EXAM PREPARATION

FOR CONTACT LENS DISPENSERS

1: Basic Lens Design

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Published By:

OPTICAL TRAINING INSTITUTE
4330 Barranca Parkway
Suite 101-129
Irvine, CA 92714
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1993

General Introduction

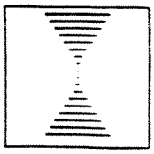
Getting The Most Out Of This Course

Welcome to the Exam Preparation Home Study Course for Contact Lens Dispensers offered by the Optical Training Institute. This course is specifically designed to help you prepare for and pass the important NCLE National Certifying Exam in Opticianry which is offered twice each year.

The course consists of six parts contained in six workbooks, and is supplemented with eight audio cassette tapes. The tapes and workbooks are designed to be used together, neither is sufficient without the other. The taped material enables the course to simulate a classroom environment. Just as a teacher would refer to items written on the "board," or from hand-out material, the tapes will refer to the content of the workbooks. Along the left hand margin of the page, the workbooks will periodically reference portions of the tapes where specific material is presented.

To get the most out of this course, when listening to the tapes for the first time, try to avoid taking notes. Simply sit back, relax, listen to the tapes, and follow along in the workbook. The workbooks are designed and organized as if excellent notes have already been taken for you. If some of the material is new or unfamiliar to you, it can be re-viewed as many times as necessary simply by replaying the tape. Of course notes may be taken on any subsequent listenings and there are pages reserved for that purpose at the end of each workbook.

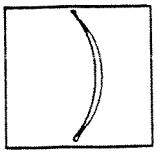
The practice tests found at the end of each workbook are based on the material just previously covered. Although they are just practice, they should be taken seriously. They should be regarded as sort of a "dress rehearsal" for the actual NCLE Certifying Exam we're preparing for. Before taking each test, be sure the material covered has been studied and understood as thoroughly as possible, and any practice exercises have been completed. Allocate at least one half hour for each test and try to arrange to take it in a quiet environment with little or no interruptions. The answers to the questions on each practice test may only be found on the accompanying audio cassette tapes, rather than in the workbooks. So, similar to a classroom setting, the principle underlying each correct answer may be clearly explained allowing for a more thorough understanding of the subject being covered. Also, certain "tips" on test taking in general will be presented on the tapes as the course progresses.



The NCLE exam consists of 125 multiple choice questions. When taking multiple choice tests in general, it is usually advisable to answer those questions you are sure of first, then go back to answer the others. By reading each of these questions slowly and carefully, and by carefully reviewing each answer given, the correct answer will often become apparent. If the correct answer is still not obvious, sometimes at least two of the choices can be eliminated. Guessing should always be a last resort, but if it is necessary to guess, at least the choices have been reduced. Normally, two hours are allocated to complete the 125 question NCLE Exam, which is ample time in most cases. However, be sure to budget your time by being aware of the number of questions completed and the available time remaining.

To become a competent contact lens fitter, a considerable amount clinical experience is required. However, there is no hands-on or practical portion of the NCLE Certifying Exam. It consists only of 125 multiple choice test questions. So completing this course and passing the NCLE Exam will not, by itself, produce an expert contact lens fitter. What it will provide is a survey of the field and an introduction to a wide variety of related subjects—a foundation upon which to gain competence through further study and clinical experience.

At the end of Part 6 you'll find a *Test Results & Student Evaluation Form.* The test results are generally known about four to six weeks after the test date, and we're very interested to know how well you did. Please attach a copy of your results to the completed form and mail it to the Optical Training Institute. If you were successful in passing the test, you will receive a *Certificate of Completion* suitable for framing. Your evaluation, comments, and suggestions regarding the Home Study Course will be highly valued.



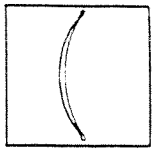
Introduction

Welcome to Part 1, *Basic Lens Design.* As with all the sections of the course, this workbook is designed to be used in conjunction with the accompanying audio cassette tape. Before beginning please be sure to read the preliminary section entitled, *Getting the Most Out Of This Course—A General Introduction.* As mentioned in the General Introduction, the illustrations are generally accompanied by text which highlights the key points mentioned on the taped discussion. Along the left margin of the page you'll find a shaded box which references the tape number and side where a full explanation of any given subject may be found.

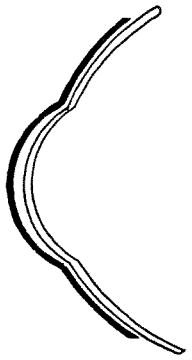
This section will begin with a discussion of the various contact lens designs to include scleral, corneal and semi-scleral lenses. Some basic terminology is covered and the various materials from which contact lenses can be made are surveyed and placed into historical perspective. The uses, advantages and disadvantages of the lens materials are discussed. The parts of a contact lens will be covered to include optic zone, peripheral curve, base curve, junction zone, and radius of curvature. The need for diopter to millimeter conversion is presented and a table is included. Part 1 also discusses the relationship between sagitta depth and fit. Changing sagitta depth by manuplating lens diameter and/or base curve radius is presented. The section concludes with a brief glossary of the terms covered.

