COURSE CODE: C-7636

2 CET POINTS

Dispensing I: Simple dispensing – easy, isn't it?

Duncan Counter

The term "simple dispensing" can cover a multitude of sins, but here we will be discussing the elements of dispensing that could be considered as Best Practice. Although only possible to cover these aspects briefly, the text will look at some of the perhaps forgotten or neglected aspects of dispensing simple prescriptions. Areas outside this will be dealt with in a later article on Complex Dispensing which will cover such matters as high power lenses, dispensing for children, and anisometropic prescriptions.

Single vision lenses

The major decision when dispensing single vision lenses in simple, low power prescriptions is whether to keep the lens design and material simple or to use one of the many more sophisticated materials or forms available today. This decision should be governed by:

- The final cosmetic appearance;
- The mechanics of using the lenses;
- The use to which the spectacles will be put;
- Any optical considerations as a result of the choice.

With single vision lenses, the fact that only one lens area has to be considered makes the options simpler, with material and form being the principal factors. Thickness and its position on the lens are dealt with later in the section on frame selection.

Lens material and form

Even in the lower lens powers under consideration in these pages, it is more than likely that lens materials other than Crown Glass or CR39, and lens forms other than purely spherical, will be offered as options to a patient. Any deviation from the above mentioned brings with it an individual set of extra factors to be dealt with. For prescriptions up to and including a total power of ±2.00 D, it is more than likely that CR39 will be the material of choice, with Crown Glass being rejected due to its weight and breakability. Dispensing CR39 lenses holds few fears: it has a very high Abbé number (thus producing low levels of transverse chromatic aberration); the lens forms (usually close to a Minimum Tangential Error design, as most 'stock' lenses are) offer reasonable off centre performance in these low powers, and indeed this low numerical dioptric value even gives an enviable level of centration tolerance (although it is not recommended that this tolerance is pushed). Accurate centration and correct fitting will still maximise the many qualities this material has and give best possible performance.

Beyond ±2.00 D, it is more likely that a different material, form or both may be sought. A certain amount of caution is advisable before automatically selecting a high index lens for a negative power or an aspheric (or indeed, combination of both) for a plus power prescription. The first governing factor, the cosmetic appearance, will be satisfied with all these choices, but each will bring with it potential problems in the other areas. The high index material could introduce an Abbé number lower than that acceptable to the patient, with the Transverse Chromatic Aberration manifesting itself by creating coloured fringes around areas of high contrast in well illuminated conditions. Worse, though, is the potential for Off Axis Blur in conditions of poor contrast or limited light levels. This is an insidious effect that can cause complaints of poor vision when night driving and is sometimes enough to cause rejection of an otherwise acceptable pair of lenses. The impact of this in some polycarbonate-based lenses used in rimless spectacles has made this possible problem somewhat more likely in recent years. An Abbé number of 40 or more should not cause major difficulty in this area.

The change of lens form in higher index lens materials can also cause some niggles if the patient is accustomed to using a large proportion of the lens area. The off centre performance of the different lens form (usually flatter) will bring an increase in other aberrations such as oblique astigmatism, and coupled with TCA can bring complaints of peripheral blurring. Sensibly

approached, the "colour fringing" and "slight" peripheral blurring can be highlighted when the lenses are being suggested, as can the cosmetic advantages they will also offer, enabling the patient to make an informed choice, but the off axis blur may need a remedial approach – perhaps an inexpensive second pair with CR39 lenses to keep in the car for night driving if the patient experiences problems.

When the prescription dispensed is of a plus power, as the dioptric value increases, so the tendency to recommend aspheric lenses becomes more probable. With the impressive list of benefits; lighter and flatter, slightly thinner (more so in high index), reduced spectacle magnification giving improved cosmetic appearance, great reduction in oblique astigmatism in the central lens area giving rise to much improved useful lens area; it is scarcely surprising that they are first choice lens for +3.00 D and over. It should be noted that this all comes at the cost of an increase in mean oblique error which may slightly take the edge off the crispness of the image. Because an aspheric lens neutralises the oblique astigmatism by introducing negative surface astigmatism (the surface has rotational but non-circular symmetry about its optical axis),[1] care should be taken when fitting (see below) and also when dispensing specifically for close work. One of the above mentioned benefits, reduction in spectacle magnification, will act against the patient when reading, when they like the image to be as large as possible. A very specific situation here is the case of an elderly patient suffering from ARMD where the image size provided by the spectacles must be as large as possible. Also there is a case (possibly) for measuring and fitting the frame with a negative bow on the front (negative face form angle) to ensure the patient looks normally (at right angles) through the centre of the lens.[2] Most presbyopic patients would probably prefer to have distance aspheric lenses fitted normally and spherical reading centred for that purpose.

