Modes of Multifocal Fitting

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Goal Statement: Many patients are not aware that bifocal and multifocal contact lenses exist, let alone that they have been around for more than 50 years. But word is spreading fast, and you must be prepared to assist these patients. Presbyopes want the vision flexibility they enjoyed at 30, and just because they require reading glasses does not mean they want to compromise their active lifestyles. All you need is some knowledge of design basics and a systematic approach and you too can enjoy the challenge and satisfaction of being a specialty contact-lens practitioner.

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Modes of Multifocal Fitting

This primer on multifocal lenses will help you understand how to fit patients with them. By Douglas P. Benoit, O.D., F.A.A.O.

Many times I am asked why anyone would bother with bifocal or multifocal contact lenses. Many associate these lenses with longer chair time, higher product costs and a more difficult fit all around. But, with just a little effort, multifocal contact lenses can be almost as easy to fit as single-vision lenses. All it takes is some knowledge of design basics and a systematic approach to these rewarding patients. There are a great many bifocal/multifocal contact lenses available today, including soft and gas-permeable varieties. But in this article, we will focus on the soft lens category, discuss the patients who would best benefit from these designs and present various approaches to fitting that will increase success rates.

The Basics

First, let's review some general considerations. There are two basic design philosophies for bifocal contact lenses—simultaneous image designs and alternating image designs.

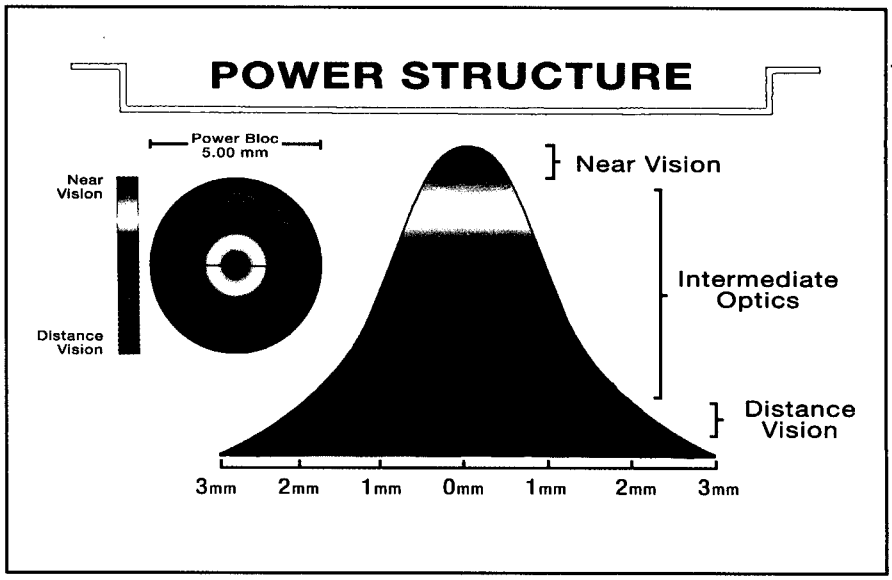
In the simultaneous image type, the retina is presented with images from multiple distances at all times and the brain has to determine which image is primary and filter out the others. Illumination and pupil size play an important role in the success or failure of these designs.[1] Also, the simultaneous image lens is not tied to the angle or position of gaze the way that alternating image designs are. The simultaneous image designs allow for intermediate vision, as well as distance and near vision. Simultaneous image bifocal designs include aspheric and concentric *(figures 1 and 2)*. At one time, there were even diffractive soft contact lens bifocals, the last available being the Echelon lens (CooperVision). With a diffractive contact lens design, there are concentric and annular rings of equal area. These lenslets, as they are called, take advantage of the difference in the refractive indices of the pre-ocular tear film and the contact lens material. Light entering the pupil is diffracted, and by constructive interference, the first-order image contributes to the reading need. Diffractive bifocal lenses focus light that passes through the entire pupil, unlike simultaneous image bifocals, which divide the incoming light through distance and near zones. For this reason, diffractive bifocals are relatively pupil-independent.[2]

Aspheric lenses incorporate an aspheric front or back surface to create a multifocal effect. As a rule, back-surface aspheric lenses are center-distance, while front-surface aspheric lenses are center-near.

