quality of the MCQ paper continues to improve and this paper had the best statistics for item discrimination (63% were good discriminators) since the examination was introduced. The Part 1 FRCOphth Sub-Committee and Senior Examiner should be congratulated for their efforts in producing a paper of such high quality.

The pass rate in the CRQ paper was lower than at the last sitting (38%). Double marking 232 scripts represents a considerable challenge for the sub-committee. An initial review of the variance in marking between examiners prompted the remarking of a relatively small number of scripts (question 12) by the Senior Examiner. The standard concordance analysis carried out before the release of the pass list did not lead to any further remarking.

There were no statistically significant differences in the success rates of candidates based upon their country of qualification, or first language. Candidates in OST performed better than those were not in UK training posts. A large number of foundation trainees sat the examination. There was also a statistically significant difference in the performance of candidates based upon gender and ethnicity. The pass rate for male candidates was greater than females (53% and 34%) and for white candidates compared to non-white candidates (56% and 39%). It is important to note that there are more white candidates in training and non-white candidates who are not in training.

Mr Michael Nelson BSc (Hons) FRCOphth MAEd  
**Education Adviser**

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## MCQ examination

**Content Table 1**

Topic	May 2012	Oct 2012	Jan 2013	May 2013	Oct 2013	Jan 2014	May 2014	Oct 2014
Anatomy/embryology	23	24	25	24	24	24	24	24
Optics	24	24	25	24	24	24	23	24
Pathology	23	23	24	23	23	23	23	23
Pharmacology & genetics	18	18	20	18	18	18	18	18
Physiology	23	23	20	23	23	23	23	23
Miscellaneous & investigations	8	8	5	8	8	8	8	8
<b>Total</b>	<b>119</b>	<b>117</b>	<b>119</b>	<b>120</b>	<b>120</b>	<b>120</b>	<b>119</b>	<b>120</b>

## MCQ paper statistics

Mean score:	72/120	60%
Median score:	73/120	61%
Standard deviation:	15.4	12.8%
Candidates:	232	
KR20: (measurement of reliability)	0.9	
Standard error of measurement (SEM):	4.8	
Range of marks:	28-105	22%-88%
<b>Pass mark derived from Standard Setting:</b>	<b>69/120</b>	<b>58%</b>
Pass mark – 1 SEM	64/120	53%
Pass rate:	144/232	62%

**Distribution of results Table 2**

Range of scores	Distribution	Number
1-30	/	1
31-40	////	4
41-50	//////////	17
51-60	//////////	29
61-70	//////////	50
71-80	//////////	56
81-90	//////////	53
91-100	//////////	18
101-120	////	4
<b>Total</b>		<b>232</b>

## Quality of questions

The Speedwell data allows us to identify easy, moderate and difficult questions, and those, which are good, poor or perverse (negative) discriminators. Ideally all questions should be moderate and good.

**Table 3**

	Negative		Poor		Good			
	< 0		0- 0.249		>0.250			
	Number	%	Number	%	Number	%	Total	%
Difficult Facility<25%	1	0.8	2	1.7	0	0	3	2.5
Moderate Facility 25- 75%	4	3.3	28	23.3	62	51.7	94	78.3
Easy Facility >75%	0	0	10	8.3	13	10.8	23	19.2
<b>Total</b>	<b>5</b>	<b>4.2</b>	<b>40</b>	<b>33.3</b>	<b>75</b>	<b>62.5</b>	<b>120</b>	<b>100</b>

## Standard setting

The pass mark for the paper was agreed using the Ebel method.

**Table 4**

	Difficult	Moderate	Easy	Total
Essential	0	24	26	50
Important	2	33	25	60
Supplementary	2	5	3	110
<b>Total</b>	<b>4</b>	<b>62</b>	<b>54</b>	<b>120</b>

The Part 1 FRCOphth Sub-Committee considered the success of a minimally competent candidate in each category as below:

**Table 5**

	Difficult	Moderate	Easy	
Essential	0.55	0.65	0.75	
Important	0.45	0.5	0.55	
Supplementary	0.25	0.25	0.25	