The practice test consists of 35 NCLE format multiple choice questions which are based on the material covered in this session. To benefit most from the test take it only after you have studied the material and are confident in your ability to answer the questions correctly. The answers may be found only on audio cassette tape number 2, side 1. By answering each question individually, we will provide a review of what was learned, and offer an opportunity to amplify each question in an effort to gain a greater understanding ot that particular subject. As we review test questions throughout this course certain "tips" on test-taking will be presented in an effort to help you with those questions where the answer may not be so obvious.

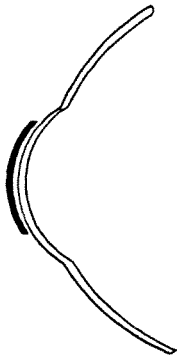
1: Basic Lens Design



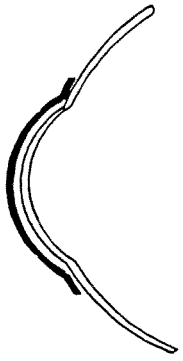
Basic Terminology



Scleral (Haptic) Lens



Corneal Lens



Semi-Scleral Lens



The information found in the first half of Part1, Basic Lens Design, may be found on tape 1, side 1. At first, it might be best not to take notes. Simply listen to the tape as you follow along in the workbook. Of course notes may be taken on subsequent listenings.

Contact lenses generally fall into one of three broad categories of design. These include: *scleral* or *Haptic lenses*, *corneal lenses*, and *semi-scleral lenses.*

Scleral or Haptic Lens: These were the first successful contact lenses. Although they were originally molded to conform to the shape of the cornea, the newer lenses are lathe cut and made of gas permeable materials. Scleral lenses are very difficult to tolerate and today are used primarily when other types of lenses would fail such as in cases of severe keratoconus, severe lid problems, and great amounts of astigmatism.

Corneal Lens: This is the most common design for rigid and gas permeable lenses. Here, the diameter of the lens is smaller than that of the cornea. Corneal diameters may range from 10.5–12.5 mm while the diameter and lens diameters can range from 7.4–9.2 mm. The typical position of a rigid corneal lens is shown in the diagram above.

Semi-Scleral Lens: These lenses bridge the limbus and lie partially on the conjunctiva tissue overlying the sclera and adjacent to the cornea, a design which is typical of soft contact lenses.

Basic Terminology

Rigid or Soft Lenses: Determined by the nature of the material.

Daily Wear, or Extended, Flexible or Prolonged Wear: Determined by the amount of gas permeability of the material. Although many extended wear lenses have been approved by the FDA for up to 30 days of consecutive wear, the FDA has recently recommended that they be worn no longer than 7 days in a row.

Gas Permeable Lens: Permits the passage of oxygen and carbon dioxide through the lens.

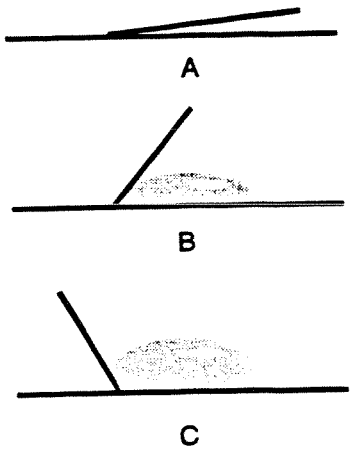
Cosmetic Lens: Can be used to cover an unsightly blind eye. Also used for non-pathological conditions to enhance cosmetic appearance.

Bandage Lens: Used over the cornea to protect it from external influences which permits the healing of underlying corneal disorders.

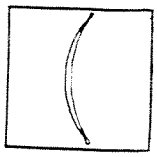
Hydrophobic Lenses: Made of materials which, if not specially treated, will repel water (fear water).

Hydrophilic Lenses: Made of materials which will naturally absorb water (love water).

Wetting Angle: The angle that the edge of a bead of water makes with the surface of a given material. The smaller the angle, the greater the wetting ability.



The more a liquid is capable of spreading over a solid, the smaller the angle of contact it makes with the adjacent material. Figure A illustrates a hydrophillic surface with a relatively small or low wetting angle. A hard lens made of PMMA is hydrophobic and manifests a relatively large wetting angle of about 60 degrees when in contact with a drop of water as shown in figure B. Figure C demonstrates the large wetting angle which might be created by a droplet of mercury.



Rigid Lens Materials

PMMA–Polymethylmethacrylate 1947 Kevin Touhy

Hard transparent plastic

Lenses typically 8–10 mm in diameter

Developed in 1947 by Kevin Touhy

"Conventional Hard Lenses" with a long history of acceptance.

Advantages:

Consistent vision; durable; spherical lenses can correct for up to 3.00 diopters of corneal astigmatism; easily fabricated.

Disadvantages:

Hydrophobic, absorbs only 1.5% water; uncomfortable; poor gas permeability requires "pumping action" of tear layer for adequate oxygen exchange; corneal edema/spectacle blur common.

CAB– Cellulose Acetate Butyrate 1974 -

Originally developed in 1938 by Eastman Kodak as a photographic material.

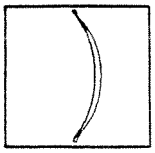
First utilized as a contact lens material in 1974.

