

Tutorial for PHYS210 lecture 8: Chromatic aberrations

- 1) Which of the following combinations would make a diverging achromatic doublet?
 - A. A strong convex lens with a high value of V and a weaker concave lens with a small value of V
 - B. A strong concave lens with a high value of V and a weaker convex lens with a small value of V
 - C. A strong convex lens with a small value of V and a weaker concave lens with a high value of V
 - D. A strong concave lens with a small value of V and a weaker concave lens with a high value of V

- 2) You have 2 biconvex lenses with the same focal distance, but made from different materials. Lens 1 is made of crown glass with a refractive index of 1.5 and a dispersive index of 50. Lens 2 is made of flint glass with a refractive index of 1.6 and a dispersive index of 35. Which of the following statements is true?
 - A. Lens 1 has stronger chromatic and spherical aberrations than lens 2
 - B. Lens 2 has stronger chromatic and spherical aberrations than lens 1
 - C. Lens 2 has stronger chromatic aberrations than lens 1, and lens 1 has stronger spherical aberrations than lens 2
 - D. Lens 1 has stronger chromatic aberrations than lens 2, and lens 2 has stronger spherical aberrations than lens 1

- 3) A patient performs the duochrome test and sees the letters on the red background more clearly than those on the green background. What is the conclusion?
 - A. The green light focuses in front of the retina. The patient has hypermetropia.
 - B. The green light focuses behind the retina. The patient has hypermetropia.
 - C. The green light focuses in front of the retina. The patient has myopia.
 - D. The green light focuses behind the retina. The patient has myopia.

- 4) A certain type of glass has a refractive index of 1.49 for red light, 1.50 for yellow light and 1.51 for blue light
 - A. What is the value of the dispersive index V for this glass?
This glass is used to make a plano-convex lens with a radius of curvature on the curved side of 10 cm.
 - B. What is the focal distance of this lens for blue light?
 - C. What is the focal distance of this lens for red light?
 - D. An object is held 50cm in front of the lens. What is the distance between the image formed by the red and the blue light?