



The ROYAL COLLEGE *of*
OPHTHALMOLOGISTS

Refraction Certificate Examination

Instructions to Candidates

The Examination

The College provides an assessment of competence in refraction, which is a requirement for trainees in specialty training in ophthalmology. The certificate must be passed in order to proceed from stage 3 to stage 4 of training.

The assessment method selected for the Refraction Certificate Examination is:

- Multi-station objective structured clinical examination (OSCE)

Preparation for the examination

This is a practical examination and candidates cannot expect to be successful if they have not had extensive practice and experience of refracting patients. It is essential, therefore, that candidates are given tuition and practise several complete refractions under the supervision of an optometrist/senior trainee/consultant.

Aims of the examination

The Refraction Certificate Examination is designed to assess the following skills from the curriculum for ophthalmic specialty training, which can be viewed in detail at: <http://curriculum.rcophth.ac.uk/>.

CA2 Assess vision

- All trainees must be able to assess visual acuity for near and distance using an appropriate method and interpret the results.
- They must be aware of and be able to interpret and apply newer methods of assessing visual acuity when they are introduced into clinical practice.
- They must be able to test colour vision using an appropriate method and interpret the results.
- They should also know the principles of the assessment of contrast sensitivity.
- They must be able to assess vision in children and in adults who have language and other barriers to communication.
- They must be able to assess vision in circumstances outside the hospital outpatient clinic environment.

PM1 To formulate and agree with the patient a management plan based upon clinical assessment and investigations, with reference to established protocols and guidelines

- All trainees must be able to formulate a management plan based upon their clinical assessment and, where appropriate, the results of relevant investigations. The management plan must acknowledge relevant guidelines or protocols and justify when these have not been followed.
- They must be able to recognise when their management plan involves a level of expertise that is beyond their own competence.

PM14 To use spectacle lenses and prisms when indicated

- All trainees must be able to identify when a patient may benefit from the use of spectacle lenses and prisms.
- They must be able to assess the type and strength of lens or prism and provide an appropriate prescription.
- They must be able to liaise with and, where indicated, seek advice from optometrists and orthoptists.
- They must be able to advise a patient on the purpose, duration and optical effects of the prescription.

PS2 Perform a refractive assessment and provide an optical prescription

- All trainees must be able to assess a patient's refractive error.
- They must be able to assess a patient's spectacle lenses using neutralisation techniques and focimetry.
- They must be able to perform retinoscopy and an accurate subjective refraction and provide an appropriate prescription.
- They must be able to assess a patient's binocular co-operation and advise on whether this should be corrected optically.
- They must be able to perform an accurate cycloplegic refraction (especially on a child) and provide an appropriate prescription.

C1 Establish a good rapport with patients and relatives

- All trainees must be able to establish a trusting relationship with a patient, their carers and relatives.
- They must be able to recognise when there could be problems with establishing rapport and make attempts to mitigate possible effects on the clinical relationship.

C11 Keep clinical records

- All trainees must be able to keep accurate, succinct clinical records.
- They must be able to produce accurate, legible contemporaneous entries in the patient's clinical records, ensuring that all relevant information is recorded.
- They must be able to use appropriate electronic records.

BCS6 Optics and Medical Physics

- All trainees must understand and apply knowledge of optics, ultrasound and electromagnetic wavelengths relevant to ophthalmic practice.
- They must have a basic understanding of medical physics.
- They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

Required Reading

Candidates should be familiar with the following documents:

- The Ophthalmic Specialist Training Curriculum (<http://curriculum.rcophth.ac.uk>).
- The Refraction Certificate Examination Syllabus which is available in the Refraction Certificate Application Pack (www.rcophth.ac.uk/examinations).
- Good Medical Practice, GMC (http://www.gmc-uk.org/guidance/good_medical_practice.asp).

Objective Structured Clinical Examination (OSCE)

The OSCE consists of a series of strictly timed assessment 'stations', where different areas of competence are tested by examiners using an objective marking.