**Table 6**

	Difficult	Moderate	Easy	Total
Essential	0	15.6	19.5	35.1
Important	0.9	16.5	13.75	31.15
Supplementary	0.5	1.25	0.75	66.25
<b>TOTAL</b>	<b>1.4</b>	<b>33.35</b>	<b>34</b>	<b>68.75</b>

**The MCQ pass mark = 69/120      57%**

**Comparison of pass marks and rates for last 7 MCQ papers****Table 7**

	Oct 12	Jan 13	May 13	Oct 13	Jan 14	May 14	Oct 14
Candidates	150	91	102	151	77	119	232
Mean score	70	67	69	72	73	67	72
Reliability (KR 20)	0.87	0.87	0.88	0.9	0.9	0.9	0.9
SEM	4.9	4.9	4.9	4	4.7	4.8	4.8
Standard setting	Ebel	Ebel	Ebel	Ebel	Ebel	Ebel	Ebel
Pass mark	66 (56%)	67 (56%)	69 (58%)	70 (58%)	68 (57%)	69 (58%)	69 (58%)
33% discrimination							
Negative	2	7	5	3	10	4	5
Poor (0-0.249)	51	47	48	48	59	43	40
Good (>0.250)	64	65	67	69	51	72	75
Facility							
Difficult (<25%)	2	8	5	2	12	6	3
Moderate	92	87	85	92	70	82	94
Easy (>75%)	23	24	30	26	38	31	23
Questions	117	119	120	120	120	119	120
Pass number (rate)	95 (63%)	46 (51%)	51 (50%)	88 (58%)	55 (71%)	54 (45%)	144 (62%)

**The CRQ paper****Table 8**

Question	Subject	Topic	Sub-sections	Data provided
1	Anatomy	Embryology of eye	3	Drawing to label
2	Pathology	Cystic lid lesion	4	Histopathology
3	Pathology	Acanthamoeba	5	Histopathology
4	Optics	Maddox rod	6	Photograph of instrument
5	Optics	Spectacle lens	5	Focimetry diagram
6	Optics	Spectacle lenses	6	None
7	Optics*	Microscope	5	None
8	Investigations	Blood tests	4	Full blood count
9	Investigations	OVT	8	OCT
10	Investigations	Amsler chart	6	Amsler chart
11	Investigations	Biometry	7	IOL master chart
12	Evidence based medicine	Test interpretation	5	Article abstract

\* Candidates are expected to draw a diagram as part of the answer

## Statistics

Mean score:	60.5/120	50%
Median score:	62.5/120	52%
Standard deviation:	17.8	14.8%
Range of scores:	0 – 93	0%-84%
Reliability: Cronbach alpha	0.94	
Standard error of measurement:	4.3	
Pass mark derived from Standard Setting:	68/120	57%
Pass mark – 1 SEM	64/120	53%
Pass rate	87/231*	38%

\* 1 candidate did not attend sit the CRQ paper

**Distribution of scores Table 9**

Range of marks	Distribution	Number
0-30	//// //	16
31-40	//// //	14
41-50	//// //	29
51-60	//// //	51
61-70	//// //	46
71-80	//// //	49
81-90	//// //	24
91-100	//	2
101-120		0
Total		231

Two examiners marked each question in the CRQ papers and the average mark from each was used to produce the candidate mark. Each question has maximum possible 10 marks. Candidate performance was variable for each question, with mean, median, minimum and maximum scores (with standard deviations) of:

**Table 10 Results for each question**

Q	Subject	Mean	Median	Min	Max	SD
1	Anatomy	4.8	5	0	10	2.49
2	Pathology	4.4	4.5	0	10	2.29
3	Pathology	5.4	5.5	0	10	2.07
4	Optics	4.1	4	0	9	2.23
5	Optics	4.2	4.5	0	9	2.17
6	Optics	6.3	7	0	9.5	2.38
7	Optics	4.3	4.5	0	9	2.56
8	Investigations	6.6	7	0	10	1.80
9	Investigations	4.0	4	0	8	1.66
10	Investigations	5.9	6	0	10	2.17
11	Investigations	4.9	5.5	0	9.5	2.47
12	Genetics	5.1	5	0	9	2.15
	Total	60.3	32	0	93	17.87

Candidates performed badly in or were particularly ill prepared for questions 2 (pathology), 4, 5 and 7 (optics), and 9 (investigations).

