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## Question: 1

Which indicates the amount of corneal astigmatism?

- A. The power for the meridian closest to the horizontal
- B. The power for the meridian closest to the vertical
- C. The sum of the power for the meridian closest to horizontal and the power for the meridian closest to the vertical.
- D. The difference between the power for the meridian closest to horizontal and the power for the meridian closest to the vertical.

**Answer: D**

Explanation:

Astigmatism is an optical condition where the cornea or lens of the eye has an irregular curvature, causing the eye to focus light on two points instead of one, resulting in blurred or distorted vision. To assess and measure the degree of corneal astigmatism, specific values are obtained through an eye examination, primarily using tools like keratometers or corneal topographers.

The key to understanding the amount of corneal astigmatism lies in measuring the power of the eye's meridians—these are the different planes through which the eye has its maximum and minimum focusing power. Typically, these are identified as the meridian closest to the horizontal (often referred to as the horizontal meridian) and the meridian closest to the vertical (often referred to as the vertical meridian).

The amount of corneal astigmatism is indicated by the difference in diopters (the unit of measurement used in optics to denote the refractive power of lenses) between these two meridians. This difference is calculated by subtracting the power of the meridian with lesser refractive power from the meridian with greater refractive power. For instance, if the horizontal meridian of an eye has a power of +1.00 diopter, and the vertical meridian has a power of +3.00 diopters, the corneal astigmatism would be  $3.00 - 1.00 = 2.00$  diopters.

This measurement of astigmatism is crucial for determining the correct prescription for eyeglasses or contact lenses. In cases of "against-the-rule" astigmatism, the horizontal meridian is steeper (has more power) compared to the vertical meridian. This type of astigmatism is typically corrected using a plus-cylinder lens placed at the 180-degree axis. Conversely, "with-the-rule" astigmatism, where the vertical meridian is steeper, would require a different lens orientation.

Additionally, the total astigmatism that needs to be corrected can include both corneal astigmatism and lenticular astigmatism—the latter stemming from irregularities in the eye's lens. The combined correction for these can be complex and requires precise measurement and evaluation by an eye care professional.

In summary, the amount of corneal astigmatism is best indicated by the difference in diopters between the power of the meridian closest to the horizontal and the power of the meridian closest to the vertical. This value not only helps in diagnosing the type and extent of astigmatism but also guides the prescription of appropriate corrective lenses to provide clear and focused vision.

## Question: 2

When using an external camera, which would indicate that you are too close to the subject?

- A. A whitish central haze
- B. A blue-gray halo
- C. An orange tint
- D. A yellow crescent

**Answer: A**

Explanation:

When using an external camera, particularly in macro or close-up photography, it is crucial to maintain an optimal distance from the subject to ensure that the image is clear, focused, and properly framed. Observing the effects produced in the image can help indicate whether the camera is positioned correctly relative to the subject.

The correct answer to the question about what indicates that you are too close to the subject is: "A whitish central haze." This visual effect occurs when the camera is positioned too close to the subject, leading to an overexposure in the center of the image where the light reflects most intensely off the subject. This excessive proximity can cause a loss of detail and clarity in the central part of the photograph, where a bright, whitish haze appears, overpowering the finer details of the subject.

In contrast, a "blue-gray halo" around the subject typically indicates that you are too far back. This effect might be observed when the camera's focus isn't tightly centered on the subject, causing the edges to appear blurry or haloed, which detracts from the sharpness and definition of the image.

Additionally, a "little yellow crescent" might be seen in images where there is inadequate dilation of the camera's aperture or improper focusing, leading to partial illumination or coloration issues in the photography. This is generally not an indication of being too close or too far but rather a technical issue related to camera settings.

Understanding these visual cues can greatly assist photographers in adjusting their positioning and camera settings to achieve the best possible results in their photographs. Recognizing signs like a whitish central haze can prompt immediate adjustments in the camera-to-subject distance, ensuring that the final image is both aesthetically pleasing and technically sound.

## Question: 3

Which is the correct direction to give to a patient using an Amsler grid?

- A. Look at the lower left corner.
- B. Scan across the card slowly.
- C. Look at the center dot.
- D. Look at the upper right corner. Move down the outer line to the lower right corner. Move across to the lower left corner. Then continue to the starting point.

**Answer: C**

Explanation:

The correct instruction to give a patient when using an Amsler grid is to "look at the center dot." This specific direction is crucial because the Amsler grid is a diagnostic tool used primarily to evaluate the central visual field, which encompasses the central 20 degrees of vision. The grid consists of a pattern of straight lines, with a central dot that serves as a focal point for the viewer.