Wets easier than PMMA therefore permitting better tear flow under it.

Much better gas permeability than PMMA.

Advantages:

Increased comfort; longer wearing time; less edema/spectacle blur; elimination of edge flare because it can be fitted larger (about 9mm); better for sports—can be fitted tighter so there is less chance of loss; very tough and difficult to break; greater gas permeability; lower wetting angle.



Rigid Lens Materials

(CAB cont.)

Disadvantages:

Poor shape retention—can warp after one year wearing time or can change after hydration and steepen after several weeks. Although thicker lenses can be used to minimize warpage they increase lens awareness due to increased center and edge thickness.

Silicone-Acrylate 1979 - Syntex

The next generation of rigid gas permeable contact lens materials

Material Composition: A combination of silicone (35%) and PMMA (65%)

Developed in 1979 by Syntex Ophthalmics

Known clinically by the following names:

Polycon I or II
(Syntex Ophthalmics, Phoenix, Arizona)

Boston Lenses I or II
(Polymer Technology Corp., Wilmington, Massachusettes)

Menicon O_2
(Toyo Contact Lens Company, Tokyo, Japan)

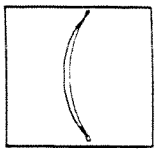
Optocryl 60

Paraperm

B&L Gas Perm

Principal advantage over CAB:

Since it is a more stable material it can be made thinner, thereby increasing patient comfort and oxygen transmission.



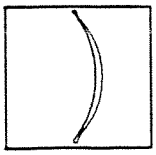
Rigid Lens Materials

Fluorocarbon and Fluorocarbon Silicone Acrylate

Highest gas permeability of all lenses.

May be made of either pure fluoropolymer or fluoropolymer combined with silicone.

Trade Name	Manufacturer	DK
Advent	Allergan/3M	100
Fluoperm 30	Paragon	30
Fluoperm 60	Paragon	60
Fluoperm 92	Paragon	92
Boston Equalens	Polymer	71
Boston Equacurve	Polymer	71
Boston Equalens	Polymer	45
Fluorex	GT Laboratories	70
Quantum I	B & L	9
Quantum II	B & L	210
Boston EXPFS	Polymer	203



Soft Lens Materials

HEMA–Hydroxyethylmethacrylate

Approved by FDA in 1971 and manufactured and marketed by Bausch and Lomb

Advantages:

- Greater comfort
- Rapid adaptation
- Spectacle blur uncommon
- OK to wear intermittently
- Minimal lens loss
- Minimal over wear reaction
- Less flare and photophobia
- Corneal protection
- Offers a possible alternative for rigid lens drop-outs.
- Excellent cosmetic lens–difficult to see
- Better for infants and children.

Disadvantages:

Spherical lenses will not significantly correct for corneal astigmatism.

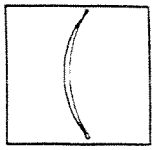
Poor vision can result when lenses are improperly fitted or when they become dehydrated under low humidity conditions such as in heated or air conditioned rooms or when there is inadequate tear flow.

Lack of durability–average life span of daily wear lenses about two years.

Material is susceptible to protein build up.

Impossible to modify and difficult to verify

Disinfection regimen must be strictly adhered to and can be costly.



Overall Benefits of New Higher DK Fluorocarbon Lenses Compared with Soft Hydrogel Materials

Greater Oxygen permeability increases the potential for extended wear performance.

Larger tear layer allows greater exchange of fluid with each blink which results in improved venting of debris.

Since they are more durable than soft hydrogel lenses they require less frequent replacement.

The larger lens sizes tend to mask greater degrees of corneal astigmatism without using special toric lenses.

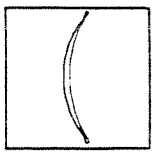
Larger gas permeable rigid lenses are easier to insert and remove.

They are more economical to maintain than hydrogel lenses.

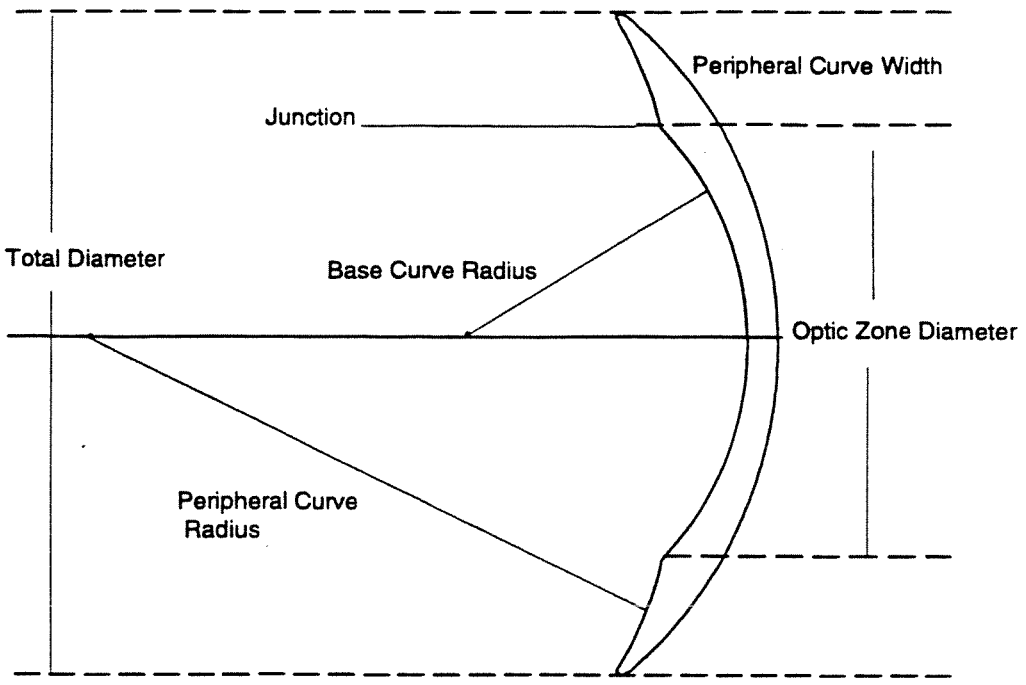
Due to the general absence of porosity, there is less risk of corneal infection.

