The Science of Photography

Photography · Answer Key · 8 Questions

1. What physical relation defines the f-number (f-stop) of a camera lens?

A) Focal length divided by the diameter of the entrance pupil
B) Diameter of the entrance pupil multiplied by the focal length
C) Sensor diagonal length divided by the shutter speed duration
D) ISO speed sensitivity multiplied by the focal length

2. Why does a standard Bayer filter array on digital image sensors contain twice as many green filter elements as red or blue ones?

A) Green light photons carry twice as much kinetic energy as red or blue photons
B) Silicon sensors cannot detect green light without double filtration
C) Human visual perception is most sensitive to green wavelengths for luminance
D) Infrared radiation naturally degrades red and blue sensors twice as fast

3. In film photography, what chemical transformation occurs when light strikes silver halide crystals in the emulsion?

A) Silver ions are oxidized into silver oxide crystals
B) Silver ions are reduced to specks of metallic silver
C) Gelatin breaks down into organic acids
D) Bromide ions convert directly into elemental oxygen gas

4. Which optical phenomenon causes image sharpness to decrease due to wave interference when a lens aperture is closed down to very small openings like f/22?

A) Spherical aberration
B) Focus shift
C) Diffraction
D) Barrel distortion

5. The Bunsen-Roscoe law states that exposure equals light intensity multiplied by exposure time. What is the deviation from this rule during extremely long or short exposures called?

A) The Purkinje effect
B) The Schwarzschild effect
C) The Doppler shift
D) The Talbot effect

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6. Which optical property causes chromatic aberration in camera lenses?

A) Dispersion, causing different wavelengths of light to refract at different angles

B) Polarization, causing light waves to align in a single plane

C) Diffraction, causing light waves to bend around the edges of the diaphragm

D) Total internal reflection, causing light to bounce inside the rear lens element

7. Which physical effect enables digital image sensors (CMOS and CCD) to convert photons into electrical charges?

A) Thermoelectric effect

B) Internal photoelectric effect

C) Piezoelectric effect

D) Photomechanical effect

8. What optical term describes the closest focus distance at which the depth of field extends from half that distance all the way to infinity?

A) Conjugate distance

B) Nodal distance

C) Hyperfocal distance

D) Focal plane limit