When a patient looks directly at the center dot, they are able to notice any distortions or irregularities in the grid lines surrounding it. These anomalies can indicate the presence of visual field defects or central vision problems, commonly associated with conditions like macular degeneration. The central dot helps in isolating the central part of the visual field, making the test more effective in detecting issues that might affect the most critical area of vision, which is used for tasks such as reading and driving.

Directing the patient to focus on other parts of the grid, such as the corners or edges, would not serve the primary purpose of the Amsler grid. The design of the grid and its use are specifically tailored to check for problems in the central visual field. Any deviation from looking straight at the center dot might lead to overlooking some central defects, hence reducing the efficacy of the test in early detection of central visual impairments.

Therefore, it is essential for healthcare providers to ensure that patients understand the importance of maintaining their focus on the center dot throughout the examination. This focus allows for the accurate assessment of the central visual field, which could be crucial in diagnosing and managing conditions that affect central vision.

### Question: 4

You are fitting a patient with new monovision lenses. You counsel the patient that the new lenses may take some time for adjustment. Some issues for monovision lenses typically include all but which of the following:

- A. Headaches
- B. Some loss of depth perception
- C. Shorter wear times
- D. Low night driving vision

**Answer: C**

Explanation:

Monovision lenses are a type of contact lens correction used primarily to address presbyopia, a condition common in older adults where the eye's lens stiffens, making it difficult to focus on close objects. In monovision, one eye is corrected for distance vision (typically the dominant eye), and the other eye is corrected for near vision. This approach can alleviate the need for bifocals or multiple pairs of glasses, but it comes with its own set of potential issues and adjustments.

Common issues associated with monovision lenses include headaches, a longer adaptation period, reduced night vision, and some loss of depth perception. These problems stem from the brain's need to adapt to processing two different visual inputs simultaneously — one eye focused on distant objects and the other on close-up tasks. This can initially lead to headaches as the brain struggles with the adaptation process. Additionally, the compromise in depth perception occurs because depth perception is optimal when both eyes have similar visual acuity and are working together.

Reduced night vision is another frequent concern, as having one eye corrected for near vision can diminish the overall visual acuity needed in low-light conditions. This can make night driving particularly challenging for some individuals fitted with monovision lenses.

Despite these issues, monovision lenses are not typically associated with shorter wear times. In fact, they are designed to be comfortable for extended wear. Unlike some corrective lenses that may need frequent removal due to discomfort or eye strain, monovision lenses generally provide a comfortable experience that accommodates both near and far vision without frequent changes. The design and material of modern contact lenses aim to maximize comfort, thereby allowing for longer wear times. Therefore, in counseling a patient about the adjustment to monovision lenses, it is important to clarify that while they may experience headaches, a longer adaptation period, reduced night vision, and some loss of depth perception, shorter wear times are not a typical issue associated with these lenses. Instead, these lenses are crafted to provide extended wear comfort, making them a practical solution for continuous daily use.

### Question: 5

The examiner is treating a toddler with amblyopi

- a. The child's eye has been occluded for several weeks. How is the child's response to therapy to be measured?
- A. With a visual acuity test, such as HOTV
  - B. By asking the child's parents a series of focused questions
  - C. By using frosted lenses over the strong eye and noting the child's agitation levels
  - D. By estimating the child's fixation pattern

**Answer: D**

Explanation:

The primary method to measure the response of a toddler with amblyopia to occlusion therapy is by estimating the child's fixation pattern. This method is particularly effective in young children, specifically those under the age of three, as they are generally unable to cooperate fully with conventional visual acuity tests such as the HOTV test.

Amblyopia, commonly known as "lazy eye," is a vision development disorder where the eye fails to achieve normal visual acuity, despite the use of prescription glasses or contact lenses. Amblyopia can be caused by conditions that interfere with normal visual development, including significant refractive errors, strabismus (misalignment of the eyes), or a blockage of an eye due to trauma, lid droop, etc.

Treatment approaches for amblyopia vary depending on the underlying cause, but a common and effective method is occlusion therapy. This involves patching the dominant eye to encourage the use of the weaker eye, thereby stimulating its visual development. For toddlers and young children, occlusion therapy can be particularly effective, and improvements can sometimes be observed rapidly.

Since children under three years old are not usually able to participate in standard eye tests that require them to read letters or identify symbols, their response to therapy is typically assessed through observation of their fixation pattern. During this assessment, the clinician observes how well the child can focus on and follow objects with the weaker eye. The key indicators of improvement are the ability of the child to maintain steady and central fixation using the weaker eye.