33% Item discrimination (ID) and facility (F) for each question and examiner:

**Table 11 Item discrimination and facility for each question and examiner**

Q	Subject	33% ID Examiner B	F examiner B		33% ID examiner A	F examiner A	
1	Anatomy	675	43		623	60	
2	Pathology	688	48		662	51	
3	Pathology	532	67		481	66	
4	Optics	532	26		649	35	
5	Optics	519	43		597	55	
6	Optics	727	71		740	55	
7	Optics	584	41		571	35	
8	Investigations	273	78		364	57	
9	Investigations	519	65		455	44	
10	Investigations	571	65		545	45	
11	Investigations	584	34		857	60	
12	Genetics	455	58		390	63	

Questions 1 (anatomy), 2 (pathology), 6 (optics) were better able to discriminate between the poor and good candidates based upon their performance in the CRQ overall. Question 8 (investigations) was relatively poor at discriminating between the poor and good candidates.

### Standard setting

The borderline candidate method was used to identify the pass mark for the CRQ. The examiners who marked the CRQ paper were asked to allocate a mark according to the marking scheme provided and, in addition, class the candidate's performance as a pass, fail or borderline. The sum of each median borderline mark was used to produce the pass mark:

**Table 12 Standard setting by each examiner**

	Topic	Examiners B				Examiners A			
		No. Fail	No. Border	No. Pass	Median Border	No. Fail	No. Border	No. Pass	Median Border
1	Anatomy	124	64	43	6	97	41	93	5
2	Pathology	121	44	66	5	115	39	77	5
3	Pathology	79	43	109	5	97	29	105	5
4	Optics	171	36	24	6	145	56	30	6
5	Optics	117	71	43	5	111	55	65	5
6	Optics	70	51	110	6	83	48	100	7
7	Optics	126	59	46	6	137	37	57	6
8	Investigations	24	56	151	6	75	78	78	7
9	Investigations	98	66	67	4	120	63	48	5
10	Investigations	63	118	50	6	90	93	48	7
11	Investigations	157	35	39	7	94	74	63	5
12	Genetics	83	57	91	5	72	65	94	5
Total									

**Table 13 Comparison between examiners**

Q	Subject	Mean mark examiner B	Mean mark examiner A	Mean absolute difference	t test of difference	Correlation between marks	Correlation between global judgements
1	Anatomy	4.8	4.9	0.5	0.114	0.95	0.76
2	Pathology	4.3	4.4	0.7	0.018	0.89	0.72
3	Pathology	5.5	5.4	0.7	0.002	0.89	0.80
4	Optics	3.8	4.4	0.7	0.000	0.91	0.78
5	Optics	4.0	4.4	1.0	0.000	0.84	0.70
6	Optics	6.3	6.3	0.4	0.201	0.96	0.70
7	Optics	4.4	4.1	1.0	0.000	0.89	0.72
8	Investigations	6.8	6.5	0.6	0.000	0.88	0.63
9	Investigations	4.0	4.0	0.6	0.943	0.86	0.50
10	Investigations	5.8	6.0	0.5	0.003	0.94	0.70
11	Investigations	5.2	4.7	0.6	0.000	0.94	0.67
12	Genetics	5.0	5.1	1.3	0.120	0.74	0.63

**Comparison to previous years Table 14**

	Oct 12	Jan 13	May 13	Oct 13	Jan 14	May 14	Oct 14
Mean score	52%	50%	57%	52%	47%	53%	50%
Median score	54%	52%	60%	54%	47%	55%	52%
Reliability	0.93	0.93	0.93	0.93	0.9	0.93	0.94
SEM	4.5	5	5	4.6	4.2	4.9	4.3
Pass mark	54%	53%	58%	60%	57%	56%	57%
Pass rate	52%	48%	54%	36%	25%	48%	38%
Correlation with MCQ	0.78	0.79	0.72	0.84	0.79	0.78	0.76

The correlation between the two parts of the examination is acceptable at 0.76



## Overall Results

To pass the Part 1 FRCOphth examination candidates are required to:

1. Obtain a combined mark from both papers that equals or exceeds the combined pass marks obtained by the standard setting exercise explained above.
2. Obtain a mark in both papers that equals or exceeds the pass mark minus 1 standard error of measurement for each paper.