OSCE Stations

- Candidates will be examined on 12 OSCE stations in four rooms. Six of these stations are retinoscopy stations. Candidates will perform retinoscopy on each eye of three patients.
- One examiner will be present at each station for the duration of the cycle.
- Each OSCE station will be worth 15 marks – a total of 180 marks.
- Compositions of OSCE stations and rooms are as follows:

Room 1

Station 1: Cycloplegic Retinoscopy 1 – Patient A: First Eye
Station 2: Cycloplegic Retinoscopy 2 – Patient A: Second Eye
Station 3: Subjective Refraction: Cylinder – Patient B: One Eye, directed by examiner

Room 2

Station 4: Cycloplegic Retinoscopy 3 – Patient C: First Eye
Station 5: Cycloplegic Retinoscopy 4 – Patient C: Second Eye
Station 6: Lens Neutralisation with or without a focimeter

Room 3

Station 7: Non-Cycloplegic Retinoscopy 1 – Patient D: First Eye
Station 8: Non-Cycloplegic Retinoscopy 2 – Patient D: Second Eye
Station 9: Visual Acuity and Trial Frame Fitting – Patient E

Room 4

Station 10: Subjective Refraction: Sphere – Patient F: Both Eyes
Station 11: Binocular Balancing – Patient F: Both Eyes
Station 12: Near Addition: – Patient G

Timetable

An example of the timetable for a cycle of the examination is set out below:

	Room 1	room 2	room 3	Room 4
	Stations 1, 2 &3	Stations 4, 5 &6	Stations 7, 8 & 9	Stations 10,11 &12
5 MINUTE CANDIDATE ORIENTATION				
18 MINS	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>Candidate 3</i>	<i>Candidate 4</i>
7 MINUTE MARKING INTERVAL				
5 MINUTE CANDIDATE ORIENTATION				
18 MINS	<i>Candidate 4</i>	<i>Candidate 1</i>	<i>Candidate 2</i>	<i>Candidate 3</i>
7 MINUTE MARKING INTERVAL				
5 MINUTE CANDIDATE ORIENTATION				
18 MINS	<i>Candidate 3</i>	<i>Candidate 4</i>	<i>Candidate 1</i>	<i>Candidate 2</i>
7 MINUTE MARKING INTERVAL				
5 MINUTE CANDIDATE ORIENTATION				
18 MINS	<i>Candidate 2</i>	<i>Candidate 3</i>	<i>Candidate 4</i>	<i>Candidate 1</i>
7 MINUTE MARKING INTERVAL				

- At each station, the examiner will remind the candidate of the time available and the signals used to indicate the timing.
- The timing of the station will be strictly adhered to. The examiner will not keep time or provide timing prompts for candidates.
- Candidates must complete their answer sheets within the allotted time.

Mark Allocation

- 12 marksheets in total will be completed by each candidate i.e. one mark (Answer) sheet per OSCE station, 12 stations.
- For each station, each mark counts towards the final overall score.
- There are 15 marks for each OSCE.
- The maximum total score for the examination is 180.

- For all candidates (whether they pass or fail) notes will be made on a separate feedback sheet so that constructive feedback can be forwarded to the candidate. Please be aware that examiners comments may not ultimately reflect the marks obtained for refractive answers e.g. retinoscopy results.

Standard Setting for the OSCE

The pass mark for each sitting of the Refraction Certificate will be calculated using the Hofstee Method.

Overall Result

To pass the Refraction Certificate examination, candidates must achieve a score that exceeds the numerical pass mark.

Candidates who failed the examination will need re-sit the entire examination, even if a pass was previously achieved in any station.

Notification of Results

The results of the examination will be released four weeks after the final day of examinations.

Final results will be sent to candidates by first class post and the pass list will be displayed on the College website. Examiners and candidates are not permitted to telephone the College for examination results.

Counselling

The College places great importance on providing guidance to those candidates whose performance failed to meet the standard to pass the examination. For the OSCE, examiners are asked to provide notes to assist in this process, particularly if there is concern regarding a candidate's conduct during the examination (e.g. if the clinical method of the candidate was rough or caused patient discomfort).

All candidates will receive details of their performance for formative purposes.

Appeals

A copy of the College's Appeals Procedure is available from the Examinations Department. The sole grounds for appeal are:

- There is evidence of a procedural irregularity in the conduct or content of the Examination or Assessment (including administrative error) which has adversely affected the candidate's performance

OR

- There were exceptional circumstances, such as illness or some other extenuating circumstance, which adversely affected the candidate's performance in the Examination or Assessment and were not revealed for valid reasons prior to receipt of the result. The candidate's request for consideration must be supported by documentary evidence which is acceptable to the Chairman of the Examinations Committee in the first instance and then to the Appeal Panel.

Please note, appeals will not be accepted on the grounds that a candidate considers his/her effort were under-marked, that the candidate did not understand or was unaware of the Examination or Assessment Regulations or because the candidate seeks to question professional or academic judgment.

