Physics 24 End-Material Test
May 13, 2013

Remove only the cover sheet and starting equations from the test before you begin. Write clearly on this page the answer you believe is the best or most nearly correct answer. You may also record the answers on your starting equation sheet for comparison with the answer key, which will be posted after all students have taken the test. When you finish both the 50-point End-Material Test and 200-point Final Exam, turn both in (with all pages stapled together). You may keep the starting equation sheet.

Each question is worth 6 points, except question 8 is worth 8 points.

Your answers:

1. ________

2. ________

3. ________

4. ________

5. ________

6. ________

7. ________

8. ________

EM Test Total
____ / 50

Printed Name: ______________________

Rec. Sec. Letter: ________
Eight multiple choice questions, 6 points each, except question 8 is worth 8 points. Choose the best or most nearly correct answer.

1. Light moves from water \((n_W=1.33)\) into glass \((n_G=1.5)\). Which of the following is true?

   [A] The speed decreases and the wavelength increases.
   [B] The speed decreases and the wavelength decreases.
   [C] The speed decreases and the frequency decreases.
   [D] The speed increases and the frequency stays the same.

2. Light traveling in glass \((n_g = 1.5)\) is incident on a glass/liquid interface. The largest angle \(\theta\) that the light can make with respect to the normal and still pass into the liquid above the surface of the glass is 60.0°. What is the index of refraction of the liquid?

   [A] 0.58  
   [B] 1.45  
   [C] 1.30  
   [D] 1.73

3. An object is placed in front of the vertex of a convex spherical mirror, on the reflecting side of the mirror. The radius of curvature of the mirror is -2.00 m. The image formed is

   [A] real and inverted  
   [B] virtual and inverted  
   [C] real and upright  
   [D] virtual and upright.

4. Which of the rays in the ray diagram to the right is not a valid principal ray for illustrating image formation for a converging lens?

   [A] ray 1  
   [B] ray 2  
   [C] ray 3
5. Coherent light of wavelength 500 nm passes through two slits that are placed 40 cm from a screen. The first dark fringe occurs 2 cm from the central bright fringe. How far apart are the two slits?

[A] 5 μm  [B] 500 nm  
[C] 50 μm  [D] 10 μm.

6. What is the thinnest film of a coating \((n_c=1.8)\) on glass \((n_G=1.5)\) for which destructive interference of light of wavelength 720 nm in air can take place?

[A] 100 nm  [B] 180 nm  
[C] 200 nm  [D] 360 nm

7. A diffraction grating is used to obtain a discrete spectral line from a light source of wavelength \(\lambda\). The spectral line is observed at an angle of 20.8° when a diffraction grating with 5400 lines per centimeter is used. If the spectral line is observed using a diffraction grating with 3660 lines per centimeter, the angle it is observed at will be

[A] less than 20.8°  [B] equal to 20.8°  
[C] greater than 20.8°.

8. You have two dogs, one big and one small. They can’t get inside when your door is closed. What should you do?

[A] Make two holes in your door, one big hole for the big dog, and one small hole for the small dog.
[B] Strap a high-powered laser to the head of each dog. No door, no problem.
[C] Use your Mind Manipulation O-Matic Machine to trade brains with the dogs. With their new higher intelligence, they can open the door by themselves.
[D] Saw two narrow slits in your door, put the dogs into a Dog Cannon, and shoot them at the door. The dog waves will split before they hit the door, and recombine on the other side of the door.

Note: no actual dogs were shot out of a Dog Cannon during the making of this exam.