Historical Development

Year	Individual (s)	Development
1508	Leonardo da Vince	Described glass contact lens
1636	René Descartes	Tube of water used to neutralize the cornea
1801	Thomas Young	Used Descartes principle to study the eye
1827	John Herschel	Described how a contact lens could be ground; concept of molding the eye
1888	A.E. Flick	Described first glass lens to be worn to correct vision
1888	E. Kalt	Designed and fitted glass corneal lenses. Used ophthalmometer to fit lenses
1936	W. Feinbloom	Made lens with glass central optic and plastic surround (first plastic used in contact lens)
1938	Mullen and Obrig	First all-plastic (PMMA) contact lens
1947	N. Bier	Fenestrated minimum-clearance haptic lens
1947	K. Touhy	All-plastic corneal lens
1950	Butterfield	Designed corneal lens to parallel the cornea. Used peripheral curves
1960	Wichterle and Lim	Hydrogel polymers for contact lenses.
1968		U.S. FDA became invloved in regulating contact lenses
1971	Bausch & Lomb, Inc.	First hydrogel lens approved in United States
1970s	J. DeCarle	Extended wear with high water content hydrogel lenses
1970s	Rynco Scientific	Use of CAB polymer for contact lenses
1970s		First clinical marteking of soft silicone lenses
1978	Danker Laboratories	U.S. FDA approval of CAB lenses
1979	Syntex Ophthalmics	U.S. FDA approval of a PMMA silicone copolymer lens



Contact Lens Design



Bicurve Lens

A bicurve lens design contains two curves, a primary base curve and a flatter peripheral curve. The junction of the two curves is generally blended to permit greater comfort. The total diameter of the lens is equal to the diameter of the optic zone plus the peripheral curve widths.

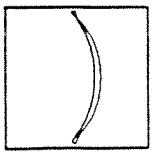
Tape 1, side 2 contains a more detailed discussion of the material covered from page 11 through the end of the Part 1 workbook. Both the workbook and the taped discussion are needed for a complete understanding of the subjects covered.

A tricurve lens, indicated in the figure to the right, contains two peripheral curves. The intermediate curve may be very narrow. Generally tricurve lenses are relatively large–9.5 mm or greater– with an optic zone of 6.5 to 7.5 mm, just large enough to clear the maximum pupil diameter.

The *peripheral* curves are slightly flatter than the base curves by 0.4 to 0.8 mm, or 2 to 4 diopters, and contain a width of approximately 1.3 mm. The *intermediate* curves of a standard tricurve lens are 1 mm flatter than the base curve.

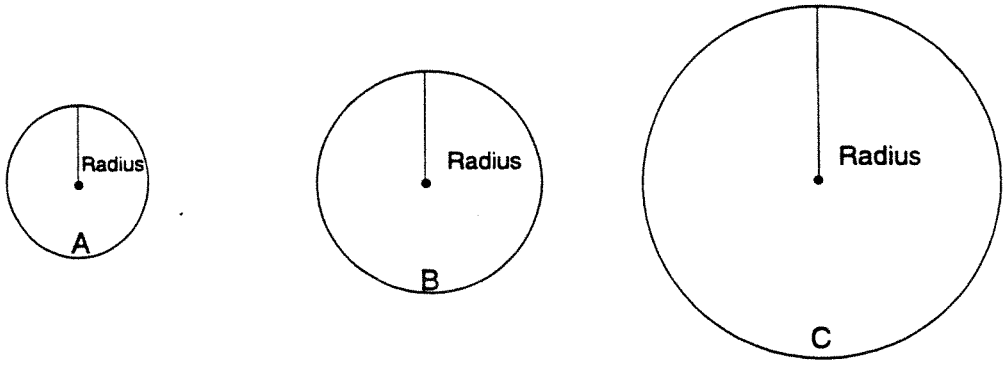


Tricurve Lens



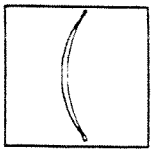
Base Curve

Base Curve: The base curve is the central portion of the back surface of a contact lens. It is also known as the *central posterior curve (CPC)* or the *primary base curve.* The base curve is designed to conform to the optic zone of the cornea and is measured in millimeters of radius of an arc, or in diopters. (i.e. 43.25 D = 7.8 mm)