Structure of the OSCE

- Candidates will be rotated through each of the four rooms during the examination, possibly starting in room 1, 2, 3 or 4. The Examinations Staff will direct each candidate to their starting station.
- Before entering each room, candidates will be able to review the relevant answer sheets for the stations in that room. The answer sheets contain detailed instructions to candidates. All 12 answer sheets can be viewed on-line in advance of the examination. (www.rcophth.ac.uk/examinations).
- On entering each room there will be up to 5 minutes for familiarisation with the room lighting, the fixation targets and lenses. (Please note that colours of lenses are not standardised; do not assume that red is positive and black is negative, though positive spheres will always be on the right). Candidates may read the patient information sheet in this time. In subjective refraction stations, the candidates can also mount lenses of their choice into the trial frame, but may not start changing them.
- Once all candidates are ready, the timekeeper will announce the start of the station.
- Double retinoscopy stations (Rooms 1, 2, & 3) - both eyes must be assessed within 10 minutes. Candidates are permitted to divide the 10 minute period between the eyes as they wish. Room 4 will start with a double OSCE lasting 10 minutes for an examination on one patient, and the candidate will be allowed to use this time flexibly.
- After double OSCEs, there will be a 3 minute change over period, followed by the final/third 5 minute OSCE station.
- At the end of the third OSCE station the candidate will leave the room and be directed to the next room where they can review the answer sheets for their next stations, while the examiners complete their marking.
- The start and finish of each station is controlled precisely by a timekeeper and clearly signalled. A one minute warning will be given before the end of each OSCE (after 9 minutes for double OSCEs and after 4 minutes for single OSCEs).
- Candidates must fully complete answer sheets for each station within the time allowed and must cease writing once the timekeeper has signalled the end of the station.
- The OSCE times will be strictly enforced and no further writing is allowed after the end of the OSCE. Please bear this in mind during your practice.
- Time is scheduled to allow for changeover and for examiners to complete the marking
- The examiner will provide written information on a "patient information sheet" which will be pinned to the wall. Unaided visual acuity and, in the subjective refraction stations, a starting refraction will be provided. Information will be given in both positive and negative cylinder formats and clearly labelled so that you may choose which format to use.
- At no stage are near and distance prescriptions written on patient information sheets.

- As in conventional practice, right eye prescriptions (in both formats) are on the left hand side of the page, and left eye prescriptions on the right hand side.

Answer (Mark) Sheets

- In each OSCE station, you will need to fill in an answer sheet, which the examiner will subsequently mark at the end of the OSCE. Please be careful to fill out this sheet correctly and in particular for the correct eye. For example, the left eye retinoscopy needs to be written on the answer sheet for the left eye.
- Do not fill in the marks on the right hand side of the sheet. This is for the examiner.
- Either a negative or positive cylinder format is acceptable, but using both formats in the same prescription is not advised.
- All dioptric powers should be written to two decimal places (e.g. +0.50 not +0.5),
- Marks will be lost for incorrect or indecipherable numbers or signs. Please take care to write positive and negative signs and numbers clearly. Paragraph C11 of the core curriculum (above) includes points about record keeping.
- A clear + or – sign should be visible.
- Do not use the degrees sign (°), because, for example, 10° can look like 100.
- In OSCE stations where a prescription is required, boxes are provided for you to write your answer. These are similar to those commonly found on prescription vouchers or GOS 18 forms. You will need to know how to fill in these boxes correctly.

	RIGHT					LEFT				
	Sphere	Cyl	Axis	Prism	Base	Sphere	Cyl	Axis	Prism	Base
Dis										
Near										

- As in conventional practice, right eye prescriptions (in both formats) are on the left hand side of the page, and left eye prescriptions on the right hand side.
- In OSCE stations where only one eye is tested, the boxes will be reduced.
- The near component can be written in prescription format (e.g. for distance prescription of +3.00 sphere, near prescription may be +5.00 sphere (i.e. add +2.00). Alternatively, write +2.00 add in the near boxes, but then it is important to write the word “add” also. The reading addition OSCE only requests that you record the near addition e.g. +2.00.