A candidate is therefore allowed to compensate a poor performance in one paper by a very good performance in the other paper. They cannot compensate for an extremely poor performance in one paper whatever the combined mark.

The minimum mark required in order to meet standard 1 above for this examination was 137/240 (57%). The minimum mark required in each paper (to meet standard 2 above) was 64/120 in the MCQ paper and 64/120 in the CRQ paper.

119 candidates (51%) gained a total mark that met standard 1 above but 17 candidates failed to obtain the minimum mark required in the one of the papers and therefore failed the examination overall. Two candidates failed to score 64 in the MCQ paper and 15 failed to score 64 in the CRQ paper.

**102/232 (44%) candidates passed the examination.**

**Distribution of scores Table 15**

Range of marks	Distribution	Number
<60	///// //	7
61-70	//	2
71-80	///// ////	9
81-90	///// ///	8
91-100	///// ////	10
101-110	///// //// ////	15
111-120	///// //// //// //// //// //	26
121-130	///// //// //// //// //	21
131-140	///// //// //// // //// //// ////	29
141-150	///// //// //// //// //// //// //// //// //	37
151-160	///// //// //// //// //// //// //	28
161-170	///// //// //// ////	20
171-180	///// //	8
181-190	///// //// //	12
191-200		0
Total		232

Mean 132/240 (55%)

Median 137/240 (57%)

Range (38) 41 – 188 (17%-78%)

Comparison to previous years: **Table 16**

Examination	Candidates	Passed examination	% Passed	MCQ pass mark %	CRQ pass mark %
<b>Oct 2006</b>	33	3	9	58	62
<b>Jan 2007</b>	24	4	16	60	43
<b>May 2007</b>	32	5	15	50	64
<b>Oct 2007</b>	56	13	23	51	59
<b>Jan 2008</b>	73	27	37	56	55
<b>May 2008</b>	66	16	24	57	48
<b>Oct 2008</b>	88	45	51	58	51
<b>Jan 2009</b>	79	37	47	61	57
<b>July 2009</b>	49	33	67	63	58
<b>Oct 2009</b>	101	56	56	62	56
<b>Jan 2010</b>	50	20	40	63	58
<b>May 2010</b>	79	31	39	60	57
<b>Oct 2010</b>	89	34	38	61	54
<b>Jan 2011</b>	62	23	37	59	58
<b>May 2011</b>	95	47	49	54	57
<b>Oct 2011</b>	122	63	52	56	56
<b>Jan 2012</b>	66	20	33	57	54
<b>May 2012</b>	104	53	51	56	58
<b>Oct 2012</b>	150	84	56	56	54
<b>Jan 2013</b>	91	47	52	57	53
<b>May 2013</b>	102	54	53	58	58
<b>Oct 2013</b>	151	65	43	58	60
<b>Jan 2014</b>	77	23	30	57	57
<b>May 2014</b>	119	55	46	58	56
<b>Oct 2014</b>	232	102	44	58	57

**Cumulative totals**

Sitting	Candidates	Number passed	Pass rate (%)
January	522	201	39
May	597	261	44
October	989	479	48
All examinations	2108	941	45

**Breakdown of results by training number (%) Table 17**

	<b>Failed</b>	<b>Passed</b>	<b>Total</b>
In OST	18 (40%)	27 (60%)	45
Not in OST	86 (62%)	53 (38%)	139
Foundation	26 (54%)	22 (46%)	48
Total	130 (56%)	102 (44%)	232

These differences are statistically significant (Chi square 9.51, p=0.0086)

**Breakdown of results by deanery Table 18**

Deanery	<b>Failed</b>	<b>Passed</b>	<b>Total</b>
East Midlands	2	1	3
East of England	1	2	3
East of Scotland	0	0	0
KSS	0	0	0
London	4	4	8
Mersey	4	2	6
N Ireland	0	0	0
North of Scotland	0	0	0
North Western	0	3	3
Northern	0	0	0
Oxford	0	0	0
Peninsula	1	1	2
Severn	0	0	0
South East of Scotland	0	2	2
Wales	2	1	3
Wessex	0	1	1
West Midlands	0	3	3
West of Scotland	3	2	5
Yorkshire	1	5	6
Total	18	27	45