Larger Circle or Sphere	Smaller Circle or Sphere
Longer Radius of Curvature	Shorter Radius of Curvature
Flatter Curve	Steeper Curve
Less Power	More Power

Every circle or sphere contains a radius of curvature. The radius of curvature is simply the distance from the geometric center of the circle to its periphery where the line is drawn. As the radius of curvature becomes longer the circle gets larger. As the circle gets larger, its curve gets flatter, as the curve gets flatter on a transparent material such as a lens, the power in diopters of that *surface* becomes less. The table above summarizes this relationship.



Base Curve

Diopter-To-Millimeter Conversion Table

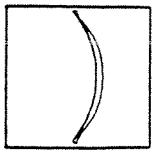
Diopters	mm	Diopters	mm	Diopters	mm
37.00	9.12	42.00	8.04	47.00	7.18
37.25	9.06	42.25	7.99	47.25	7.14
37.50	9.00	42.50	7.94	47.50	7.11
37.75	8.94	42.75	7.89	47.75	7.07
38.00	8.88	43.00	7.85	48.00	7.03
38.25	8.82	43.25	7.80	48.25	6.99
38.50	8.77	43.50	7.76	48.50	6.96
38.75	8.71	43.75	7.71	48.75	6.92
37.00	8.65	44.00	7.67	49.00	6.89
39.25	8.60	44.25	7.63	49.25	6.85
39.50	8.54	44.50	7.58	49.50	6.82
39.75	8.49	44.75	7.54	49.75	6.78
40.00	8.44	**45.00**	**7.50**	50.00	6.75
40.25	8.39	45.25	7.46	50.25	6.72
40.50	8.33	45.50	7.42	50.50	6.68
40.75	8.28	45.75	7.38	50.75	6.65
41.00	8.23	46.00	7.34	51.00	6.62
41.25	8.18	46.25	7.30	51.25	6.59
41.50	8.13	46.50	7.26	51.50	6.55
41.75	8.08	46.75	7.22	51.75	6.52

The base curve of contact lenses may be expressed either in terms of radius of curvature in millimeters or in diopters of power. The table above converts diopters of power into millimeters of radius. The entire table does *not* need to be memorized. However, what should be memorized is that 45.00 diopters of power is equivalent to 7.50 mm of radius and this is indicated in bold on the table.



Rule of Thumb: When the power of a curve changes by a 0.50 diopter, the radius of curvature changes by *approximately* 0.10mm.

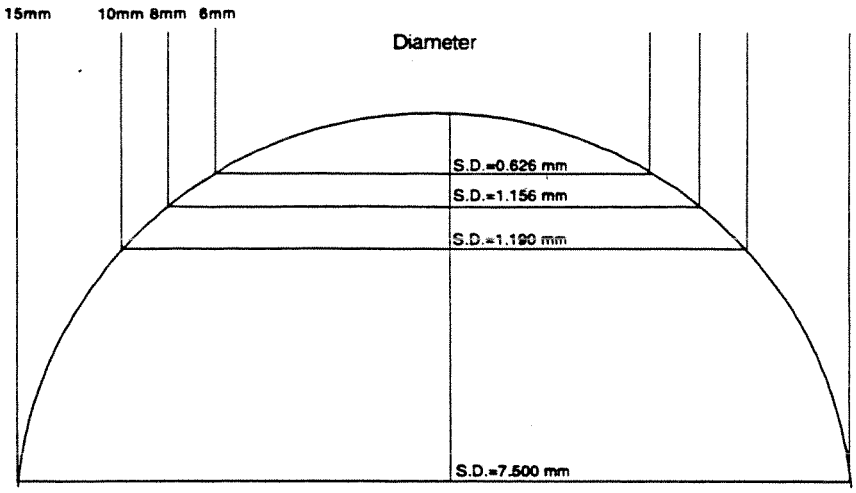
The rule of thumb is very rough. However simply remember that 7.50mm =45.00 diopters and use it as a starting point. Then, apply the rule of thumb to approximate the radius of curvature in millimeters when given the power in diopters, or to approximate the power when given the radius of curvature.



Sagitta Depth

Sagittal Depth or Height: The distance between a flat surface and the back surface of the central portion of a lens. A greater sagittal depth produces greater "vaulting" of the lens and in effect would be steeper. Is sometimes referred to as *sagittal vault.*

Loosening and Tightening a Lens: Two important variables are diameter and radius of curvature.