Rooms and Equipment

- The patients are seated in a room with fixation target, trial frames, lenses, reading chart and reading lights are available, where appropriate. If you cannot identify these, please ask the examiner for help during the familiarisation period.
- In the stations where you are required to subjectively assess the distance refraction, you should fog or occlude one eye appropriately.
- Trial frames will normally be the metal Oculus Universal Trial Frame as illustrated below:



- The host examination centres provide streak retinoscopes. Candidates are permitted, and strongly encouraged, to bring and use their own retinoscopes. Many prefer to use an instrument that they have been able to use in their own training. It is advisable to ensure that your retinoscope is working and is fully charged or has spare batteries.
- It is important that you are comfortable with the room set up, the lighting, how to work the fixation device, and access to the patient for the task that is set for you. If something appears to be missing, incorrect or not working, ask the examiner for help. Do this during the familiarisation period before the OSCE time starts.
- Some of the fixation charts are computer driven. The examiner may suggest that the control of the chart is handed over to the examiner so that you ask them to change the monitor for you. You can choose to operate this yourself, or ask the examiner for assistance.
- In some examination rooms, there may be limited options to adjust the lighting. If you find the lighting unsuitable, ask the examiner to help. The examiner will alter the lighting if possible, but remember that all candidates will be working in the same conditions.

Detailed advice to candidates for each OSCE station

Retinoscopy Stations:

Cycloplegic Retinoscopy 1, 2, 3 & 4 and Non Cycloplegic Retinoscopy 1 & 2

- There will be no trial frame available for one of the cycloplegic refractions (1&2),
- For cycloplegic retinoscopy 3&4, a trial frame is provided for you to use if you wish.
- It is assumed a trial frame will be used for the non-cycloplegic retinoscopy, and whilst you may choose not to use it, it must remain fitted.
- Trial frames can be pre-fitted for cycloplegic retinoscopy 3&4 and for the non-cycloplegic retinoscopy 1&2 stations, however lenses cannot be preloaded before the start of the station.

Patient information sheet:

- Unaided distance visual acuity will be available.
- There will be a separate answer sheet for each eye. Each answer sheet should be completed according to the following scheme:

Question 1 will ask you to write down your gross retinoscopy, i.e. without making any adjustment for working distance.

- You may use any positive or negative spherocylinder format for this question. A power cross format is also acceptable. Other formats will not be accepted.
- If you work with a lens equal to your working distance in a trial frame – you will need to combine the numbers (your “corrected power” and the working distance lens) to answer this question.
- Avoid duplicating your answer in multiple formats, or make it clear which format you wish the examiner to mark. If multiple possible answers are recorded the one left-most and upper-most will be the one marked.

Question 2 will ask you to write down your usual working distance and what this equates to in dioptric power. (For example a working distance of 66 cm equals +1.50 Dioptries, and one of 50cm equals +2.00 Dioptries).

Question 3 will ask you to make an appropriate adjustment from the retinoscopy result and to write a prescription, i.e. to take off your working distance.

- This is sometimes known as the “full prescription”. This should be written as a prescription, (positive or negative spherocylinder format).
- You do not need to make any adjustment if the room is 3 metres rather than 6 metres. You should take off the working distance only.

Subjective Refraction: Cylinder

This section asks you to refine a cylinder.

- You will need to fit the trial frame and place the lenses in the trial frame prior to the start of the station.
- You will only have to refine the cylinder in one eye. It is important to fog or occlude the other eye. You may assume the prescription is similar to the other eye (unless told otherwise).
- You may need to alter the sphere as a result of power changes in the cylinder.

Patient Information Sheet:

- This will contain the starting prescription and the unaided visual acuity for each eye.
- This will indicate which eye is to be refracted.

Lens Neutralisation with or without a focimeter

- You will be given a pair of glasses. These may be a pair of bifocals or contain single lenses. They will not be a pair of variable focus (varifocals) glasses. They may have a prism ground in, or have a Fresnel prism stuck on.
- You will be asked to measure the prescription using a focimeter, or using lens neutralisation. You may choose which method. The focimeter will not be an automated focimeter.
- The type of focimeter will vary – but will look similar to this:



- Your final answer should be written in prescription format for both eyes, distance and near (the near can be written as an “add”) as described previously.
- You will need to write down your answer in prescription format for each eye.

Visual Acuity / Trial Frame

The purpose of this part of the exam is to demonstrate a measurement of unaided visual acuity (VA) for distance for each eye, a pin-hole visual acuity for distance for each eye, to measure the inter pupillary distance (IPD), to fit the trial frame, and to measure the back vertex distance (BVD).

