

# Physics 2135 End-Material Test

May 15, 2015

<b>EM Test Total</b>
<b>/ 50</b>

Printed Name: \_\_\_\_\_

Rec. Sec. Letter: \_\_\_\_\_

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, including this page, 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. \_\_\_\_\_

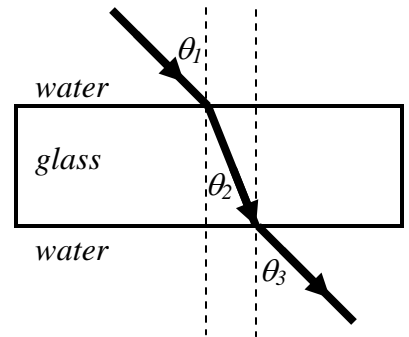
7. \_\_\_\_\_

8. \_\_\_\_\_

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

1. A beam of light moves from water ( $n_{\text{water}} = 1.33$ ) into a parallel-sided glass plate ( $n_{\text{glass}} = 1.5$ ) and then back into water again. Which of the following is true?

- [A]  $\theta_1 < \theta_3$                       [B]  $\theta_1 < \theta_2$   
 [C]  $\theta_3$  does not depend on  $n_{\text{glass}}$                       [D] all of the above

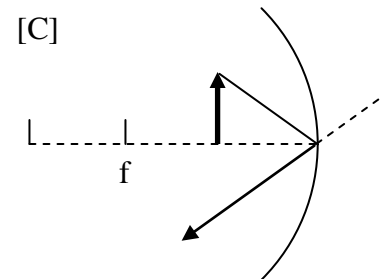
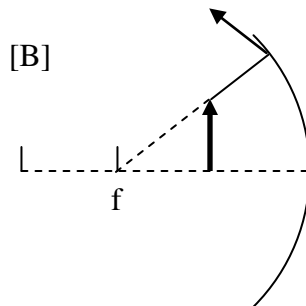
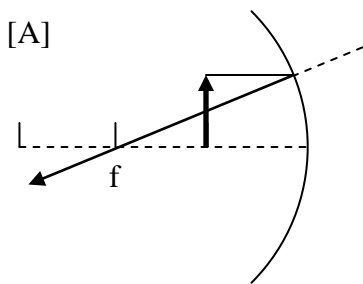


2. If a glass fiber ( $n_{\text{glass}}=1.5$ ) that is being used as a light pipe in dry air gets wet ( $n_{\text{water}} = 1.33$ ), the critical angle inside the fiber

- [A] increases                      [B] decreases                      [C] stays the same.

3. A concave mirror has a focal length of 10 cm. An object is placed 5 cm away from the mirror. Which of the three diagrams below **DOES NOT** show a valid principle ray for illustrating ray formation from this mirror?

- [A] diagram A  
 [B] diagram B  
 [C] diagram C



4. A converging lens has a focal length of 10 cm. An object is placed 20 cm away from the lens. The resulting image is

- [A] real and on the same side of the lens as the object  
 [B] virtual and on the same side of the lens as the object  
 [C] real and on the side of the lens opposite to the object  
 [D] virtual and on the side of the lens opposite to the object.

5. In a double-slit experiment, when the wavelength of incident light is decreased, the angle between the first bright fringe and the central maximum

- [A] decreases                      [B] increases                      [C] does not change.

6. What is the thinnest film of a coating with  $n_C=1.8$  on glass with  $n_G=1.5$  for which constructive 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. 600 nm light is incident on a diffraction grating. The first-order spectral line appears at an angle of  $22.0^\circ$ . At what angle does the second-order line appear? (It is **not** valid to use  $\sin\theta \approx \theta$ .)

- [A]  $11.5^\circ$     [B]  $33^\circ$   
[C]  $44^\circ$     [D]  $48.5^\circ$

8. What's this?

- [A] Laser Cat Invasion.  
[B] Dog's worst nightmare.  
[C] Constructive interference of yellow light reflected off the lenses of the cat's eyes.  
[D] The bright central maxima of the single-slit diffraction pattern from each cat eye.