In conclusion, the fixation pattern is a critical tool for clinicians to estimate the response of a toddler undergoing occlusion therapy for amblyopia. This method provides valuable insights into the effectiveness of the treatment in enhancing the visual function of the weaker eye.

## Question: 6

During the healing phase after LASIK surgery, two important concerns include

- A. flap integrity and epithelial healing
- B. interface debris
- C. undercorrection and astigmatism
- D. epithelial undergrowth

**Answer: A**

Explanation:

During the healing phase after LASIK surgery, two important concerns include flap integrity and epithelial healing. Here's an expanded explanation of why these factors are critical:

**\*\*Flap Integrity:\*\*** In LASIK surgery, a thin flap is created on the cornea using a microkeratome or a femtosecond laser. This flap is then lifted to allow the laser to reshape the underlying corneal tissue, a process necessary for correcting vision. After the reshaping is complete, the flap is repositioned back over the treated area. Ensuring the flap is securely in place and heals properly without shifting is crucial because any movement can lead to complications such as irregular astigmatism or flap dislocation, which can affect visual outcomes. Proper adherence of the flap to the underlying stroma prevents further complications such as infection or delayed healing.

**\*\*Epithelial Healing:\*\*** The epithelium is the outermost layer of the cornea and plays a key role in maintaining corneal transparency and protecting against environmental damage. During LASIK, the corneal epithelium is disrupted. Prompt and proper healing of the epithelium is essential to prevent infections and other complications such as epithelial ingrowth, where epithelial cells grow under the flap instead of over it. This can lead to blurred vision, discomfort, and the need for additional surgical interventions. Effective epithelial healing also helps to stabilize the surgical outcomes and improve the overall success of the procedure.

These two factors, flap integrity and epithelial healing, are interconnected and essential for a successful recovery from LASIK surgery. Any compromise in these areas can lead to suboptimal visual results and increase the risk of post-operative complications. Therefore, post-operative care includes close monitoring of these aspects, along with appropriate medical treatments and patient education on proper eye care during the recovery period.

## Question: 7

On an axial topography map, which colors represent the flatter areas of the cornea?

- A. Blue and green
- B. Red and yellow
- C. Red, purple, and blue
- D. Orange and red

**Answer: A**

Explanation:

In an axial topography map of the cornea, the colors blue and green are used to represent the flatter areas of the cornea. This color coding is based on a standardized color scale where cooler colors indicate flatter regions and warmer colors indicate steeper, more curved regions.

The axial map, often referred to as a curvature map, is a crucial tool in ophthalmology and optometry for assessing the shape and curvature of the cornea. This map is particularly important for diagnosing and managing conditions such as keratoconus, a degenerative disorder that leads to a cone-shaped distortion of the cornea. It is also vital in the planning and evaluation of refractive surgeries and fitting contact lenses.

On these maps, the color scale generally transitions from cool to warm colors to represent the increase in curvature. For instance, areas depicted in blue and green have less curvature and are therefore flatter. On the opposite end of the spectrum, colors like orange and red signify steeper or more highly curved areas of the cornea. This visualization helps in easily distinguishing between different corneal topographies.

The use of colors in such topographic maps simplifies the interpretation and allows for a quick visual assessment of corneal shape and condition. Understanding these color representations is essential for professionals in accurately diagnosing corneal irregularities and planning appropriate treatments.

## Question: 8

Of the following disorders of pupillary function, which one is incorrectly included in the grouping?

Differential Diagnosis of a dilated pupil

Third Nerve Palsy

Adie's pupil

Acute glaucoma

Iritis

Drug-induced Dilation

A. Iritis

B. Adie's pupil

C. Third-nerve palsy

D. Acute glaucoma

**Answer: A**

Explanation:

**\*\*Iritis Incorrectly Included in Grouping\*\*** The question asks which disorder is incorrectly grouped with conditions causing a dilated pupil. Among the options, iritis stands out as the incorrectly grouped condition because it typically results in a constricted pupil, not a dilated one.

**\*\*Understanding Iritis\*\*** Iritis, or anterior uveitis, involves inflammation of the iris, the colored part of the eye. This inflammation often leads to a painful, constricted pupil as the muscles of the iris become spasmodic and the pupil contracts. The constriction is a protective response to minimize the amount of light entering the eye, which can be painful during inflammation.