Bifocals

When dispensing and fitting bifocals, as well as taking the factors that apply to single vision into account, and what they have previously worn, it is essential to remember all the bifocal specific factors that could cause rejection. These could include:

1. Field of view in either lens area
2. Range of vision through either lens area
3. Cosmetic appearance
4. Optics and mechanics of use
5. Physical comfort of spectacles

1. The field of view will be controlled by two factors, the size and position of the segment. The purpose of the spectacles will decide these and if all the patient's needs have not been taken into account the bifocals will not work as well as they could. All the segment shapes and sizes must be reviewed and the most appropriate selected; then the ideal position for the segment should be applied. The "normal" lower limbus position is a catch-all but will not give 100% satisfaction in all cases – sometimes, for maximum effect, the segment can be moved higher or lower than this, or even shifted laterally on the rare occasion that an "offset" segment position is required. Remember to maintain the correct centration distance if two segments are dispensed, and to use a segment that can be manipulated in this way.

2. The range of vision is, of course, controlled by the prescription and this should only be changed for vocational purposes. The possibility of dispensing a bifocal other than distance/near is regularly ignored, yet can be the solution to so many dispensing problems. An intermediate/near bifocal can help a patient who works in confined spaces as part of their occupation immensely. The intermediate addition can be calculated once the working distance is known. The reciprocal of the working distance (in metres) gives the full add required – if any remaining useful accommodation is incorporated the intermediate add is soon arrived at and can be checked in a trial frame. In the same vein, the near or intermediate segment does not have to be at the bottom of the lens; a segment dispensed upside down will solve the problems of a patient who has near demands above eye level.

3. Bifocals have always had a bad press cosmetically, and that offending line cannot be removed, but some are more cosmetically acceptable than others. Any straight top segment will bring the most cosmetic problems, the larger the segment, the worse the appearance – curved top segments partially alleviate this. The humble round segment, however, is cosmetically quite acceptable especially if small in diameter. Any glass fused bifocal, by nature of the fact that the extra plus power for the segment is generated by a higher refractive index material with the same radius of curvature set into the main lens, will look less obvious than its plastics solid counterpart, whose extra plus in the segment is as a result of a change in radius of curvature on (usually) the front surface, and which can be felt when running a finger tip across the surface of the lens.

4. When using bifocals, whether the main lens is of a minus or plus prescription will dictate the ease of use of the lens. As the wearer looks off centre to use the bifocal segment, the main lens will inflict induced prism on the user. With a plus power this will be prism base up due to the main lens (assuming the segment to be in a conventional position) which will make positioning the reading material difficult if the power is of a reasonable magnitude, and could lead to the familiar "lifting the chin" mannerism so characteristic of bifocal wearers. It is important not to confuse this base up prism with differential prism at the reading point which is due to vertical anisometropia and will be dealt with in a later article; the prism referred to here is present in all plus power lenses. Use of a round segment, which will induce prism base down as the patient looks into the segment, will help reduce this but will impose jump, the sudden introduction of base down prism at the dividing line which the patient may find annoying. Jump is an instantaneous effect, whereas the prism at the NVP is constant and may be more of a problem for the user, and selection of a bifocal with the segment optical centre on the dividing line (E line, D40) will eliminate it at the cost of cosmetic appearance.[3]

5. The physical comfort of the spectacles is, of course, dependant on the fitting and adjustment of the frame

and the selection of lens material, both of which are covered elsewhere in this article.

So the dispensing and fitting of bifocals is a juggling act requiring accurate information from the patient, depth of knowledge of what is available, and a background knowledge of the implications of the advantages of using the different bifocal types. Table 1 gives a brief breakdown of the "pros and cons" of the different types and where they stand in the above cases, with a little additional information to help build a fuller picture. Table 2 gives a cross section of the bifocal segment diameters available.

