



Tanta University

Faculty of Medicine

Ophthalmology Department

26/2/2022

MD exam; OPTICS

Second Semester

(All questions must be answered)

1. Define critical angle and discuss its optical principle and clinical applications.
2. During penetrating keratoplasty, pupil dimensions and position change before and after clear corneal button suturing. Comment
3. Discuss the optical principle of the Galilean telescope and its applications in Ophthalmology.

❖ Identify the incorrect answer unless otherwise indicated:

1. Epithelial edema-induced halos:

- A. occur when the cornea acts as a diffraction grating.
- B. are white when white-light objects are viewed.
- C. can be seen by patients who have contact lens over-wear.
- D. are colored when white objects are viewed.

2. Photochromic lenses:

- A. darken when they contact ultraviolet (UV) light.
- B. take longer to darken than lighten.
- C. are excellent UV absorbers when dark.
- D. absorb about 80% of incident light when maximally darkened.

3. Soft contact lenses that:

- A. fit too steeply will show distorted keratometric mires between blinks and a central dark spot on retinoscopy.
- B. are dry will exhibit poor keratometric mires.
- C. fit flatly will have an edge that turns away from the eye.
- D. fit steeply will decenter easily.

4. The indirect ophthalmoscope:

- A. provides a real, inverted aerial image of the patient's illuminated fundus.
- B. when used with stronger lenses provides a larger field of retinal view.
- C. in examination of an emmetropic eye with a 20 diopter lens provides 2X magnification.
- D. brings the patient's and the examiner's pupils into conjugate relationship.

5. Progressive addition lenses:

- A. a disadvantage is that laboratory-applied coatings cannot be used.
- B. are available in glass and plastic.
- C. disturb peripheral visual space.
- D. require the patient to learn head-turning.

6. The Jackson Cross-Cylinder test:

- A. involves the principle of placing the circle of least confusion on the retina.
- B. cannot determine the power of the astigmatic correction.
- C. verifies the axis and power of the correcting cylindrical lens.
- D. has markings (red dots) on each end of the minus axis.

7. The red-green duochrome test:

- A. is used for binocular balance.
- B. makes use of the eye's chromatic aberration.
- C. uses a pair of colored slides at 500 nm (green) and 670 nm (red).
- D. is sensitive to 0.25 diopter.

8. The stenopeic slit:

- A. acts as a line of pinholes.
- B. can be used to screen for astigmatism.
- C. is most useful in patients who have better than 2/40 (6/12) visual acuity.
- D. is found in most trial lens sets.

9. Visible light:

- A. wavelengths represent about 1% of the electromagnetic spectrum.
- B. has shorter wavelengths than ultraviolet light.
- C. has shorter wavelengths than radiowaves.
- D. has wavelengths about 400 to 700 nm.

10. Ultraviolet light:

- A. represents 25% of the light energy that reaches earth.
- B. contains UV-A, -B, and -C.
- C. causes greater damage in older individuals.
- D. is filtered from the retina by the crystalline lens.

11. During retinoscopy:

- A. a typical working distance is 75 cm.
- B. the far point of the uncorrected hyperope is behind the patient's retina.
- C. the closer to neutrality, the faster the reflex movement.
- D. the closer to neutrality, the brighter the reflex movement.

12. Keratometry:

- A. assumes that the cornea is spheric or toric.
- B. the interpretation of the Placido's disk corneal topography data is not complicated.
- C. measures only the anterior corneal power.
- D. works well-enough to permit accurate contact lens fittings.

13. The lensometer:

- A. measures the focal length of the lens.
- B. consists of a movable target, a powerful fixed lens, and a telescopic eyepiece.
- C. maintains proportion among the power of the unknown lens, the target, and the fixed-field lens.
- D. can be used with progressive multifocal lenses.

14. Identify the incorrect response:

- A. contrast sensitivity decreases with age.
- B. contrast sensitivity decreases with decreased luminance.
- C. pupil size of 1 mm gives the maximal modulation transfer function for high spatial frequencies.
- D. visual acuity of 20/20 (6/6) is equivalent to 30 cycles per degree.

15. Identify the incorrect response:

- A. a photon of blue light carries more energy than a photon of red light.
- B. a photon's energy is proportional to its frequency.
- C. stimulated emission produces incoherent light.
- D. spontaneous emission is a random process.

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Doctoral Ophthalmic Anatomy Examination (19/2/2022)

Part I: Answer the following questions:

- 1- Describe embryology of bony orbit and anatomy of orbital apex?
- 2- Describe anatomy of the internal scleral sulcus contents?
- 3- Describe anatomy and applied anatomy of optic radiation?