**Breakdown of results by stage of training Table 19**

<b>Stage (includes FTSTA)</b>	<b>Failed</b>	<b>Passed</b>	<b>Total</b>
Foundation yr 2	26	22	48
ST1 (LAT or LAS)	11 (5)	13 (1)	24
ST2	7	10	17
ST3	0	2 (1)	2
Total in OST	18	25*	43

\*Stage of training unknown in 2 candidates

**Breakdown of results by gender Table 20**

	Failed	Passed *	Total
Female	75 (66%)	38 (34%)	113
Male	55 (47%)	63 (53%)	118
Total	130	101	231

\*Gender not declared by 1 candidate.

These differences are statistically significant (Chi square 8.38, p=0.0038)

**Breakdown of results by country of qualification Table 21**

	Failed	Passed	Total
UK	77	56	133
Outside UK	53	46	99
Total	130	102	232

These differences are not statistically significant (Chi square 0.28, p=0.60)

**Breakdown of results by declared ethnicity Table 22**

Ethnicity	Failed	Passed	Total
White	31 (44%)	39 (56%)	70
Non-white	80 (61%)	51 (39%)	131
Total	111	90	201

Ethnicity not declared by 31 candidates

These differences are statistically significant (Chi square 4.54, p=0.033)

It is important to note that ethnicity is not evenly distributed across all groups of candidates (trainees and non-trainees) which may explain this difference.

**Breakdown of ethnicity of candidates in OST and not in OST excluding FY2 Table 23**

	White	Non-white	Total
OST	24	17	41
Not in OST (excluding FY2)	33	84	117
Total	57	101	158

These differences are statistically significant (Chi square 12.78, p=0.0004)

**Breakdown of results by first language Table 24**

	Failed	Passed	Total
English	77	66	143
Other	36	26	62
Total	113	92	205

First language not declared by 27 candidates

These differences are not statistically significant (Chi square 0.16, p=0.69)

**Breakdown of results by number of attempts      Table 25**

Attempts	Failed	Passed	Total
1 (First)	94	80	174
2	23	13	36
3	6	6	12
4	4	1	5
5	1	1	2
6	1	0	1
7	0	1	1
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	1	0	1
Any resit	36	22	58
Total	130	102	232

## Appendix 1 Overall results for each deanery

Result data by deanery has been available since October 2010. The summary results for each deanery are listed below:

Deanery	Number of candidates	Pass rate (%)
East of Scotland	5	100
Yorkshire	40	73
Severn	10	70
North of Scotland	6	67
Oxford	9	67
South East of Scotland	17	65
North Western	16	63
KSS	20	60
Northern	20	60
East Midlands	22	59
London	81	55
West Midlands	53	51
East of England	26	50
Wales	26	50
Wessex	39	46
West of Scotland	34	44
Peninsula	13	38
Mersey	30	37
N Ireland	19	37
Total	486	55

## Appendix 2 Hofstee pass mark

The Hofstee technique is an alternative method of standard setting, which is employed in addition to the Ebel and BCM. The pass mark that is generated is not used to decide the pass list, but acts as a useful way of checking the pass rate and pass mark.

The technique requires the examiners to agree a maximum and minimum acceptable pass marks and a maximum and minimum fail rates. This has not, as yet, been applied to the part 1 FRCOphth examination and the examiners values are therefore unknown. It is likely that the part 1 examiners would agree similar values to those chosen by the examiners for the part 2 written papers. These values are:

Maximum fail rate	50%
Minimum fail rate	20%
Maximum pass mark	65% (156/240)
Minimum pass mark	50% (120/240)

These values are then used to identify 2 coordinates on a plot of the fail rate against the pass mark for the examination. A line is drawn between the coordinates, which crosses the plot line. The pass mark is determined by dropping a line from the intersection to the X-axis as shown.

Using this method, the pass mark is 132/240 (55%), which is slightly lower than the pass mark identified using the Ebel and BCM standard setting techniques. If this pass mark had been used, the pass rate for the examination overall would have been 58%.