Each design has its advantages: In center-distance designs, there is a progressive flattening of the posterior surface from the center toward the periphery, creating a progressive decrease in minus power or an increase in plus power from the center outward. A major advantage of the center-distance aspheric lens design is the improvement in visual performance at intermediate distances in all positions of gaze, when compared to concentric designs.[3] Also, the decreasing eccentricity may help minimize flare when the pupil dilates in lower illumination.[4] And, since the area of highest eccentricity is in the center distance zone, the most effective near portion of the lens usually covers the area just inside the pupil margin in well-lit settings. Thus, the pupil diameter controls the effective lens aperture and with it, the available add power.[4]

In center-near designs, the anterior aspheric surface has the greatest eccentricity in the center, and it decreases toward the periphery. This creates a situation where the greatest plus power, or least minus power, is in the center of the lens, and it gradually changes as you move away from the center. Here, the pupil diameter influences the quality of the distance vision. So, the choice of which design to use comes down to a determination of the patient's needs and ocular characteristics, such as pupil size. For example, someone who spends eight hours a day working on a computer may do better with a center-near design, whereas someone only using contact lenses for casual activities might benefit from a center-distance design.

In concentric designs, there is a central zone of distance power or near power surrounded by one or more rings of the opposite power. The optical performance of concentric bifocal designs is also dependent on pupil size.[5] Center-distance designs typically have better distance image quality with smaller pupil diameters or bright light conditions, which is why near vision would be compromised in this situation. Conversely, center-near designs tend to have better distance image quality with large pupils or in dim light, whereas near vision is enhanced.[6] The Proclear Multifocal (CooperVision) uses a combination of a center-distance design for the dominant eye with a center-near design for the nondominant eye *(figure 3)*. In theory, this design concept should allow better vision under varying lighting and pupils size conditions. Some, such as the Acuvue Bifocal (Vistakon)

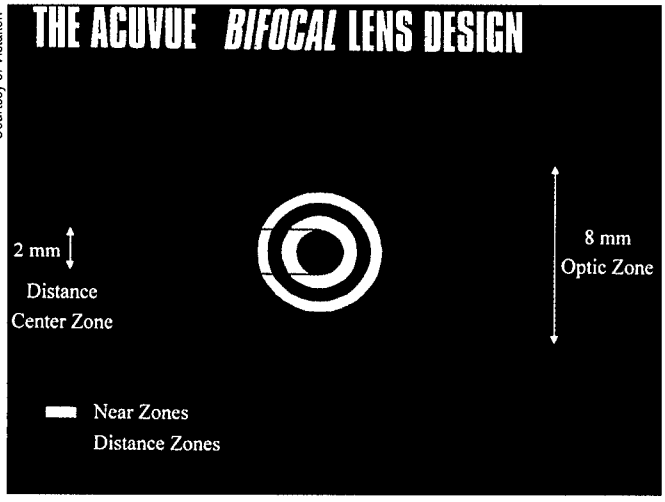


Courtesy of Blanchard Labs

1. Schematic depiction of center-near aspheric optics as represented by the Quattro Multifocal from Blanchard Contact Lens.

alternate distance and near powers in a repeating pattern *(figure 2)*. This seems to improve vision even with varied pupil sizes brought on by changes in illumination.[7]

With alternating image designs, also called translating designs, there is a dedicated area for distance and for near. Often, the top of the lens is the distance part, and there is a line where the near area is accessed. This is precisely the design that patients think of when bifocal contact lenses are mentioned. In theory, patients see well at distance with straight ahead gaze, and when the patient looks down, the lens moves up to place the near power area before the pupil *(figure 4)*. Because these lenses have a different dedicated area before the pupil for distance versus near tasks, there is no decrease in illumination, so image quality is generally good.[8] When translating designs are successful (e.g., translating up on down-gaze), vision can be very sharp, making these lenses a great choice for patients with high visual demands. However, patients tend to lose intermediate-distance focus with translating bifocal designs, so this should also be taken into consideration.



Courtesy of Vistakon

2. Schematic diagram of center-distance concentric optics as represented by the Acuvue Bifocal from Vistakon.

Soft Lens Choices

In 2001, the last soft translating design introduced was the Triton Translating Bifocal (Gelflex Laboratories). According to Gelflex, the latest redesign took place approximately three years ago and involved rounding and thinning the truncation area to increase comfort. The design of this lens allows incorporation of the patient's full prescription, distance and near, including toric powers. It is a truncated lens, available in two diameters and seven base curves, with cylinder axes in one-degree increments.