Part II: Chose the correct answer:

- 1- Which of the following regarding orbital roof is correct?
(A) Orbital roof is made solely from frontal bone.
(B) Trochlear fossa lies 7mm from orbital margin.
(C) Ethmoidal canals open below fronto-ethmoidal suture.
(D) Frontal nerve lies below and in contact with roof periorbita.
- 2- Which of the following regarding lateral orbital wall is correct?
(A) Lateral wall is formed from frontal and zygomatic bones.
(B) Lateral orbital tubercle (Whitnall's tubercle) lies on zygomatic bone 5mm behind orbital rim.
(C) Spina recti lateralis lies on superior margin of superior orbital fissure.
(D) Meningeal foramen is situated near posterior end of superior orbital fissure.
- 3- Which of the following regarding extraocular muscles is correct?
(A) Both oblique muscles pull at equal angles to optical axis of the globe.
(B) Both oblique muscles pass below their corresponding rectus muscle.
(C) Medial rectus muscle is supplied by superior division of oculomotor nerve.
(D) Superior rectus is the only muscle supplied by superior division of oculomotor nerve.
- 4- Which of the following regarding orbital fasciae is correct?
(A) Periorbita is firmly attached to orbital margin and lacrimal fossa.
(B) Periorbita carries nutrient arteries to rectus muscles.
(C) Orbital septum extends between orbital margin and non-attached border of tarsus.
(D) Orbital septum is perforated by infraorbital nerve.
- 5- Which of the following regarding paranasal sinuses is correct?
(A) All air sinuses, except the ethmoidal sinuses are well developed at birth.

- (B) They are lined by stratified squamous epithelium.
- (C) The maxillary sinus drains via the hiatus semilunaris.
- (D) The sphenoidal sinus drains into the superior meatus of the nose.

6- Which of the following regarding cornea is correct?

- (A) Adjacent cells of corneal epithelium and endothelium are linked by hemidesmosomes.
- (B) Cells of corneal epithelium and endothelium are capable of regeneration.
- (C) Corneal innervation is via long ciliary nerves.
- (D) Intraepithelial nerves of cornea are myelinated.

7- Which of the following regarding ciliary body is correct?

- (A) Ciliary body lies about 1.5mm from limbus.
- (B) Ciliary muscle attached to zonular fibres.
- (C) Capillaries of ciliary processes are nonfenestrated.
- (D) Ciliary body is about 8mm width of which pars plana is 4mm.

8- Which of the following regarding retina is correct?

- (A) Photoreceptor nuclei are found in middle nuclear layer.
- (B) Outer plexiform layer contains amacrine and bipolar cells.
- (C) Inner nuclear layer contains ganglion cell nuclei.
- (D) Inner plexiform layer contains synapses between ganglion and bipolar cells.

9- Which of the following regarding eyelids is correct?

- (A) There are two facial planes in upper eyelid and one in lower eyelid.
- (B) Lacrimal artery terminates as medial palpebral branches.
- (C) Upper eyelid has usually three arterial arcades.
- (D) Orbicularis oculi muscle originate from lateral palpebral ligament and neighboring bone.

10- Which of the following regarding primary visual area is correct?

- (A) Primary visual area lies on lateral aspect and posterior pole of occipital lobe of the brain.
- (B) Calcarine fissure runs from isthmus of singulate gyrus to posterior pole of occipital lobe.
- (C) Primary visual area is formed of 6-laminae, which act separately.
- (D) Ganglionic lamina of visual area contains the smallest pyramidal cell somata and numerous stellate cells.

11- Which of the following regarding oculomotor nerve is correct?

- (A) Oculomotor nerve emerges as 15-20 rootlets close to upper border of pons.

- (B) Oculomotor nerve crosses upper surface of optic tract from medial to lateral.
- (C) Oculomotor nerve lies in lateral wall of cavernous sinus with abducent nerve inferomedial to it.
- (D) Oculomotor nerve divides into two divisions after passing through superior orbital fissure.

12- Which of the following regarding trigeminal nerve is correct?

- (A) Proprioceptive information from muscles of mastication and extraocular muscles passes to principle sensory nucleus of trigeminal nerve.
- (B) Nucleus of spinal tract of trigeminal extends from pons to second cervical segment of spinal cord.
- (C) Nociceptive information is conveyed to mesencephalic trigeminal nucleus.
- (D) Ophthalmic nerve has no communication with motor nerves of extraocular muscles.

13- Which of the following regarding autonomic nervous system is correct?

- (A) Postganglionic sympathetic fibres "hitchhike" on internal carotid artery.
- (B) Superior cervical ganglion lies opposite fourth cervical ganglion.
- (C) Sympathetic supply to the eye is through two neuron arc.
- (D) Postganglionic sympathetic fibres to the eye "hitchhike" on short ciliary ganglion.

14- Which of the following regarding vascular system is correct?

- (A) Cavernous part of internal carotid artery has no branches.
- (B) Anterior and posterior cerebral arteries are terminal branches of internal carotid artery.
- (C) Anterior cerebral arteries have no communication with each other.
- (D) Middle cerebral artery supply internal capsule and optic radiation.

15- Which of the following regarding vascular system is correct?

- (A) Lacrimal artery arises from ophthalmic artery usually while the later lies above optic nerve.
- (B) Lacrimal artery runs forwards accompanied by frontal nerve.
- (C) Lacrimal artery supply lacrimal sac.
- (D) Lateral palpebral arteries are terminal branches of lacrimal artery.