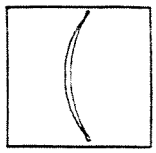


longer Diameter - larger Sagitta depth
Shorter Diameter - Shorter Sagitta dept

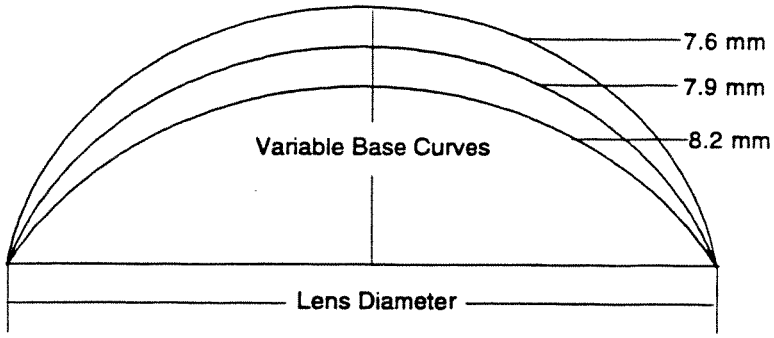
In the diagram above the radius of curvature remains constant while the diameter changes. As the diameter gets greater, the sagitta depth or vaulting effect of the lens increases. The greater the sagitta depth, the tighter the fit of the lens.

tighter fit moves less
goes to loosen or tighten

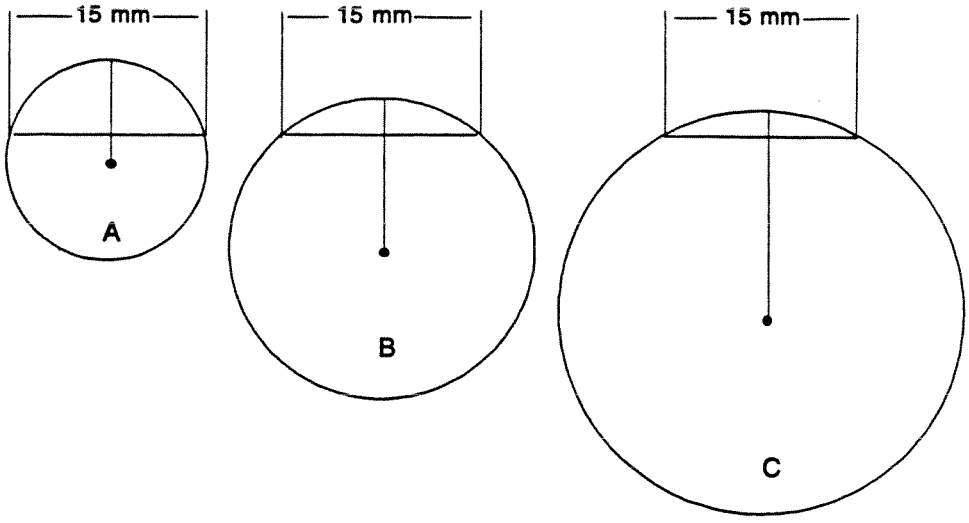
longer sagitta depth - more vaulting tighter lens
Shorter " Less Vaulting looser lens



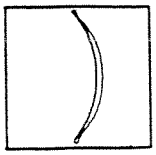
Sagitta Depth



If the diameter is held constant, but the radius of curvature changes, the sagitta depth will be effected. The shorter the radius of curvature, the greater the sagitta depth, the longer the radius, the shorter the sagitta depth.



If the diameter is kept constant, the sagitta depth will decrease with an increasing radius of curvature as from A to C above.



General Terminology

Optic Zone: The central portion of a contact lens which contains the refractive power and generally corresponds to the central corneal cap.

Posterior Apecal Radius: This term is generally used in reference to spin-cast soft lenses. The curvature of the posterior surface of the lens changes with the refractive power. The radius of curvature is measured at the apex of the poste rior surface.

Steeper Base Curve: Occurs when the posterior radius of curvature is *decreased* (i.e. 8.4 to 8.1 mm).

Flatter Base Curve: Occurs when the posterior radius of curvature is *increased* (i.e. 8.1 to 8.4 mm).

Bicurve Lens: A contact lens which contains two curves: one base curve and one secondary curve. It is usually small (7.5 to 8.8 mm in diameter), relatively steep, and made with narrow peripheral curves (about 0.2 mm). Bicurve rigid lenses are usually intrapalpebral lenses, designed to fit within the palpebral fissure limits.

Tricurve Lens: A contact lens which contains three curves: a base curve, an outer peripheral posterior curve (PPC), and an intermediate posterior curve (IPC). Tricurve lenses are generally larger, 9.5 mm or greater.

Multicurve Lens: Contains a base curve and three or more peripheral curves. Usually a larger lens.

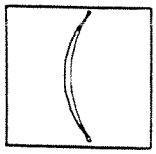
Junctional Zone: The junction of two curves.

Blending: The smoothing of a junctional zone by removing the sharp line between the zones.

Lens Diameter or Chord Diameter: The width of a lens or the measurement from one edge of the lens to the opposite edge.

Curve Widths: The width of the CPC, PPC, or IPC.

Central Thickness: Separation between the anterior and posterior surface at the geometric center of the lens. Minus lenses are thinner, plus lenses are thicker.



General Terminology

Ballasted Lens: Lens with a heavier base which becomes oriented inferiorly or downward when the lens is worn.

Prism Ballasted Lens: A ballasted lens which utilizes a prism wedge designed to weight the lens.



Prism Ballast

Truncated Lens: A lens which has been cut off, usually 0.5—1.5 mm along its lower edge, to form a horizontal base. Double truncations, along the top and bottom portion of the lens is sometimes done to help improve stabilization.