Progressive power lenses

There is a wealth of different Progressive Power Lenses (PPLs) available from many different manufacturers. Most optometrists and dispensing opticians tend to get to know a relatively small selection and use the lenses with which they are familiar. This is a sensible approach as long as there is a representative cross section of the different types of design within that selection, allowing for change of design dependant on patient needs. The selection should include:

- Occupational Progressive and Enhanced Reading Lenses
- One Hard design PPL
- One or two Soft design PPLs
- A selection of Design by Prescription PPLs
- One or two Freeform "bespoke" PPLs

OPALs and Enhanced Readers will be used for specific reasons and vocational purposes and will be covered in a later article on Occupational Dispensing. Suffice it to say, here that they should be replacing single vision reading lenses for many patients, giving them reading spectacles with more versatility. The hard design PPL will only be used rarely, usually when troubleshooting, but can be useful for the hardened bifocal wearer who wants to "get rid of the line", or the economy-minded patient whose reading addition is beginning to add too much unwanted aberrational astigmatism in the wrong places in their soft design lenses.

The soft design and design-by-prescription-types will form the mainstay of the range, being dispensed to most of the PPL wearers. Soft design, with their more generous useful intermediate area (compared to hard design) are excellent in lower additions, but in the less expensive types tend to develop aberrations in unwanted places as the addition moves past +2.00 DS. The more expensive soft and ultrasoft designs introduce design by prescription, which equalises the field of vision irrespective of the lens power and incorporates design changes (becoming harder) as the addition increases. Many of them offer more symmetrical aberration patterns on the right and left sides of the corridor to make the lens adaptation easier for the wearer. With the most sophisticated of these "standard" designs incorporating many variations through the power and addition range, aspheric technology and placing the progressive surface on the back of the lens to make its use more natural, and decrease spectacle magnification, they move very close to the last group of PPLs, "bespoke" or made-to-measure lenses.

This most recent lens type, because of its very individualistic approach, is likely to become the true "problem solver". For the patient who has truly experienced "non-tolerance" to PPLs in the past (not merely because of poor fitting or lens selection) a further attempt using a pair of accurately fitted freeform PPLs may work the charm and bring

Bifocal Type	Field of vision in two areas	Cosmetically	Jump	Prism in near due to Main lens
Round Segment	Excellent distance, some lower field also, but offers widest field very low in seg - actual field will depend on diameter	Excellent, particularly small seg fused glass	Poor – always induce jump which is particularly bad in large diameters	Very good for plus powers because segment gives base down prism
D or S Segment	Good distance with some lower side field – widest part of segment right below line – near field dependant on diameter	Best in fused glass but progressively poorer in plastics as diameter increases	Greatly reduced compared with round – still some jump	Good for minus powers as NVP close to segment centre only rarely affects prism due to dist.
C Segment	Same as D segment	Curved top gives better cosmetic impression than straight line segment	Same as D segment	Same as D segment
E line	Excellent in both Dist and Near areas – maximum field in both areas	Very poor. Avoid dispensing in plus Rx if possible. Still not good in minus - very visible ridge	No Jump at all. Near portion optical centre on dividing line eliminates it	Because Near OC is on dividing line, can cause "chin lifting" in plus powers due to base up prism

Table 1
Bifocal characteristics

Segment shape	Available diameters Plastic	Glass
Round segment	24, 25, 28, 38, 40, 45	Fused 25, 26, 28 Solid 30, 38, 45
D or S segment	D25, D or S28, D35, 40mm flat top, D45	S26, S or D28
E line	No diameters	
C segment	C25, C26, C28, C40	C25, C28, C30

Table 2
Table of available bifocal segment diameters[7]

them into the PPL fold. Also if specific measurement variations are required, such as a particular degree of inset (or lack of it), the very individual nature of the lenses enables supply of exactly what is required. Care must be taken when fitting as many extra measurements must be supplied, including vertex distance and a measurement of pantoscopic angle and face form angle (bow or dihedral in manufacturer's terminology), as well as boxed lens size to facilitate manufacture of the lenses to minimum thickness. There are now many of these lenses available (each manufacturer will have their own measurement requirements) and they can prove useful at any stage of a patient's PPL wearing life as the design pattern remains constant from one prescription/add stage to the next.