California Optics makes a crescent-segment lens called the C.O. Soft 55 Crescent Bi-focal. This lens has two diameters, three base curves and add powers to +4.00, and a toric version is available. (The manufacturer notes that the lens is still being made, but that it is probably better used as a problem solver rather than a first choice.)

Simultaneous image designs, aspheric or concentric, are the most popular soft contact lens designs. In the concentric arena, we have the Acuvue Bifocal, which is a center-distance concentric design with alternating distance and near zones. This multi-zone design provides better distance and near vision due to better coverage of the pupil as it dilates or constricts, as opposed to a two-zone concentric design.[7] The Acuvue Bifocal has distance powers from +6.00D to –9.00D, as well as four add powers: +1.00D, +1.50D, +2.00D and +2.50. This lens satisfies a wide range of patient needs. For instance, the Acuvue Bifocal is ideal for an active patient who works in multiple settings and various illumination conditions. Another concentric soft bifocal is the SimulVue 38 (Unilens), which has a center-near design. It is available with two segment sizes: 2.35mm and 2.55mm; and add powers of +2.00D, +2.50D and +3.00D, with a wide range of distance powers. There is also a +3.50D add available, but the other parameters are more limited. Having two segment sizes to choose from allows enhancement of near vision with good lighting. For example, using the 2.35mm segment in a patient with small pupils should improve near acuity in the bright office environment but at the same time provide acceptable distance vision when driving home at the end of the day.

Examples of aspheric designs include the Quattro (Blanchard Labs), which is a center-near design manufactured with proprietary "S-Form" lathing. It offers add powers to +2.50D, two base curve/lens diameter combinations and a wide range of distance powers. Bausch & Lomb's Soflens Multi-Focal is an aspheric front-surface center-near design. It has a low add to +1.50D and a high add from +1.75D to +2.50D, as well as a range of available distance powers. It is offered in two base curves and one lens diameter.

Recently, Bausch & Lomb introduced the Purevision Multi-Focal (balafilcon A), which is the first silicone hydrogel multifocal. It is a monthly lens that has the same parameters as the Soflens Multi-Focal.

Focus Progressives (CIBA Vision) is another center-near design with an aspheric front surface that offers add powers to +3.00D. It is available in two base curves, one lens diameter and a wide range of parameters. It is even available as a daily disposable. The Focus Dailies Progressive lens (CIBA Vision) has

some slight parameter limitations and a different material (nelfilcon A).

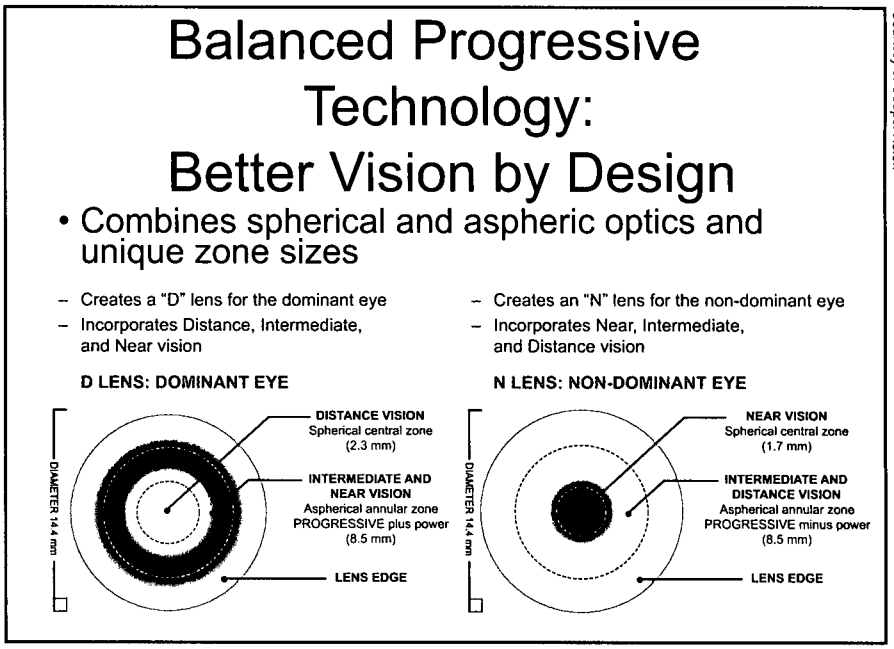
The Proclear Multifocal is a combination aspheric and spherical lens made of omafilcon A. (The Frequency 55 Multifocal is the methafilcon A version). The center is spherical, and there is an aspheric annular surround. Standard distance powers are +4.00D to –6.00D. The add powers, ranging from +1.00D to +2.50D (in 0.50D increments), come in D and N configurations. In the D, generally the dominant eye, version the central spherical zone has distance power, and the aspheric annular portion picks up the intermediate and near vision. The N, generally non-dominant, version is exactly the opposite. These lenses are designed to be fit with a modified or enhanced monovision approach, termed "Balanced Progressive Technology" by the lab. The XR version increases the distance range to +/-20D (0.50D steps after+/-6.50D), and increases the add range to +4.00D. CooperVision also makes the Proclear Toric Multifocal (omafilcon A), with the same lens design. It has spherical powers to +/-20D (0.50D steps after +/-6.50D), cylinders to –5.75D in 0.50D increments and adds to +4.00 (0.50D increments). The wide parameter ranges of the Proclear Multifocal make it another good choice for a variety of patients.