Truncated Lens

Back Surface Power: Effective power of a lens when measured from the back surface.

Wetting Angle: The angle that the edge of a bead of water makes with the surface of the plastic, The smaller the angle the greater the wetting ability.

Toric Lenses or Toroid Lenses: Lenses with different radii of curvature in each meridian which are used to correct astigmatism.

Principal Meridians: The meridians of shortest and longest radii which differ by 90 degrees.

Front Surface Toric Lens: A lens in which the anterior surface has two different radii and the posterior surface is spherical.

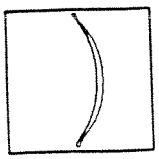
Back Surface Toric Lens: A lens in which the posterior surface has two different radii and the anterior surface is spherical.

Bitoric Lens: A lens in which both the posterior and anterior surfaces contain two different radii.



Lenticular Lens

Lenticular Bowl: A lens design generally used in higher plus powers which consists of a central optic zone and a surrounding non-optic peripheral or "carrier" portion.

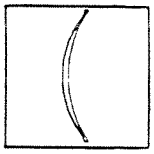


General Terminology

Spin-Cast Soft Lens: A method of manufacturing soft contact lenses whereby a liquid material is revolved in a mold at a controlled speed and temperature which produces the desired curvature, design, and power.

Lathe Cut Soft Lens: A method of manufacturing soft contact lenses in which a machine lathe is used to to grind lens designs, size and power.

Spherical Equivalent: A spectacle or contact lens prescription which is expressed only as a sphere. To calculate the spherical equivalent, algebraically add half the cylinder power to the sphere.



Practice Test



The practice test for Part 1 will be reviewed on tape 2, side 1. Before taking this test be sure you have understood and absorbed the material as thoroughly as possible. Listen to the taped review only after having completed the practice test.

___1. The first successful contact lenses which were originally molded to conform to the shape of the cornea were known as_____lenses.

a. corneal
b. haptic
c. interpalpebral
d. gas permeable

___2. Corneal contact lenses:

a. are a typical design of soft lenses.
b. bridge the limbus and lie partially on the conjunctiva tissue overlying the sclera.
c. are used only as a last resort when other of contact lens designs would fail.
d. are the most common design for rigid and gas permeable lenses.

___3. The majority of soft lenses fit today are:

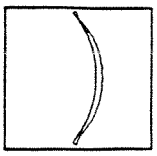
a. corneal lenses
b. haptic lenses
c. semi-scleral
d. hydrophobic

___4. A liquid coming in contact with a hydrophillic lens material with a relatively small wetting angle would be likely to:

a. form beads on the surface
b. quickly evaporate
c. spread evenly over its surface
d. none of the above

___5. A contact lens with diameter larger than that of the cornea is called a_____lens.

a. corneal
b. hydrophillic
c. hydrophobic
d. haptic



Practice Test

___6. All of the following are symptoms of a loose fitting lens *except:*

a. lid sensation
b. constant awareness
c. burning
d. feeling the lenses move

___7. Of those curves listed, which indicates the flattest base curve?

a. 7.50 mm
b. 37.50 diopters
c. 8.60 mm
d. 49.00 diopters

___8. A contact lens was ordered with a base curve of 7.85 mm but was received back from the laboratory with a base curve measuring 7.80 mm. The base curve of the actual lens is:

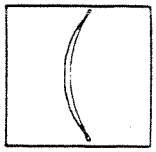
a. 0.25 D flatter than the lens ordered
b. 0.25 D steeper than the lens ordered
c. 0.50 D steeper than the lens ordered
d. 0.50 D flatter than the lens ordered

___9. It is noticed that a rigid contact lens containing a base curve of 7.42 mm is fitting quite loose. A tighter fit may be achieved by changing the base curve to:

a. 7.46
b. 7.85
c. 8.04
d. none of the above

___10. A contact lens has a base curve of 7.50 mm. Its posterior peripheral curve would most likely be:

a. 7.45 mm
b. 42.50 D
c. 7.35 mm
d. 30.00 D



Practice Test

___11. The secondary curve of a rigid contact lens is generally:

a. steeper than the CPC
b. 1 to 2 diopters flatter than the CPC
c. 2 to 4 diopters flatter than the CPC
d. none of the above

___12. The term "Haptic Lens" is used in reference to:

a. a prism ballast lens
b. a truncated lens
c. a scleral lens
d. a spin-cast lens

___13. The CPC of a contact lens measures 7.5 mm radius of curvature. Its power in diopters is:

a. 41.00 D
b. 43.00 D
c. 45.00 D
d. 47.00 D

___14. The fitting characteristics of a gas permeable rigid contact lens may be altered by:

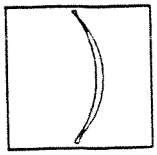
a. changing the radius of curvature of the CPC
b. increasing the diameter
c. widening the PPC
d. all of the above

___15. A soft contact lens demonstrates excessive movement. This may be remedied by:

a. a larger diameter lens
b. a smaller diameter lens
c. a flatter lens
d. disinfecting the lens

___16. The term "sagittal value" refers to:

a. a poorly fitted lens
b. scleral show
c. the vaulting effect of a contact lens
d. nothing of significance



Practice Test

___17. When determining the best lens material to use, which of the following should be considered?

1. The patient's working conditions
2. Precorneal tear film evaluation
3. Full time vs part time wear

a. 1 only
b. 1 and 3 only
c. 2 and 3 only
d. 1, 2, and 3

___18. The gas permeability of a CAB lens is largely dependent upon:

a. the diameter of the central posterior curve
b. the width of the posterior peripheral curve
c. the lens thickness
d. the overall diameter

___19. A rigid gas permeable lens with a base curve of 7.50 mm is found to be fitting *slightly tight*. To improve the fit we might consider changing the base curve to which of the following?

