

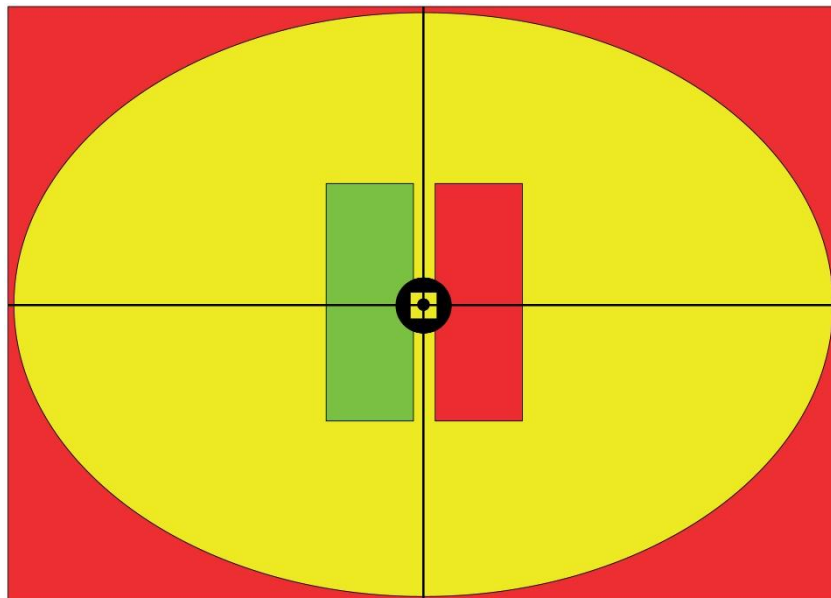
11 Calculation of the lens magnification

11.1 Introduction

Each spectacle lens contains own magnification (so called shape factor). This magnification we can calculate according to following formula. We need to know lens' front surface's optical power (φ'_1), central thickness of the lens (t) and refractive index (n) of the lens and vertex distance (d).

$$M = M_p \cdot M_s = \frac{1}{1 - \varphi'_1 d} \cdot \frac{1}{1 - \varphi'_1 t/n} \quad M [\%], \varphi'_1 [D], d [m], t [m] \quad (3)$$

Spectacle's own magnification we can use for correction aniseikonia. Size of the aniseikonia can be measured with instruments called eikonometers or with the help of collection of so-called size lenses. Measured magnification difference between eyes should be added to sphero-cylindrical correction. The spectacle lens manufacturers are able to produce lenses with own magnification. Usually they provide it with change of lens base curvature or lens thickness.



Picture 11.1: Anaglyph eikonometer (Opticaldiagnostic.com 2013)

11.2 Goals

- Calculate own magnification of spectacle lens with front surface's optical power +8 D and thickness 3 mm
- Calculate own magnification of the given lens

11.3 Equipment

Writing equipment, sphere-meter, calculator and spectacle lens.

11.4 Methods

Calculate own magnification of spectacle lens with front surface's optical power +8 D and thickness 3 mm

According above placed formula calculate own magnification of the spectacle lens

Calculate own magnification of the given lens

For calculation you need to know optical power of the front surface which you can measure with sphere-meter. Further you need to know central thickness of the lens which could be measured with thickness-meter. We suppose refractive index of the lens is 1.5.

11.5 Results

Calculate own magnification of spectacle lens with front surface's optical power +8 D and thickness 3 mm

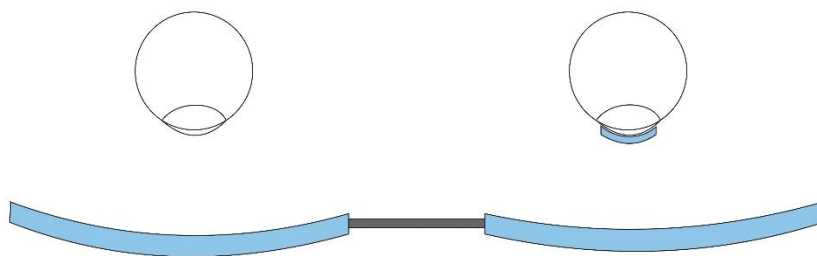
$M_1 =$

Calculate own magnification of the given lens

$M_2 =$

11.6 Discussion

We can use many corrections of the aniseikonia in the practice. For example, in case of eyepiece aphakia we can use contact lens to reducing difference between the image sizes of the both eyes. In another case we can use correction with spectacle lenses but the size of images of both eyes can be nearly 20 % which is usually non-tolerated. Third possibility is use combination spectacle lens – contact lens. This combination can change the size of the image.



Picture 11.2: Correction of aniseikonia with combination contact lens and glasses (Opticaldiagnostic.com 2013)

11.7 Conclusion, notes, comments

Which type of aniseikonia correction could you recommend?

What are the causes of the aniseikonia?