Several other laboratories manufacture soft toric multifocal designs. Examples include the C-VUE 55 Toric Multifocal (Unilens), the Essential Soft Toric Multifocal (Blanchard Contact Lens) and the recently introduced Cibasoft Progressive Toric (CIBA Vision). The C-VUE 55 Toric Multifocal uses patented aspheric power shifts to provide lens powers necessary for a variety of activities. It has a wide range of powers in a center-near aspheric front-surface, toric back-surface design. The Essential Soft Toric Multifocal also has an aspheric front surface with a toric back surface and a center-near design. It too has a large parameter range that includes the choice of three base curves. The Cibasoft Progressive Toric features a double slab-off, front-surface toric design combined with a center-near progressive add on the back surface. It is available in two base curves, cylinder powers from -0.75D to -2.75D in 0.25D steps, axes around the clock in five-degree increments and +9.00D to -9.00D for distance. It should be noted that all of these designs are made to order and available in spherical (non-cylinder) versions for patients who only require astigmatism correction in one eye.

Getting Started

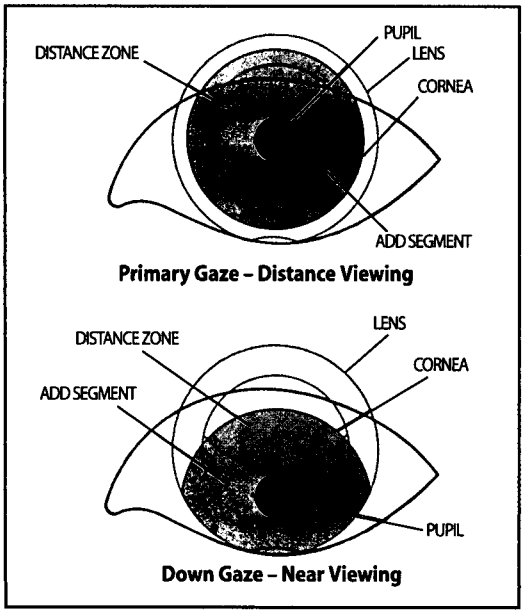
Keeping the various design choices in mind, let's take a look at incorporating bifocal or multifocal contact lenses into your practice. Many patients are not aware that bifocal contact lenses exist, let alone that they have been around for more than 50 years. But word is spreading fast, and four to five million presbyopes join the ranks each year.[9] You must be prepared to assist these patients. Presbyopes want the vision flexibility they enjoyed at 30, and just because these patients require reading glasses does not mean they want to compromise their active lifestyles. But, many current single-vision contact-lens wearers fear that they must give up contact lenses to get both good distance and near vision. This presents the perfect opportunity to educate them and thereby grow the practice. In fact, you may want to take the progressive approach, and plant the seed long before patients need additional correction for near viewing.

