

Level 6 Certificate in Contact Lens Practice



Unit 2 – Visual Optics

Principal Examiner:

J Underwood MSc BSc (Hons) FBDO (Hons) CL (Hons) SLD
SMC(Tech) FEAOO CertEd

Winter 2022
Duration: 2 hours

Candidate Number:

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Seating Location:

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Answer **four** questions only.

Please tick below the numbers of the questions attempted:

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| 1 | <input type="checkbox"/> | 2 | <input type="checkbox"/> | 3 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | 5 | <input type="checkbox"/> |
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Number of Supplementary Sheets used (if any), including graph paper.

For office use only

| Question number | 1 | 2 | 3 | 4 | 5 | Total | | |
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| | | | | | | Overall | % | |
| Marks | | | | | | | | |
| Moderated | | | | | | | | |
| Borderline (57%-62%) | Please tick the box to acknowledge that this is a borderline result and confirm that the marks have been checked in terms of allocation and addition. | | | | | | <input type="checkbox"/> | |

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| Examiner's Signature | |
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| Moderator's Signature | |
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Question 1

- i) An eye with a spectacle refraction of +4.75DS is corrected for distance vision at a vertex distance of 15mm by a spectacle lens with the following details;

| | |
|------------------|---------|
| F_2 | -5.00DS |
| Centre thickness | 3.90mm |
| Refractive index | 1.59 |

■ **Calculate** the spectacle magnification if the entrance pupil lies 3mm behind the cornea.

(40 marks)

- ii) The same eye is now corrected for distance vision by an RGP contact lens with the following specification;

| | |
|------------------|--------|
| BOZR | 7.70mm |
| Centre thickness | 0.21mm |
| Refractive index | 1.47 |

This contact lens has a clearance of 0.10mm and the spherical corneal radius is 7.75mm.

■ **Calculate** the spectacle magnification produced by this contact lens system, if the refractive index of the tears is 1.336.

(60 marks)

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■ Calculate the spectacle magnification produced by this contact lens system, if the refractive index of the tears is 1.336. **(60 marks)**

Question 2

- i) **Explain** Drysdale's method for determining the radius of curvature of a convex or concave reflecting surface. **(20 marks)**
- ii) **Describe** the optical arrangement of the radiuscope.
 Include a clearly labelled diagram.
Include 5 statements of fact. **(25 marks)**
- iii) **State** two ways to visually identify the difference between the surface image and the aerial image. **(10 marks)**
- iv) **State** why water or saline must be placed between the lens and its holder prior to a reading being taken. **(5 marks)**
- v) **Explain** how the instrument would be modified for use with soft lenses and include any disadvantages of the method. **(20 marks)**
- vi) **State** other rigid lens parameters that can be verified using the radiuscope, including a brief description of the methods used. **(20 marks)**

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vi) State other rigid lens parameters that can be verified using the radiuscope, including a brief description of the methods used. **(20 marks)**

Question 4

A soft contact lens is to be made to the following specification:

| | |
|------------------|--------------------------------------|
| BOZR | 8.60mm |
| TD | 14.20mm |
| BVP | -3.50DS/ -1.75DC x 120 |
| Centre thickness | 0.12mm |
| Refractive index | 1.43 (hydrated) 1.56 (dehydrated) |
| Hydration factor | 27% |

Find:

- i) The surface radii (stating their relevant meridians), total diameter and centre thickness of the dehydrated lens. **(50 marks)**
- ii) The BVP of the dehydrated lens, expressed in positive sphere-cyl form. **(30 marks)**
- iii) If, in error, the BOZR in the dehydrated state is made as 6.70mm, find the error in the BVP of the finished **hydrated** lens. **(20 marks)**

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iii) If, in error, the BOZR in the dehydrated state is made as 6.70mm, find the error in the BVP of the finished **hydrated** lens. **(20 marks)**

Question 5

A toroidal cornea has anterior radii of curvature of 7.70mm along 105 and 8.20mm along 15. The posterior radii are 7.85mm along 105 and 8.35mm along 15.

- i) **Find** the total corneal astigmatism if the corneal thickness is 0.54mm and the refractive indices of the cornea and aqueous are 1.376 and 1.336 respectively.
A value and axis must be specified. **(35 marks)**
 - ii) **State** the approximate link between the amount of front and back surface corneal astigmatism. **(10 marks)**
 - iii) ■ **Calculate** the corneal astigmatism of the same eye measured by a keratometer calibrated for 1.3375.
A value and axis must be specified. **(15 marks)**
 - iv) **Comment** on the reasons for the use of 1.3375 as the keratometer refractive index. **(10 marks)**
 - v) **Discuss** the methods of classification of regular astigmatism in the eye.
You should include 8 facts, which may include diagrams. **(30 marks)**
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A value and axis must be specified. **(35 marks)**

ii) **State** the approximate link between the amount of front and back surface corneal astigmatism. **(10 marks)**

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A value and axis must be specified.

(15 marks)

- iv) ■ **Comment** on the reasons for the use of 1.3375 as the keratometer refractive index.

(10 marks)

- v) ■ **Discuss** the methods of classification of regular astigmatism in the eye.

You should include 8 facts, which may include diagrams.

(30 marks)

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Important Instructions to Candidates

Please read carefully and follow these instructions when told to do so by the Examiner/Invigilator.

1. You will be given 5 minutes at the beginning of the examination to read through the questions.
2. **Please enter your candidate number and date in the boxes on the front cover of this booklet.**
3. Please **DO NOT write your name** on the booklet. Candidates must remain anonymous for marking purposes.
4. Candidates must answer questions legibly, using blue/black ink or ball-point pen. *Pencil may be used for graphs and diagrams only.*
5. Candidates please note, the examination paper has been designed for you to answer the stated number of questions within the allotted time.
6. Candidates must read each question carefully and make sure that you know what you have to do before starting your answer.
7. Candidates must write the answer to each question in the space provided. Additional paper may be used if necessary but you must show your Candidate Number and question number(s) clearly at the top of each page.
8. Please do not write in the margins.
9. Any extra pages used should be securely fastened together using a treasury tag. This includes any diagrams, additional graph paper or any continuation paper.
10. Candidates are advised to carefully cross out any work not intended to be marked by the Examiner.
11. Please do not tear out any part of this booklet. All work must be handed in.

Important Information for Candidates

1. Answer **four** questions only.
2. Answer all parts for each question.
3. Candidates **MUST** work to at least 4 decimal places in ALL calculation questions and they will be penalised if this is not done.
4. Where relevant, the marks awarded for each part of a question are given in brackets, e.g. **(10 marks)**.
5.   These symbols indicate that a diagram/calculation is required or a diagram needs annotating.
6. This entire document consists of 24 pages. Any blank pages are indicated.

When told to do so by the Invigilator, you may turn the paper over and begin.