Frame selection

The simplest of topics on the surface, and yet riddled with potential pitfalls, the selection of a suitable frame is a crucial element of the dispensing process. Often delegated to less experienced colleagues, an early error here can result in loss of patient confidence if an alternative to the chosen frame has to be suggested for technical reasons. The most likely of these is the fact that the frame selected requires a lot of decentration to position the optical centres properly. This obviously will result in a major difference in edge thickness between the nasal and temporal sides of the lenses, seeming almost more unacceptable in a positive prescription than a negative one. It is worth noting that the lens powers do not necessarily need to be particularly high for this to become an issue. Careful selection of a frame whose Box Centre Distance is not too far removed from the appropriate Centration Distance for the patient, will go a long way toward avoiding this.

On the other hand, it is perfectly possible that a frame could be judged unsuitable because its dimensions are too small. When dispensing any kind of multifocal lens, sufficient allowance has to be made for segment positioning or progression corridor length. This is particularly pertinent when fitting the more vocational type of lens. If a trifocal is the choice then it is essential that sufficient depth is available below the segment top position to allow the patient a reasonable reading area below the intermediate portion of the segment, especially important when fitting a lens with a deep intermediate band. Equally, when fitting Enhanced Reading or Occupational Progressive lenses there is often a minimum distance required above the fitting position to allow for full use of the exceptionally long corridor usually present in this type of lens.

As well as size of frame, sometimes shape of frame needs to be considered. If the prescription is high, common sense indicates that a regular round or oval shape would be recommended, and if quadra or similar is essential, at least ensure that the "corners are rounded". However, if the lens power is almost totally cylindrical, even more care must be taken, especially if the axis oblique. Cylindrical corrections can be very confusing and can, in some cases, work to help the final cosmetic appearance. Consider the prescription:

R: -2.00/-1.50x180; L: -2.50/-1.00x175.

In the vertical meridian the lens has a higher negative power, thus a potentially thicker edge substance if glazed in a round shape; in a modern shallow oval shape the smaller vertical frame dimension will give an almost exactly even edge thickness to the whole circumference of the lenses. It does not work so well every time, though, as if the axes were 90 and 85 the regular rounder shape would at least limit the thicker edge to nasal and temporal edges, where extra thickness is more expected. With an oblique cylinder, for example:

R: +0.50/+4.25x135; L: +0.25/+4.50x45,

the lens form becomes more difficult to visualise. Where are the significantly thicker parts of the lens? The fact that the lens is almost a Plano/cylinder gives the answer. The maximum thickness will be in the centre due to the lens having an overall positive power, but the very low power along the axis meridian extends that thickness, almost unchanged, to the very edge of the lens, resulting in excessive substance at the extremes of the 135 meridian in the right and the 45 meridian in the left. The ramification of this is that no matter what frame is selected, the lenses will be very thick in the lower nasal and upper temporal quadrants. The only option with a prescription like this is damage limitation by avoiding really irregular lens shapes.

Spectacle fitting

No discussion of dispensing as a general subject, whether simple or complex would be complete without addressing the subject of spectacle fitting. Today, as mentioned above, more sophisticated lenses are being utilised for the "under ±5.00D" prescriptions. In order for these lenses to function properly and offer their full benefits to the wearer, many of them have to be fitted in a particular way.

This is not the only important element, however. Observation of the spectacles seen on the faces of the general public (and indeed on television worn by the not so general public) provokes comment with regard to the fitting methods that were used, or

otherwise. In an earlier section, it was noted that care should be taken when gauging the size of the finished spectacles to avoid excessively thick lenses. Equal care should be taken to ensure that the frames are not out of proportion with the patients' facial features – allowance should be made for the power of the lenses to be glazed taking into account the likely spectacle magnification. This is often ignored, despite the availability on most computer imaging software of a feature allowing the lenses to be shown on the picture for the patient's consideration. The resulting "too big" or "too small" appearance can be the cause of patient dissatisfaction, and result in a general loss of confidence.