**\*\*Conditions Typically Causing Dilated Pupils\*\*** Contrary to iritis, the other conditions listed are known for causing pupil dilation: 1. **\*\*Third Nerve Palsy\*\*** - This condition involves damage to the third cranial nerve, which can lead to a lack of innervation to the muscles that constrict the pupil, resulting in a dilated pupil. 2. **\*\*Adie's Pupil\*\*** - This is a neurological condition where the pupil is dilated and reacts

poorly to light but may respond more normally to near stimuli. 3. **Acute Glaucoma** - A rapid increase in intraocular pressure in acute glaucoma can cause the pupil to become mid-dilated and non-reactive. 4. **Drug-induced Dilation** - Certain medications, such as anticholinergics or sympathomimetics, can cause the pupil to dilate by either relaxing the muscles that constrict the pupil or stimulating the muscles that dilate the pupil.

**Conclusion** In the context of differential diagnosis for a dilated pupil, iritis should not be included as it typically manifests with the opposite symptom—a constricted pupil. Understanding these characteristic responses in pupillary behavior is crucial for accurate diagnosis and appropriate management of eye conditions.

## Question: 9

The patient diagnosed with which of the following should be referred to a neurosurgeon immediately?

- A. Acute glaucoma
- B. Adie's pupil
- C. Iritis
- D. Third nerve palsy

**Answer: D**

Explanation:

Among the conditions listed—acute glaucoma, Adie's pupil, iritis, and third nerve palsy—the one that necessitates immediate referral to a neurosurgeon is third nerve palsy. This urgency is due to the possible underlying causes and the potential for severe complications associated with third nerve palsy. Third nerve palsy, or oculomotor nerve palsy, affects the third cranial nerve, which is crucial for controlling most of the eye's movements, the response of the pupil to light, and the upper eyelid's position. When this nerve is impaired, the patient may experience ptosis (drooping of the upper eyelid), an outward and downward deviation of the eye (due to unopposed action of the lateral rectus and superior oblique muscles), and in some cases, pupil involvement indicating a more severe condition. The symptoms of third nerve palsy can be caused by a variety of factors, including an aneurysm, tumor, or hemorrhage, particularly those impacting the nerve along its path from the brainstem to the orbit. The involvement of the pupil is especially concerning as it often suggests compression of the nerve by an aneurysm, which is a life-threatening condition requiring immediate surgical intervention. Without prompt and appropriate management, conditions like an expanding aneurysm could rupture or lead to more extensive neurological damage. Therefore, any signs of third nerve palsy should be evaluated as a potential neurosurgical emergency to rule out or confirm serious underlying causes and to initiate the necessary interventions swiftly.

In contrast, conditions such as acute glaucoma, Adie's pupil, and iritis, while potentially serious and requiring medical attention, do not typically pose the same immediate risk of neurological damage and are usually managed by specialists in ophthalmology rather than neurosurgery. Acute glaucoma is a pressure-related optic neuropathy, Adie's pupil involves benign irregular pupil dilation, and iritis is an inflammation of the iris, none of which are likely to require neurosurgical intervention.

## Question: 10



With the PACT (prism and alternate cover test), a prism is held before an eye and prism power is:

- A. Decreased until no eye movement is seen and the deviation is neutralized
- B. Increased until no eye movement is seen and the deviation is neutralized
- C. Increased until no eye movement is seen and the deviation is stabilized
- D. Decreased until eye movement increases and the deviation is neutralized

**Answer: B**

Explanation:

The correct answer to the question regarding the PACT (prism and alternate cover test) is that the prism power is increased until no eye movement is seen and the deviation is neutralized.

To understand why this is the case, let's explore how the PACT works. The PACT is a diagnostic tool used primarily by eye care professionals to measure both the magnitude and direction of strabismus, which is the misalignment of the eyes. This test helps to determine how much correction, in terms of prism diopters, is needed to align the visual axis of both eyes so that they are looking at the same point in space.

During the test, one eye is covered with an occluder while the other eye is observed. A prism is then placed in front of the observed eye. The purpose of the prism is to bend the path of the incoming light, which shifts the image onto the fovea (the small pit in the retina that provides the clearest vision) of the deviating eye. Initially, prisms of different powers are tried to determine the amount necessary to achieve this alignment.

The prism power is incrementally increased until a point is reached where no additional eye movement is observed when the occluder is alternated between the eyes. This indicates that the image is falling directly on the fovea of both eyes, meaning the deviation has been neutralized by the prism.

If the prism power were decreased from a point where no eye movement is observed, it would lead to under-correction, causing the deviating eye to move again in an attempt to refixate on the target. Thus, increasing the prism power is essential until the point of neutralization to ensure that both eyes are correctly aligned.

Therefore, the increase in prism power continues until no eye movement is seen, indicating that the light is hitting the fovea directly and both eyes are aligned to the same visual target, successfully neutralizing the deviation. This is a crucial step in determining the appropriate treatment or correction needed for individuals with strabismus.

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