- The tasks can be performed in any order.
- If you prefer to measure the IPD with a ruler, please do so (and bring a ruler).
- If you prefer to use the pin-hole in the trial frame, this is acceptable.
- For distance visual acuity you should be familiar with Snellen and logMAR nomenclature.

Subjective Refraction: Sphere/Binocular Balance

This double OSCE is about refining the sphere of both eyes. The aim is to reduce and balance any accommodation.

- The trial frame should be fitted and the lenses loaded before the start of the station. You should mount the lenses as per the patient information sheet instructions using your preferred format (positive or negative cylinder) and test the visual acuity in each eye.
- You must not alter the cylinder.
- In the first OSCE you will refine your sphere using plus and minus spheres. You must write down the refraction from that stage on the first answer sheet "Subjective Refraction: Sphere". This will be for both eyes.
- The second OSCE, "Binocular Balance" is for fine tuning your spherical component. There are several techniques in practice (e.g. duochrome, +1 blur back, binocular balance) and using one or a combination of techniques is acceptable. However, we advise at least a well recognised form of binocular balance e.g. Humphriss to achieve the best marks.
- Your final answer for each OSCE should be written in prescription format for both eyes, distance only, on the mark sheet for that OSCE.
- A final visual acuity is also required for the second station.
- There is a separate mark sheet for each OSCE.
- This is a 10 minute OSCE and you can use the time flexibly. Both OSCE mark sheets need to be completed by the end of the 10 minutes. You may alter your first marksheet (spherical refinement) once you have completed it right up until the end of the 10 minutes BUT you must not alter the result in lieu of your binocular balance results - this will be scrutinised.

Patient Information Sheet:

- This will contain information at the start of the spherical OSCE only.
- This will give the unaided visual acuity for each eye, and the starting, or “incorrect”, prescription that you will be expected to improve.

Near Addition

The aim of this OSCE is to test your ability to provide a patient with a suitable addition for reading over their distance correction

- The trial frame should be fitted and lenses pre-loaded before the start of the station.
- You will be asked to interview the patient with respect to visual activities that may require a near add.
- You should perform a near visual acuity assessment using a standard near visual acuity chart for each eye and to add in lenses over the patient’s distance prescription.
- You record your answer as simple near addition (for example “+2.50 add”).
- You are required to give appropriate advice to the patient regarding their options for near correction, the prescription you are recommending, and how best to use it.

Patient information sheet:

- This will contain the unaided distance visual acuity in each eye, the distance refraction and the near IPD.

Further Advice to Candidates: Techniques, Model Answers and Common Problems

To pass this exam it may not be sufficient to be able to refract - you will need to refract quickly and under pressure. There is no substitute for practice on different patients with differing prescriptions.

It is not possible to dictate, based on current knowledge, how many refractions or retinoscopy examinations are required in order to become proficient. The best guide from candidates is that 50 to 80 refractions is common-place, and some declare over a hundred refractions.

Some of the following advice is also given in the above instructions, but is worth repeating:

Retinoscopy

The practice of retinoscopy requires practise. It is not something you can master in a short time by reading books, this guide or by going on a course. There are numerous ways of obtaining an accurate retinoscopy result and the methods described below are not necessarily the only ones.

The descriptions below assume you are using a streak retinoscope.

The aim is to identify three numbers - the power of the two meridians and the axis of one (assuming regular astigmatism).

Fixation: In non-cycloplegic retinoscopy, particularly in young phakic patients, control of accommodation is essential. The patient is asked to fix on a distant, non-accommodative target, such as a spot light, ideally 6 metres away.

In cycloplegic retinoscopy, the patient should fix on the retinoscope light.

Alignment: Ideally the macular area should be refracted but this conflicts with the wish to avoid accommodation. Therefore once the patient is fixing on the target you need to move as close to the line of sight as possible, without obscuring it. It may be helpful to instruct the patient: "tell me if I obscure your view of the (fixation) light" and then do just that – moving back to allow re-fixation. It is helpful if you can retinoscope the patients right eye with your right eye (and use your right hand), and the left eye with your left eye/hand.

Trial frame: In non-cycloplegic retinoscopy, a trial frame can be fitted. This can also be used in a cycloplegic retinoscopy (3&4) if you choose, however some children will not allow this. In this examination no trial frame will be allowed for cycloplegic retinoscopy (1&2), although it may be used on the side to assess axis. If you are familiar with placing a lens equal to your working distance in the trial frame you may wish to practise holding the lenses as you might do with a child who will not tolerate a trial frame.