The actual fit of the frame also requires some care. It is not sufficient for the patient to select a frame that they like, the frame must also fit sufficiently well that there are no long term problems. To help with this it is key to remember how the various bridge types should fit. A regular bridge (one with no pads) should follow the contours of the nose perfectly for a snug, unbroken contact surface. Bridges of this type are generally found on handmade frames as it is not very likely such an accurate fit will be possible with a mass produced example. The various types of pad bridge (fixed pad, adjustable pads on arms, keyhole) are called pad bridges for a reason – the pads are the main weight bearing surfaces of the bridge. This will regularly (always with a pads on arms bridge) result in a gap at the top of the bridge. As long as the gap is not too large or unsightly this should be regarded as acceptable if the pads fit well on the sides of the nose (See Fig A).

The final overall fit should be carefully planned. Too often patients present for adjustment with spectacles "slipping down" when the root cause is that the frame is too tight across the temples and is actually pushing forward. Measurements such as head and temple width should not be ignored when recording initial fitting details. Other fitting parameters that should be included are angle of side, in terms of the way in which it affects pantoscopic angle, length to bend and in the case of a pads on arms frame, distance between pad centres. A full set of these (head and

Figure A
An acceptable gap on a fixed pad frame

temple width will dictate angle of let back) added to the front dimensions and centration distances give a peerless picture of the finished spectacles, which can be set up thus for the patient before collection and which provide a wonderful basis for problem solving if the patient returns with spectacles not functioning properly.

Measurement

When it comes to the act of measurement there are certain precautions, often brushed aside in haste, which must be taken. They are the simplest of things:

- Ensure person measuring is "square on" to person being measured
- Use adjustable height furniture to ensure eye levels are exact
- Carry out measurements in good light to eliminate error caused by difficult iris colours
- Keep patient informed of procedures – their personal space is being invaded. This is essential if taking any measurements that have not previously been recorded for this patient
- Use the actual frame set up for the patient to measure heights and centration distances

Some of these precautions become more important as the lens types become more complex.

Single vision lenses

The dismissal of fitting procedure for single vision lenses as being unworthy of a lot of time is far too commonplace. Just as much care needs to be taken fitting a pair of -3.50D single vision lenses as that expended on the most complex of PPL fittings. It should be noted that inaccuracy of optical centre positioning will lead to induced prism, particularly when the patient converges to read. As an example, the prescription:

R: +2.50/+1.00x90; L: +3.00/+0.50X90,

is dispensed for distance use. When completed there is an error in centration, where 68 is supplied where 64 is required. In such a low power, it can be tempting to ignore what seems a small inaccuracy. If Prentice's Rule, P = cF is applied it will be found that there is a 1.4△ base Out differential prism in distance gaze, and 2.8△ base Out differential when reading.[4] It could be argued that a young patient (using this pair for both distance and reading) could easily tolerate and overcome this, but it is always best not to let patients become accustomed to incorrect dispensing; also, if dispensing to BS tolerances no error of more than 1△ is acceptable.[5] If dispensed correctly later, intolerance is the likely reaction. Equally if the patient is nearing 40 years of age, they are probably going to experience difficulty reading, particularly when tired, due to the extra convergence necessary to overcome the base out prism.

Centration accuracy is not limited to the horizontal meridian. When fitting any high refractive index or aspheric lens it is important to measure the vertical position of the pupil centre in normal distance gaze. Relating this to the pantoscopic angle, as noted below in the section on PPL fitting, and adjusting the optical centre accordingly (or alternatively measuring the vertical OC position with the frame at Zero pantoscopic angle) will ensure that these lens types will perform to full potential.

Bifocal Lenses

Again, the basic precautions will yield good results. If, however, the eyes of the person measuring are at a different height to the those of the subject, the carefully planned vertical position of the segment top will be incorrect, resulting in an ineffective pair of bifocals, and possible rejection. Even a small error in levels of three or four inches can give as big an error as 3mm at arms length, with the segment being

too low if the person measuring is too low (See Fig B). It is worth getting a third party to check levels if there is doubt. If the inset is important (or actually variable in the selected bifocal type), ensure the near centration distance is measured in the plane of the frame, not at the eyes. In the case of a patient with an excessively large or small distance PD this can make a significant difference.