Here is the rational criteria for screening potential bifocal candidates: First, assess patients' motivation. Ascertain whether they will comply with the visits and lens changes necessary for success. Multifocal contact lenses can require more follow-up visits than single-vision lenses, and changes in lens parameters to maximize vision are common. Next, discuss patients' expectations. If perfect vision at every distance is their goal, they are likely to end up dissatisfied. Make



Courtesy of CooperVision

3. The Balanced Progressive Technology in CooperVision's concentric design bifocal.



4. Schematic diagram of a translating bifocal design depicting primary gaze and downgaze positioning of the segments.

sure patients realize that presbyopia requires compromise. Multifocal contact lenses can take care of most visual needs most of the time, but there are times when some other form of vision correction (or even the naked eye) may work better.

You also need to consider patients' ocular health and physiology. Look for a healthy cornea and conjunctiva, good lid structure and function and a wet-enough eye to sustain a contact lens. Check the lid position relative to the limbus, as well as apposition to the globe. Floppy lids may interfere with the ability to maintain a normal corneal surface or lens movement, especially with a translating design. Many older patients have reduced tear function that can make vision and comfort poor.[10] So, assess tear film quality and quantity using fluorescein and lissamine green or Rose Bengal to screen for epithelial breaks and other signs of dry eye. In fact, discomfort from dryness is a major reason why patients drop out of contact lens wear.[11]

Also, check pupil sizes in average and low light, as this can sometimes aid in choosing a lens design. Studies have shown that success with simultaneous image bifocals is increased with an average pupil size of 3mm to 4mm.[1] Additionally, there is a loss of visual quality when illumination is decreased with all simultaneous image bifocal designs.[12]

Age affects all of these areas, so it is important to be thorough and critical. If patients are not appropriate candidates, inform them directly. If their ocular health and physiology are satisfactory, then discuss their vision requirements at work and play. Most people have some computer use in their day, which necessitates reasonable intermediate-distance vision. Patients who need very sharp vision at any or all distances may be disappointed, as may those who work mainly in low-light environments. Lastly, consider patients' refractive errors. In the past, it was believed that if the distance need was below 1.00D or the add power was too high, the patient would not do well with multifocals or bifocals.[13] But, most of these challenges can be met with the new designs being produced.

Patient Education

With the many vision correction options available for presbyopes, you need to decide which particular one will best suit each patient. For some patients, eyeglasses or refractive surgery may be more appropriate. But, those people for whom contact lenses are the best choice need to be educated on the different approaches available.

For athletes and outdoor enthusiasts, using distance contact lenses with reading glasses is often a good compromise, while office workers may prefer near-intermediate range contact lenses with an over-refraction for distance in spectacles. The majority of patients, however, really desire a contact lens-only approach.

For many years, monovision was the method of choice for early presbyopes. It can provide good vision at various distances, and it is less time-consuming and expensive for both the patient and practitioner. But, monovision does disturb stereo acuity, especially as the near add power increases.[14,15] Bifocal or multifocal contact lenses can eliminate some of this difficulty, allowing a more equal image size and quality between the two eyes.[16] Studies have shown that in most cases, patients actually prefer bifocals or multifocals over monovision.[17] These lenses also cover a broader range of prescription needs. Monovision and bifocal and multifocal contact lenses are not mutually exclusive, but rather, complementary approaches.

Fitting Approaches

As I mentioned earlier, once a patient is at the point where a single-vision lens is no longer adequate for all viewing tasks, compromises must be made to see comfortably throughout the day. Many methods can help achieve this goal. Ideally, the total bifocal fit, in which each eye gets the maximum vision for distance and for near, is the best approach. But, as is the case with spectacles, this can create visual stress; the visual system has a dominant eye, and this dominance needs to be respected.[18] The dominant eye can be determined by methods such as the simple "hole in the hand" test or fogging techniques, where plus-power over-correction is added to each eye in turn. The eye that accepts the most plus at distance is considered nondominant.

Modified monovision, sometimes called enhanced monovision, is a good

way to solve the dominance issue. In this situation, the dominant eye is given a bifocal with better correction for distance, and the nondominant is given a slightly greater add power or over-plussed slightly for distance. This way, both eyes have nearly equal visual input, and patients tend to adapt easier. Modified monovision can simplify and enhance fitting success while reducing chair time. Even the so-called "total bifocal fit" usually results in a form of modified monovision.