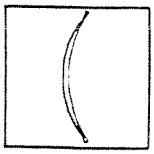
a. 7.40
b. 7.45
c. 7.55
d. 7.65

___20. If the CPC of a rigid contact lens is held constant while the diameter is increased, it would result in:

a. a tighter fit
b. a looser fit
c. less vaulting
d. increased gas permeablility

___21. When compared with PMMA, CAB lenses:

a. have much better gas permeablity
b. can be fit larger
c. are less likely to result in hypoxia induced corneal edema
d. all of the above



Practice Test

___22. When compared with PMMA which of the following is *not* true about about CAB lenses?

a. they have excellent shape retention
b. they can be fit tighter
c. they can be fit larger
d. they are better for sports

___23. HEMA is an abbreviation commonly used to describe:

a. rigid lenses
b. gas permeable lenses
c. soft lenses
d. corneal abrasion

___24. The chief reason to utilize a ballasted contact lens is:

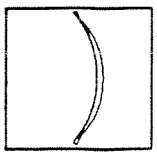
a. to correct verrtical prismatic imbalances
b. to lower the wetting angle
c. to inhibit lens rotation
d. to tighten the fit

___25. Which of the following is *not* true of PMMA lenses?

a. spherical lenses can generally correct for up to 3.00 diopters of corneal astigmatism.
b. they are easily fabricated
c. they have a long history of acceptance
d. they have excellent gas permeability

___26. Which of the following is *not* true about soft contact lenses?

a. spectacle blur is uncommon
b. There is less flare and photophobia than with "conventional" rigid lenses
c. rapid adaptation to lens wear is possible
d. spherical lenses will correct for moderate to high amounts of corneal astigmatism



Practice Test

___27. The central portion of the back surface of the contact lens is called:

a. the central posterior curve (CPC)
b. the primary base curve
c. the base curve
d. all of the above

___28. The distance between a flat surface and the back surface of the central portion of a lens is the:

a. chord diameter
b. sagittal depth
c. principal meridian
d. back surface power

___29. A contact lens design which utilizes a lenticular bowl is typically employed with:

a. bitoric lenses
b. prism ballasted lenses
c. higher minus lenses
d. higher plus lenses

___30 A loose fitting contact lens can be made to fit tighter by:

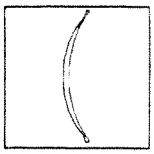
a. shortening the radius of curvature of the CPC
b. lengthening the radius of curvature of the CPC
c. decreasing the diameter
d. truncating the lens

___31. The first all plastic corneal contact lens was developed by Kevin Tuohy in:

a. 1888
b. 1936
c. 1947
d. 1971

___32. An example of a hydrophillic lens material is:

a. silicone-acrylate
b. CAB
c. PMMA
d. HEMA



Practice Test

___33. Bicurve rigid contact lenses are usually:

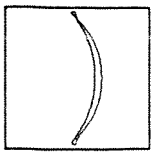
a. small and steep
b. fit within the interpalpebral fissure limits
c. made with narrow peripheral curves
d. all of the above

___34. A contact lens in which the anterior surface contains two different radii of curvature and the posterior surface is spherical is called a_____lens.

a. bitoric
b. front surface toric
c. back surface toric
d. bicurve

___35. When the radius of curvature is held constant while the diameter is increased, the vault of the lens will be:

a. unchanged
b. increased
c. decreased
d. truncated



D.optical radius of curv
45.00 = 7.5 mm

Power of curve changes .50 diopters — radius of curve changes by ≈ .10 mm

.75 or more passes

Notes

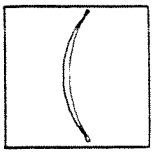
7.5 = 45 D

7.5 - 45 D

45 = 7.50

7.5
7.50

B D
D C
C C
C A
D D
C A
B B
D C
D D
D D
C D
C D
C B
C A
D C
C D
D B



Notes

Patient - hard lens, hydrophobic, durable
Consistent vision 3.00d. astig.
U. comfortable

CAP2: greater eyes permm

7.42 = ? 45 45 Smaller steeper more

1.50 = 45

4/3 D. = 9mm flatter - longer

Smaller Steeper

7.5 = 45

x = 37.5

8.4 = 49

7.5 = 45

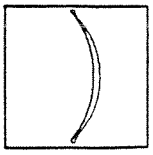
8.3 = 49

7.5 45 D. = 37.5

8.5

7.5 + .85 = 8.35

7.5 .85



Notes