Retinoscopy reflex: This may be “against” or “with”. A “with” reflex indicates that the optical correction required to neutralise is a convex lens (or plus lens), and an “against” reflex, a concave lens (or minus lens).

Initial reflex without any lenses, indicates if the patient is myopic (more than your working distance), or hypermetropic (or weakly myopic less than your working distance).

It is also possible to get an initial impression of any astigmatism by rotating the streak. If the streak is initially placed at axis 90 and 180 then rotate to other oblique axes. Remember that cylinder axes are often not 90 or 180.

The width of the reflex tells you how near you are to an end point. This works better for hypermetropic errors: a thinner reflex suggests a higher error and as you approach the end point the width increases.

If there is no discernable reflex, or the movement cannot be identified, the likelihood is that the patient has a large refractive error. It may be helpful to put up a +/- 6.00 dioptre lens to try and identify a reflex (occasionally even +/- 10.00).

It is helpful if you can pick an initial lens that is near to the result, and this speeds up the process. This can be judged on the uncorrected VA (if known) and the initial reflex.

Neutralising lenses: At this point practices differ in two major ways:

- 1) using spheres only or spheres and cylinders and
- 2) approaching the end point using a “with” reflex or an “against” reflex.

1) Spheres/cylinders: One option is to work in spheres only, identifying the neutralisation point of the two meridians with two different spheres. The power of the astigmatism would be the difference. This has the advantage of being simple, and avoids the problem of generating odd reflexes if the neutralising cylinder is not on axis. The axis of the cylinder can be identified using the streak and sliding up the collar. This narrows the reflex and allows you to read or estimate the axis.

The advantage of using spheres and cylinders (usually in a trial frame) is that it is possible to neutralise both meridians simultaneously. It is also possible to undercorrect the cylinder power a small amount and if not on axis, this will project the streak away from the correct axis in an exaggerated fashion. This can be used to refine the axis.

Approaching the end point: This relates to how you reach the end point. In an example of a hypermetropic error with hypermetropic astigmatism, it would be intuitive to start at zero, introducing increasing positive lenses which reduce the ‘with’ reflex towards a neutralisation point, noting the axis of the remaining cylinder, and then neutralising the second meridian.

However, if the patient had a myopic error with astigmatism, it would similarly be reasonable to reverse the argument, arriving at your neutralisation point from a different direction by adding negative lenses until the ‘against’ reflex is neutralised. In theory there is little difference, however in practice the end point is more clearly defined in the former example – to put another way, it is easier to define a neutral point when the ‘with’ reflex is followed to an end point. In a myope this can be achieved by refracting through lenses initially too strong (more myopic) to induce a “with” reflex. One danger in trying to replicate this in young myopic non-cycloplegic patients is that it might encourage accommodation.

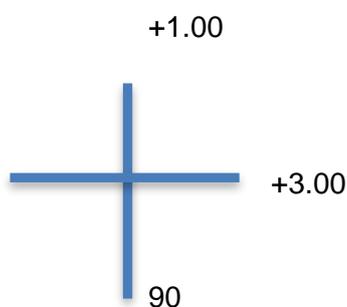
Once the readings are identified, they need to be documented clearly so that others can understand them. This is particularly important if the prescription is taken directly from a retinoscopy alone - as will happen in children and some adults.

There are three ways of doing this.

1. a power cross
2. positive cylinder format
3. negative cylinder format

A power cross is particularly useful if refraction is carried out in spheres (see above). The power cross draws out the two principal axes, and the direction can be represented by how the cross is drawn – the axis of at least one power should be documented.

Example 1



This means that when a plus +1.00 lens was held up with the streak horizontal, the power meridian is tested at 90, axis at 180, and similarly when a streak was vertical, (power meridian is now 180, axis 90) it was neutralised with a +3.00. (Note this is not the refraction as it has not been adjusted for working distance).

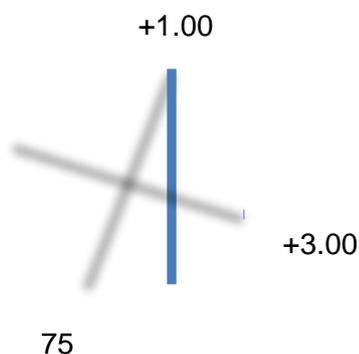
The same result (example 1) could equally be written:

In positive cylinder format +1.00/+2.00x90 or
 In negative cylinder format +3.00/-2.00x180

All three mean the same. There are three numbers present in each answer – although in the latter two the power of the cylinder has been calculated, and not in the power cross.

