

**For General Medicine**  
**Topic of section: Optics**  
**Topics of seminar: Eye vision**

**Answer the questions:**

1. Describe eye structure and the optical properties of the eye mediums.
2. Explain the functions of the eye optical system. Give definition of the eye refractive power.
3. Explain phenomenon of the eye accommodation. Describe its mechanism. What is the range of the accommodation? How the range accommodation depends on age?
4. Characterize the main eye refraction defects. Explain methods of their correction.
5. Give definitions of the eye resolution limit, the visual acuity and the visual angle.
6. Describe the eye retina structure.
7. Give definitions of rods and cones. Explain rhodopsin-retinal visual cycle.
8. Describe difference between daylight vision and twilight one. Give the light absorption spectrum for cones and rods.
9. Explain phenomenon of the eye adaptation. Describe the basic mechanisms of light and dark adaptation.

**Solve problems:**

1. Find the distance at which the letters with size of 6 mm will be visible under the angle of 5'.  
*Answer: 4.1 m*
2. Find the visual acuity for the minimum visual angle which equal to 5'.  
*Answer: 0.2*

3. Find the minimum distance at which a person with normal visual acuity can distinguish subject details with size smaller than 4.5 mm.

*Answer: 15.3 m*

4. How many diopters does the eye optical power change if subject moves from distance of 2,5 m to distance of 25 cm.

*Answer: 3.6 dptr*

5. If an object is located at the distance of best vision, a person with normal visual acuity can recognize two points of the object if a distance between these points is equal to  $d = 0,075$  mm. What is the least distance between two object points which can be recognized, if an object is located at the distance of 2 m from eye?

*Answer: 0.6 mm*

### **Literature**

1. Medical and biological physics for medical students, pages 209 -220