With these fits, practitioner motivation is as important as patient motivation. If you are excited and believe it can be successful, you enhance your motivation and your approach to patients. Do not hesitate to fit bifocal or multifocal contact lenses for fear of failure with complex designs or negative prior experiences. Neither of these factors should be obstacles any longer. Today's design and parameter availabilities and the very convenient exchange and cancellation policies of most laboratories allow for multifocal fitting with near-zero material outlay or risk. Your office staff should also be kept up to date on what is new in bifocal contact lenses, so you can handle patient inquiries effortlessly and with confidence.

Practice Makes Perfect

To get started, develop experience with some of the various designs by following the manufacturers' fitting nomogram. Each company has invested many hours and much money to make their lens perform in a predictable fashion with minimal chair time. By fitting a few patients in these designs, you will be able to increase your comfort level and streamline your approach for any appropriate patient. As few as three fits or less with a particular design can be all it takes to master the nuances of each lens. You could even fit staff members with these new designs as part of your learning curve. By doing so, you will provide them with first-hand experience with these lenses and enable them to better explain how these lenses work. You do not need expertise in every bifocal or multifocal contact lens design, but you should master—and have available fitting sets—for three or four different lenses that you use regularly. Diagnostic fitting is very advantageous and really is a must. You get to know the pros and cons of each lens and be able to predict which patient will be best served by a given design. You can provide patients with an idea of how their final lenses will perform during a diagnostic fitting. This will also allow you to evaluate the likelihood of changes after the initial lenses are dispensed and to properly educate the patient on the rationale for follow-up visits.

Both you and your patient will need patience during the follow-up period, as it is not uncommon to require modifications in the distance power, add power or both. Pay careful attention to the patient's complaints and comments at each progress evaluation. These can guide you in the quest to improve visual performance. Use loose lenses during over-refraction and to vary the lighting levels to offer the patient a more natural visual setting. Make sure that you do not make parameter or lens changes too quickly, as it can take two to six weeks for some patients to fully adapt. Hasty, unnecessary adjustments could end up wasting time and warranty exchanges.

A Successful Business

I hope you are able to dismiss any hesitations you may have had about fitting multifocal or bifocal contact lenses. These lenses really are just an extension of the standard contact lens practice. And, as the number of presbyopic patients increases, providing these services will bring more patients into your office and keep them there. With just a small investment of time, you can enjoy the challenge and satisfaction of being a specialty contact-lens practitioner.

Dr. Benoit is a board certified optometrist with sub-specialty training in contact lenses and external disease. His practice includes general optometry with an emphasis on contact lens care and the treatment of external disease. Dr. Benoit is a Fellow of the American Academy of Optometry and a Diplomate and Secretary of the Section on Cornea and Contact Lenses. He is also on the Advisory Committee of the Gas Permeable Lens Institute.

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Self-Assessment Examination: Modes of Multifocal Fitting

DIRECTIONS: To obtain 2 hours of continuing education credit, complete the exam by recording the best answer to each self-assessment question on the Examination Answer Sheet on Page 27. Mail the answer sheet to Optometric-CE, P.O. Box 488, Canal Street Station, New York, NY 10013. A minimum score of 70 is required to obtain a certificate of completion. There is no fee for this course.

TEST QUESTIONS:

1. Presbyopic contact lens correction can include:
a. Monovision.
b. Distance contact lenses and reading glasses.
c. Bifocal/multifocal contact lenses.
d. All of the above.

2. Simultaneous image bifocal designs include:
a. Aspherics.
b. Concentrics.
c. Segmented.
d. Both a and b.

3. What impact does a well-fit translating/alternating image design have on the amount of illumination that reaches the eye?
a. No decrease in illumination.
b. Slight decrease in illumination.
c. Drastic decrease in illumination.
d. Slight increase in illumination.

4. In which lens design do distance and near powers alternate in a repeating pattern?
a. Aspheric
b. Concentric
c. Center-distance
d. Both b and c

5. In a center-distance aspheric bifocal:
a. The anterior surface flattens toward the periphery.
b. The posterior surface flattens toward the periphery.
c. The anterior surface steepens toward the periphery.
d. The posterior surface is spherical.