Progressive power lenses

Just as for bifocals, the basic precautions will work well, but particular emphasis needs to be laid on equal eye level, square on to patient, and particularly the actual frame, set up for the patient. It is important to remember that the lenses being fitted are pre-decentred to allow for a pantoscopic angle of 10º (8º to 12º to be precise).[6] This maximises field of vision for near and offers the correct effective reading power to the wearer. If the frame does not fit at that angle then either the side angle must be adjusted to give that pantoscopic angle (if this is possible) or the vertical fitting height should be modified to allow for it. The error in fitting cross position will be 1mm for every 2º of pantoscopic angle error. Again, this is enough to affect the performance of the PPL. The pantoscopic angle is often confused with the angle of side – yes the two are interdependent, but pantoscopic angle is altered by adjusting angle of side, an important distinction (See Fig. C). The pantoscopic angle is the angle between the plane of the front and the vertical, and can be measured using various devices, including the Serelo facial gauge. Most often, though, this angle is judged by viewing the final fitted frame from the side and estimating. If the patient is very critical about lens

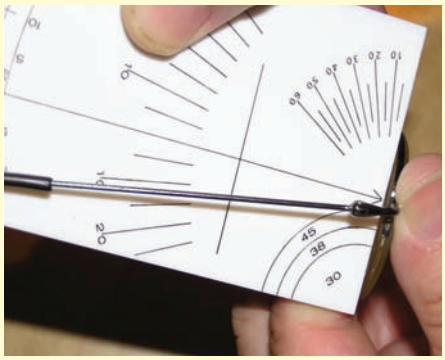

Figure B
Measurement of angle of side

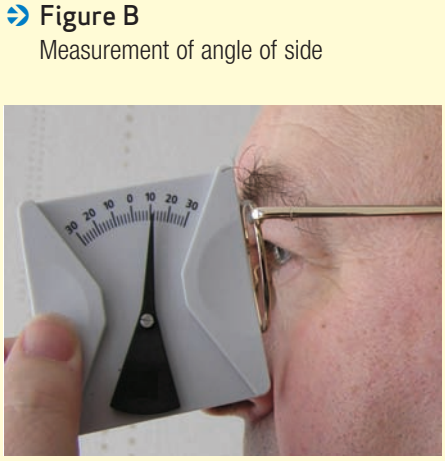

Figure B2
Measurement of pantascopic angle

performance it may be worth measuring the pantoscopic angle and making any necessary adjustments, either to side angle or the vertical position of the fitting cross.

All of the above precautions and methods will pay dividends when fitting any type of lens. The more care taken, the better the results.

Is it simple?

As can be seen above "simple dispensing" is littered with potential pitfalls, waiting to trap the unwary and bring out the dreaded "grief case". Most of these pitfalls, however, can be avoided with careful thought, accurate measurement and fitting, and above all a high level of communication with the patient. Being aware of the effects they are likely to experience can actually lead to acceptance of the negative aspects in order to gain the benefits of the positive. It is impossible to emphasise the importance of communication and keeping the patient abreast of possibilities and developments at every stage, as well as keeping them informed of your actions when measuring and adjusting. Most grief cases in "simple dispensing" situations arise out of "simple breakdown in communications".

The amount of care taken in dispensing, however "simple", is rewarded with satisfied patients with little need to return other than routinely, who will pay back the efforts by recommending the service to all their friends and family. What better reward could there be?

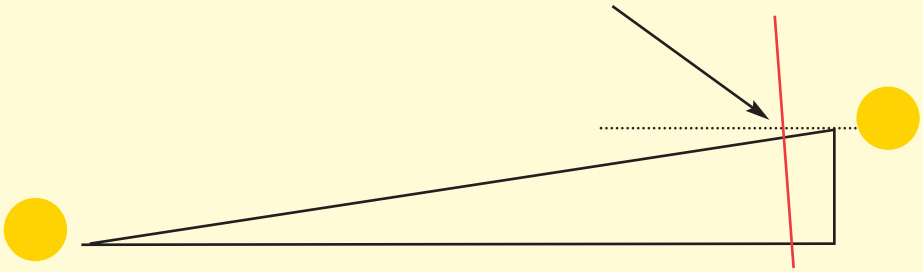

Figure C
When the observer's eye (left yellow circle) is at a lower level than that of the subject (right yellow circle), even at a short, arms length distance of 50cm and a minimal height difference, the error in segment top position can be significant

About the author

Duncan Counter is a Dispensing Optician from the West Country who has been involved in many aspects of dispensing over the years, but with an increasing leaning toward training. He has been heavily involved with the ABDO, both representatively and as an examiner and tutor, and has been closely involved with the introduction of CET for Dispensing Opticians. He has made many CET presentations and published several articles.