If the axis were oblique, a power cross would be written as below

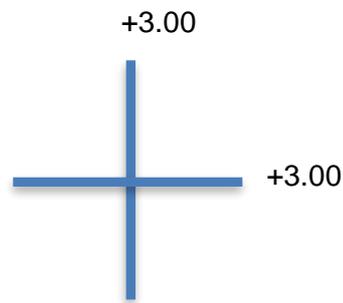
Example 2



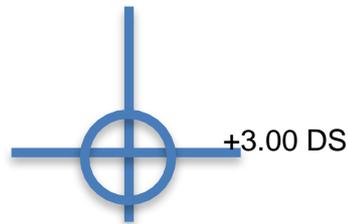
In positive cylinder format - +1.00/+2.00x75
 In negative cylinder format - +3.00/-2.00x165

Lastly the power cross can be used in the case of a sphere. Either write the same power on each power meridian such as:

Example 3



Or draw a circle around the base of the cross and write the power with a DS (for dioptre sphere)



In prescription format, a dioptre sphere can be written as either +3.00DS or sometimes the ∞ sign is used, in which case the format would read +3.00/ ∞ .

Essentially question 1 of each retinoscopy OSCE asks you to write down the retinoscopy in one of the following formats, of your choice: a power cross or in positive or negative spherocylinder format.

Some practice retinoscopy by placing their working distance (for example a +1.50 lens) in the trial frame. This value is then removed to commence the subjective refraction. This is not incorrect, but it can lead to confusion if you are unable to fit a trial frame.

If you prefer to carry out retinoscopy using your working distance in a trial frame you will have to add the value of the working distance onto the other lenses in the trial frame to reach the answer to question 1.

Please practice writing down the correct answers, in particular the retinoscopy findings, and practise taking off the working distance for the retinoscopy stations. This is commonly performed poorly.

Subjective Refraction: Cylinder

Model Technique and Answer:

You should place the lenses in the trial frame and fog/occlude the other eye, checking that either the visual acuity is indeed fogged, or by using a quick sweep of a retinoscope.

You should then check the visual acuity in the “to be tested” eye.

You need to check the axis then the power.

Ask the patient to look at a round letter on a line that they can read. Refine the axis by placing the handle of a Jackson cross cylinder in line with the axis of the cylinder and use the bracketing technique – i.e. move in 20 then 10 then 5 then 2.5 degrees steps.

If the visual acuity is poor, you need to use a 1 dioptre cross cylinder rather than a 0.5 dioptre. The power you have in the cylinder will also influence the size of the rotation steps, using smaller steps for larger powers.

On offering the cross cylinder, you ask “does the O look rounder and clearer with lens 1 (offering one direction) or lens 2 (switching the lens)?”

This technique is a common stumbling ground. You must be aware of which way to turn the cylinder.

Remember to recheck the visual acuity after every few steps.

It is also common for candidates to ask, “does the O look rounder and clearer with lens 1 (offering one direction) or lens 2 (switching the lens) or better without?” This is incorrect. The cross cylinder will make the letters look worse than the lenses in the frame – it is a comparison of the two new lenses being offered only.

Now refine the power of the cylinder – always aiming to minimise the total negative power. Place the power marks in line with the cylinder and ask “which is clearer, lens 1 (offering one direction) or lens 2 (switching the lens).”

If you increase the power more than 0.5 dioptres, you may need to correspondingly modify the spherical power by 0.25 dioptres. Make sure you move the sphere the correct way.

Be careful when using a Jackson cross cylinder that you are using the correct terminology.

Lens Neutralisation

Please practice both focimetry and lens neutralisation.

Prisms may be difficult to assess using a focimeter, particularly in particular glasses with a Fresnel prism – for which lens neutralisation is a simple method.

Please be prepared to use lens neutralisation techniques without using a focimeter.

Subjective Refraction: Sphere/Binocular Balance

You must not alter the cylinder.

Remember to fog or occlude the not being tested eye as appropriate.

We are not asking for a mean sphere. After you have refined your sphere using plus and minus spheres, you must write down the refraction (at that stage) on the first answer sheet "Subjective Refraction: Sphere". This will be for both eyes.

