Scientific Principles of Photography

Photography · Answer Key · 20 Questions

1. Which optical phenomenon occurs when light rays pass through a small aperture, resulting in an inverted image on the opposite wall of a dark chamber?

A) Diffraction
B) Refraction
C) Rectilinear propagation
D) Dispersion

2. In a digital camera sensor, what is the function of the Bayer filter mosaic?

A) To convert analog voltage to digital bits
B) To capture color information by filtering red, green, and blue light
C) To reduce thermal noise in the sensor
D) To focus light onto the photodiode array

3. What is the relationship between the f-number (aperture size) and the amount of light reaching the sensor?

A) Light is proportional to the square of the f-number
B) Light is inversely proportional to the square of the f-number
C) Light is directly proportional to the f-number
D) Light remains constant regardless of the f-number

4. Which chemical compound was historically essential in traditional film photography due to its light sensitivity?

A) Silver halide
B) Sodium chloride
C) Copper sulfate
D) Iron oxide

5. What does the 'Circle of Confusion' define in optical theory?

A) The distortion at the edges of wide-angle lenses
B) The maximum size of a point source of light that appears as a point rather than a blur
C) The physical limit of a lens's resolution
D) The area where light rays converge after passing through a prism

6. Which property of light is primarily responsible for the phenomenon of chromatic aberration in refractive lenses?

A) Reflection
B) Dispersion
C) Diffraction
D) Interference

7. In digital imaging, what is the 'Nyquist frequency' in the context of sensor sampling?

A) The maximum resolution of the lens

B) The limit at which spatial aliasing occurs

C) The speed of the electronic shutter

D) The dynamic range of the sensor

8. What effect does increasing the ISO sensitivity have on a digital sensor?

A) It physically changes the size of the sensor pixels

B) It increases the gain of the analog-to-digital signal amplification

C) It changes the color temperature of the captured light

D) It increases the amount of light entering the lens

9. What is the primary purpose of a 'low-pass filter' (anti-aliasing filter) placed in front of some digital camera sensors?

A) To block infrared light

B) To prevent moiré patterns by slightly blurring fine details

C) To protect the sensor from dust

D) To increase the color depth of the image

10. Which of the following describes the 'Inverse Square Law' as it pertains to studio lighting?

A) Light intensity decreases as the square of the distance from the source

B) Light intensity doubles as the distance doubles

C) Light intensity is independent of distance

D) Light intensity is proportional to the cube of the distance

11. What is the 'Reciprocity Law' in chemical photography?

A) Exposure equals intensity multiplied by time

B) Exposure equals intensity divided by time

C) Exposure is independent of time

D) Exposure is constant regardless of light intensity

12. In optics, what is the 'Hyperfocal Distance'?

A) The distance at which the lens is sharpest

B) The distance beyond which all objects are in acceptable focus when focused at infinity

C) The closest distance the lens can focus

D) The distance at which diffraction is minimized

13. Which color space is defined by a standard set of primaries intended for consistent color reproduction on electronic displays?

A) sRGB
B) CMYK
C) Pantone
D) ISO 100

14. What creates 'shot noise' (photon noise) in digital images?

A) Heat generated by the sensor
B) The statistical variation in the arrival of photons
C) The quantization error of the ADC
D) Dust on the sensor surface

15. What is the 'angle of view' primarily determined by in a camera lens?

A) The aperture and the distance to the subject
B) The focal length and the sensor size
C) The shutter speed and the ISO
D) The lens coating and glass type

16. What happens to the depth of field as the focal length of a lens increases, assuming the aperture and subject distance remain constant?

A) It becomes deeper
B) It becomes shallower
C) It remains unchanged
D) It disappears entirely

17. What is the role of the 'shutter curtain' in a focal-plane shutter mechanism?

A) To regulate the color balance
B) To control the duration of light exposure on the sensor
C) To adjust the aperture size
D) To reduce lens flare

18. Which type of radiation does a standard digital camera sensor typically have an integrated filter to block?

A) Ultraviolet and Infrared
B) X-rays
C) Microwaves
D) Gamma rays

19. What is the technical term for the unwanted image artifacts caused by undersampling high-frequency patterns?

A) Vignetting

B) Moiré

C) Chromatic aberration

D) Barrel distortion

20. In the context of lens optics, what is 'vignetting'?

A) A reduction of an image's brightness or saturation toward the periphery

B) A rainbow effect around high-contrast edges

C) A softening of the image center

D) A type of physical scratch on the glass