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Module questions

Course code: c-7636

Please note, there is only one correct answer. Enter online or by form provided

An answer return form is included in this issue. It should be completed and returned to CET initiatives (c-7636) *OT*, Ten Alps plc, 9 Savoy Street, London WC2E 7HR by February 22 2008.

1. The prescription R: -1.50/-3.50 x 135; L: -2.00/-3.00 x 45 is dispensed in a round frame. Where will the thickest parts of each lens be found?
a. In the centre of each lens
b. R at each extremity of 135 meridian, L at each extremity of 45 meridian
c. R at each extremity of 45 meridian, L at each extremity of 135 meridian
d. R at ends of power meridians in upper part of lens, L at ends of power meridians in lower part of lens

2. The prescription R: +2.25/+1.00 x 175; L: +2.50/+0.75 x 5, R&L Add +2.00 is to be dispensed in bifocal form with segment tops 2mm below HCL. Which bifocal segment type will give the least amount of overall vertical Prism at the Near Visual Point 10 mm below the distance OC set on the HCL?
a. Round Segment
b. D or S shape Segment
c. Curve top Segment
d. E line Segment

3. Which of the following benefits gained by dispensing aspheric lenses for a Plus prescription can be a disadvantage when using them for reading lenses?
a. They are lighter and thinner than conventional lenses
b. They offer a larger useful lens area by reducing oblique astigmatism
c. They are flatter in form and thus more attractive
d. They reduce spectacle magnification making the eye appear nearer a normal size to an observer

4. When fitting an aspheric or PPL lens the pantoscopic angle is crucial and is linked to the vertical position of the Optical Centre or Fitting Cross. How much adjustment to the vertical OC must be made if the pantoscopic angle is changed by 4º?
a. 8 mm
b. 6 mm
c. 4 mm
d. 2 mm

5. Which of the following types of spectacle frame bridges should never allow a gap to occur between frame and nose at the crest of the bridge?
a. Keyhole bridge
b. Regular bridge
c. Adjustable pads on arms bridge
d. Fixed pad bridge

6. The E-line bifocal is exceptional in its elimination of jump. Why is there no jump in an E-line?
a. It produces base up prism at the NVP of a plus prescription
b. It produces base down prism at the NVP of a plus prescription
c. It places the segment optical centre on the dividing line
d. Because it offers the widest field of vision for near

7. Which of the following side measurements would be altered to directly change the pantoscopic angle of the front of a pair of spectacles?
a. Angle of let back
b. Angle of side
c. Downward angle of drop
d. Inward angle of drop

8. During verification of the prescription on a focimeter, the prescription R: +3.25/+075 x 90, 1.00△ In; L: +3.25/+0.75 x 90, 1.00△In, is found to have no prism present at the optical centres. How much error in centration does this indicate, assuming the centres to be symmetrical right and left?
a. 2.5 mm too little decentration R&L
b. 3 mm too little decentration R&L
c. 2.5 mm too much decentration R&L
d. 3 mm too much decentration R&L

9. Which type of lens deliberately introduces negative surface astigmatism in an attempt to effectively neutralise the oblique astigmatism induced when looking away from the optical centres?
a. A Minimum Tangential Error Best Form lens
b. An Aspheric lens
c. A Point Focal Best Form lens
d. A Percival Best Form lens

10. Which of the following symptoms, typically encountered by a new wearer of very high refractive index lenses, is the most likely to cause major problems or rejection?
a. Colour fringing around objects in high contrast situations
b. The edge thickness of the lenses
c. Off axis blur in poor light and low contrast situations
d. Slight blurring in the peripheral field of vision

11. Which of the following progressive lens types gives the option of variable inset of the reading portion?
a. Occupational Progressive lenses
b. Hard design Progressive lenses
c. Freeform Bespoke Progressive lenses
d. Soft design Progressive lenses

12. What is the likely result of the person measuring a patient for bifocals being much taller than their subject, but failing to compensate for this difference in heights?
a. The bifocal segment will be too low
b. The bifocal segment will be too high
c. The inset of the segments will be too great
d. The distance optical centres will be displaced nasally

Please complete on-line by midnight on July 10 2008 - You will be unable to submit exams after this date – answers to the module will be published in our July 11 issue