The second OSCE, is for fine tuning your spherical component. There are several techniques in practice (e.g. duochrome, +1 blur back, binocular balance) and using one or a combination of techniques is acceptable. However, we advise at least a well recognised form of binocular balance to achieve the best marks (see below).

You will need to write your final answer in prescription format, for both eyes, distance only, on the second mark sheet ("Binocular Balance").

This is a 10 minute OSCE and you can use the time flexibly. Both OSCE mark sheets need to be completed by the end of the 10 minutes. You may alter your first marksheet (spherical refinement) once you have completed it right up until the end of the 10 minutes BUT you must not alter the result in lieu of your binocular balance results - this will be scrutinised.

Model Technique and Answer:

You should mount the lenses as per the instructions using your preferred format (positive or negative cylinder) and test the visual acuity in each eye.

The patient is directed to look at the last line they can read. The candidate should pick one letter and ask them to study that letter.

The patient should be offered plus lenses first. If the visual acuity is less than 6/18, it is unlikely they will notice much difference with a +0.25. If the visual acuity is worse than 6/18 a 1.0 dioptre lens is used, between 6/9 and 6/18: 0.5 dioptre and better than 6/9; a +0.25 lens is offered.

You should ask "is the letter clearer *with* (placing the lens over the visual axis) *or without* (removing the lens) or about the same". The patient needs to be given a chance to decide. It may be necessary to repeat the same question with the same lens. If they respond either "with" or "about the same" – give the lens and repeat with the other +0.25. If you have changed the lens, recheck the visual acuity.

If the patient does not accept any more plus – you will need to check to see if they will accept a minus 0.25. There is a danger (in a young myope) of accepting more minus lenses than required as they may see more 'crisply'.

On offering the negative lens, you should ask "is the letter clearer, or just smaller and blacker *with* (placing the lens as before) *or without*" removing the lens. With a negative lens it is important to avoid leaving the lens up for any length of time as this will encourage accommodation and lead to a "smaller darker" but not "clearer" image that the subject may erroneously decide they prefer. You can offer the lens again if required.

Binocular Balance (including Duochrome / +1 Blur back) (Second OSCE)

The aim is to reduce and balance any accommodation. There are various techniques - the one described here is the Modified Humphriss Immediate Contrast Test (HICS) for binocular balancing. A +1.0 is placed over one eye (say the left) and a +0.25 is offered to the "being tested" eye to see if it blurs the binocular vision. If it does not, the +0.25 is given and a further +0.25 added, until you blur the vision. The +1 is then changed to the other (right) eye and a +0.25 is offered to the left eye to check it blurs the visual acuity, and repeat as for the first eye.

Duochrome: A myope should not usually be left on the green; equal green and red is acceptable, red is generally preferable. The eyes should be balanced. This test may not be suitable and does not work reliably for all patients e.g. pseudophakes.

Plus 1 blur back: The visual acuity can be blurred with a +1.0 dioptre to check for overminussing. This should blur the visual acuity to 6/12 or worse (6/12 - at best). This may be performed / combined with the HICS above.

The examiner will be marking your technique(s). Using one or a combination of techniques is acceptable but we advise at least a well recognised form of binocular balance e.g. HICS to achieve best marks.

Your final answer should be written in prescription format for both eyes, distance only on the two mark sheets. A final visual acuity is also required for the second station.

Near Addition

You will be asked to interview the patient with respect to visual activities that may require a near add. You are asked to perform a near visual acuity assessment using a standard near visual acuity chart (for each eye) and to add in lenses over the patient's distance prescription.

Model answer:

Take a brief, succinct history of near activities and establish where the patient wishes to place reading material. You need to ask about middle distance, for example use of computer screen or reading music.

You need to mount the trial lenses for their distance prescription in your preferred format – this should be done before the OSCE starts.

Don't forget to use the reading light. Switch on the reading light and offer the reading chart to the patient. Ask which line they can read comfortably.

Remember to vary distance as well as to offer at least two combinations of reading lenses.

You record your answer down as a simple near addition (for example "+2.50 add").

The near vision should be for each eye, not both eyes together. It is most unusual to prescribe different near additions for the right and left eyes.

You need to offer advice about glasses prescriptions, (separate pairs, bifocals, varifocals), depending on need. You also need to offer advice about lighting, the prescription you are recommending, and how best to use it.

Marks for question 2 (history) are not based on the summary you write on the mark sheet, they are based entirely on the examiner's observation of your consultation with the patient.