6. What kind of lenses rely on the difference in the refractive index between the material and the pre-ocular tear film to create near power?
a. Aspheric lenses.
b. Crescent-segment lenses.
c. Diffractive bifocal lenses.
d. Toric multifocal lenses.

7. In low illumination, an aspheric center-distance bifocal contact lens will:
a. Maximize flare.
b. Minimize flare.
c. Not work.
d. None of the above.

8. In a center-near aspheric bifocal contact lens, eccentricity is:
a. Greatest in the center.
b. Greatest in the periphery.
c. On the back surface.
d. Equal to zero.

9. What does the optical performance of concentric bifocal designs depend on?
a. Amount of illumination.
b. Good lid structure.
c. Pupil size.
d. Tear function.

10. How do you assess ocular dominance?
a. The "hole in the hand" test.
b. Fogging.
c. Cover test.
d. Both a and b.

11. In what fitting technique do you fit the dominant eye with a bifocal lens?
a. The total bifocal fit.
b. Monovision.
c. Modified monovision.
d. Both a and c.

12. The major cause of contact lens drop out is:
a. High cost of lenses.
b. Complicated lens-care regimens.
c. Discomfort due to dryness.
d. None of the above.

13. With which lens design is there a loss of visual quality with decreased illumination?
a. Simultaneous image bifocal design.
b. Aspheric lens design.
c. Translating lens design.
d. Center-near lens design.

14. When does monovision disturb stereo acuity?
a. When there is no add power.
b. Never.
c. When the cylinder power increases.
d. When the near add power increases.

15. What qualifications should you look for in an ideal bifocal candidate?

a. Healthy cornea and conjunctiva.
b. Good lid structure.
c. Willingness to comply with the lens regimen.
d. All of the above.

16. Which lens design has dedicated areas for distance and near?

a. Simultaneous image design.
b. Translating bifocal design.
c. Concentric design.
d. Both b and c.

17. On average, how long does it take for a patient to adapt to bifocal or mutlifocal lenses?

a. Six months.
b. One year.
c. Two to six weeks.
d. Five days.

18. Success with simultaneous image bifocal contact lenses is increased when the average pupil size is:

a. 2mm to 3mm.
b. 3mm to 4mm.
c. 4mm to 5mm.
d. 5mm to 6mm.

19. Which lens design is most affected by the angle of gaze?

a. Single vision contact lenses.
b. Simultaneous image bifocal contact lenses.
c. Alternating image bifocal contact lenses.
d. Both a and c.

20. Which lens design provides the best intermediate vision?

a. Concentric lens design.
b. Translating/alternating lens design.
c. Aspheric lens design.
d. Both a and c.

Examination Answer Sheet

Valid for credit through March 31, 2009

This exam can be taken online at www.revoptom.com. Upon passing the exam, you can view your results immediately. You can also view your test history at any time from the Web site.

Modes of Multifocal Fitting

Directions: Select one answer for each question in the exam and completely darken the appropriate circle. A minimum score of 70% is required to earn credit.

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There is an eight-to-ten week processing time for this exam.

1.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
2.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
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13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
16.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
17.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
18.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
19.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
20.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

21. The goal statement was achieved:
○ Very Well ○ Adequately ○ Poorly

22. The information presented was:
○ Very Useful ○ Useful ○ Not Very Useful

23. The difficulty of the course was:
○ Complex ○ Appropriate ○ Basic

24. Your knowledge of the subject was increased:
○ Greatly ○ Somewhat ○ Hardly

25. The quality of the course was:
○ Excellent ○ Fair ○ Poor

How long did it take to complete this course?

Comments on this course:

Topics you would like in the future CE articles:

Please retain a copy for your records. Please print clearly.

You must choose and complete one of the following three identifier types:

① SS # ___-___-____

Last 4 digits of your SS # and date of birth ② ____-_____

State Code and License #: (Example: NY12345678) ③ _____

First Name _____

Last Name _____

E-Mail _____

The following is your: ☐ Home Address ☐ Business Address

Business Name _____

Address _____

City _____ State ____

ZIP _____

Telephone # ___-___-____

Fax # ___-___-____

By submitting this answer sheet, I certify that I have read the lesson in its entirety and completed the self-assessment exam personally based on the material presented. I have not obtained the answers to this exam by any fraudulent or improper means.

Signature _____ Date _____