

# PracTest - Optics & Duality

## Multiple Choice

Identify the choice that best completes the statement or answers the question.

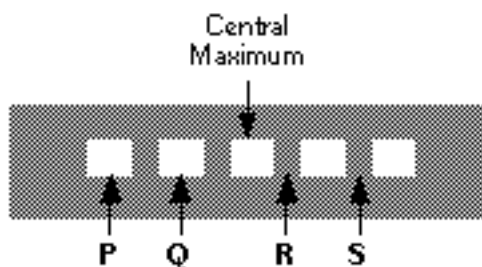
- [CPA-Light Waves] Dark regions [Hewitt discusses at the beginning of the video] result from
  - constructive interference.
  - destructive interference.
  - diffraction.
  - polarization.
  - scattering.
- [CPA-Light Waves] Bright regions [Hewitt discusses at the beginning of the video] result from
  - constructive interference.
  - destructive interference.
  - diffraction.
  - polarization.
  - scattering.
- [The Edge of Forever] The painstaking observations of Milton Humason established the \_?\_.
  - location of the Milky Way
  - the expansion of the universe
  - the steady-state theory
- [The Edge of Forever Update] The background radiation from the Big Bang—which fills all of space—has now been carefully measured. Those radio waves appear \_?\_.
  - to show lumpiness in the early universe
  - almost perfectly uniform throughout the sky
  - to be arranged in a grid or surprising regularity
  - to have an enormous bubble-like structure to them
- [Mechanical Universe-Light] Invented the reflecting telescope
  - Christian Huygens
  - Albert Einstein
  - James Clerk Maxwell
  - Michael Faraday
  - Isaac Newton
  - Galileo
  - Thomas Young
- In the early 1900s, it was determined that
  - Light can behave like particles
  - Particles can behave like waves
  - both of these
  - none of these
- From **lowest**-energy to **highest**-energy on a particle level, the order of spectral colors is (B=blue, G=green, O=orange, R=red, V=violet, Y=yellow)
  - Y-V-R-O-G-B
  - B-G-O-R-V-Y
  - R-O-Y-G-B-V
  - V-B-G-Y-O-R
  - All colors have equal energy
- Which light source is most likely to liberate photoelectrons from a polished metal surface?
  - dim blue
  - bright red
  - dim orange
  - bright green
- The best "one word" explanation for the colors in the rainbow is
  - Diffraction
  - Thin Film Interference
  - Atmospheric Refraction
  - Scattering
  - Polarization
  - Dispersion

10. The best "one word" explanation for the colors in an oil slick on wet pavement  
 A. Diffraction                      C. Atmospheric Refraction    E. Polarization  
 B. Thin Film Interference    D. Scattering                      F. Dispersion
11. If 100% of a light beam were unpolarized, it could be approximated as a beam of light that is   ? polarized vertically and   ? polarized horizontally.  
 A. 0%; 100%    B. 25%; 75%    C. 50%; 50%    D. 75%; 25%    E. 100%; 0%

**Glare is observed to be reflecting from a horizontal tabletop. An observer views the glare through a polarizing filter. She rotates the filter until the glare is minimized.**

12. If the filter were then rotated clockwise 90° as seen by the observer, the glare would  
 A. still be blocked out  
 B. no longer be blocked out  
 C. not enough info to determine

**Laser light is passed through two narrow slits very close to each other. The resulting interference pattern (shown to the right) appears on the wall at which the beam is aimed. The central maximum has been identified.**



13. Because the interference pattern spreads out horizontally, the narrow slits must be  
 A. horizontal    C. circular  
 B. vertical    D. cannot be determined
14. Zone R in the diagram is a region of   ? interference  
 A. sonic                      B. destructive                      C. constructive                      D. polarized
15. At point P in the diagram, the light from each slit arrives  
 A. in phase                      B. out of phase                      C. cannot be determined
16. Laser light passing through two closely spaced narrow slits produces the interference pattern shown below.



If a laser whose light had a significantly shorter wavelength were used, the resulting pattern would most closely resemble which choice shown below?

- A.                       B.                       C. 

17. The fact that light can bend around a barrier is evidence of the   ? nature of light.  
A. wave                      B. particle                      C. electromagnetic      D. quantum

**Laser light is passed through a diffraction grating (as was done in the "How Groovy is Your CD?" lab). The resulting central maximum and first order maxima are shown below.**



18. If the grating were moved farther from the wall/screen (and all other parameters were unchanged), the resulting pattern would most closely resemble which of the choices below?



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### Answer Section

#### MULTIPLE CHOICE

- |                       |        |                                      |
|-----------------------|--------|--------------------------------------|
| 1. ANS: B             | PTS: 1 | TOP: 31. Light Waves                 |
| 2. ANS: A             | PTS: 1 | TOP: 31. Light Waves                 |
| 3. ANS: B             | PTS: 1 | TOP: The Edge of Forever             |
| 4. ANS: A             | PTS: 1 | TOP: The Edge of Forever             |
| 5. ANS: E             | PTS: 1 | TOP: MU-The Wave Nature of Light     |
| 6. ANS: C             | PTS: 1 | TOP: Models                          |
| 7. ANS: C             | PTS: 1 | TOP: Photon Energy                   |
| 8. ANS: A             | PTS: 1 | TOP: Photoelectric effect            |
| 9. ANS: F             | PTS: 1 | TOP: Wave Optics Phenomena           |
| NOT: PracTest UT12-04 |        |                                      |
| 10. ANS: B            | PTS: 1 | TOP: Wave Optics Phenomena           |
| NOT: PracTest         |        |                                      |
| 11. ANS: C            | PTS: 1 | TOP: Polarization                    |
| 12. ANS: B            | PTS: 1 | TOP: Polarization NOT: PracTest      |
| 13. ANS: B            | PTS: 1 | TOP: Interference Math               |
| NOT: PracTest         |        |                                      |
| 14. ANS: B            | PTS: 1 | TOP: Fringe Pattern Zones            |
| NOT: PracTest         |        |                                      |
| 15. ANS: A            | PTS: 1 | TOP: Fringe Pattern Zones            |
| NOT: PracTest         |        |                                      |
| 16. ANS: C            | PTS: 1 | TOP: Single Slit Diffraction Pattern |
| NOT: PracTest         |        |                                      |
| 17. ANS: A            | PTS: 1 | TOP: Diffraction NOT: PracTest       |
| 18. ANS: C            | PTS: 1 | TOP: How Groovy is Your CD?          |
| NOT: PracTest         |        |                                      |