Ophthalmic Optics / Spectacles: Optics (Ophthalmic)

A. Physical characteristics of ophthalmic lenses
   1. Geometry of lens surfaces (spherical, cylindrical, toric, aspheric)
   2. Base curves (form of lenses)
   3. Lens thickness (center, edge, gradients, iso-thickness curves)
   4. Specification of lens size and shape
   5. Materials (refractive index, dispersion, hardness, specific gravity)

B. Reflection
   1. Planar and spherical reflection
   2. Proportion of light reflected from a surface (Fresnel's law)
   3. Focal power, focal length, and curvature
   4. Object-image relationships
   5. Magnification
   6. Lens/mirror systems
   7. Ray tracing

C. Optical characteristics of ophthalmic lenses
   1. Locations of and relationships between the optic axis, optical center, geometric center, and major reference points
   2. Principles of corrected curve lens design
   3. Verification of lens prescriptions (Lensometer, lens gauge, and hand neutralization)
   4. Writing and transposing lens prescriptions
   5. Effect of lens tilt (spheres and spherocylinders about a principal meridian)
   6. Effective power (for near and for changes in vertex distances)
   7. Spectacle lens processing
   8. Spectacle magnification
      a. Shape and power factors
      b. Iseikonic lens design
   9. Methods of remedying reflections and ghost images

D. Ophthalmic prisms and prismatic effects of lenses
   1. Thickness differences across a prism
   2. Prismatic effects in the periphery of a lens (spheres, spherocylinders)
   3. Decentration (prism from decentration, decentering to obtain prism, interpupillary distance)
   4. Correction of vertical prism effect
      a. Slab off (front, back, top, bottom, reverse)
      b. Dissimilar segments
      c. Prism segments
      d. Multiple corrections
      e. Contact lenses
      f. Fresnel prisms
      g. Fresnel Adds

E. Multifocal lenses
   1. Types (fused, 1-piece, progressive additions and blended lenses)
   2. Methods of producing Add powers
   3. Segment center location
   4. Differential displacement (jump)
   5. Total displacement, horizontal and vertical imbalance
   6. Placement of distance and multifocal optical center
   7. Optical and physical characteristics of segments (design and calculations, progressive Adds, aberrations, surface characteristics)
   8. Specifying multifocal height, size, shape and location of segment
F. Physical characteristics and biological compatibility of frame materials

G. Fitting, adjustment, specification, and nomenclature of frames

H. Optical and frame consideration of high powered lenses: spheric, aspheric, and high refractive index materials

I. Absorptive lenses
   1. Specification of lens tints and absorptive coatings (including spectral transmission curves)
   2. Characteristics of photochromic lenses
   3. Relationship between lens thickness and spectral transmission
   4. Special occupational requirements

J. Impact resistance
   1. Degrees of resistance of ophthalmic lens materials
   2. Methods of rendering materials impact resistant
   3. Methods of verifying impact resistance
   4. Performance of materials upon, and after, impact
   5. Specifications of occupational safety lenses

K. Optical tolerances and physical requirements of ophthalmic lenses and frame materials (FDA, ANSI Z80 and Z87, OSHA)

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