24

Physics 2135 End-Material Test

May 11, 2016

EM Test Total
/ 50

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. ____B____

2. ____D____

3. ____A____

4. ____D____

5. ____B____

6. ____A____

7. ____C____

8. ____ABCD____

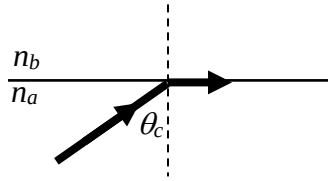
Eight multiple choice questions, 6 points each, except question 8 is worth 8 points. Choose the **best** or **most nearly correct** answer.

1. It takes light 1 μs to travel 300 meters in air. How long would it take light to travel 300 meters in glass of index of refraction n=1.5?

[A] 0.667 μs [B] 1.5 μs
[C] 2.0 μs [D] 3.0 μs

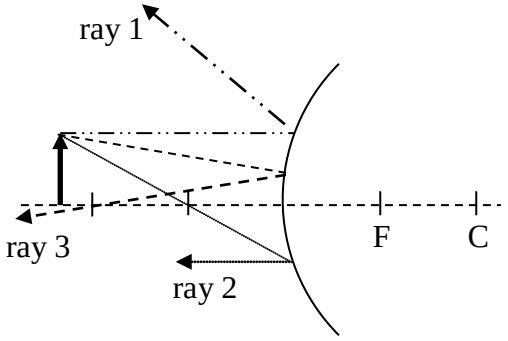
2. Light traveling in a medium of index of refraction n_a is incident at an angle θ on a second medium of index of refraction n_b. In order for total internal reflection to occur, it must be true that

[A] $n_a < n_b$ and θ is less than the critical angle.
[B] $n_a < n_b$ and θ is greater than the critical angle.
[C] $n_a > n_b$ and θ is less than the critical angle.
[D] $n_a > n_b$ and θ is greater than the critical angle.



3. Which of the three rays in the ray diagram to the right is a valid principal ray for illustrating image formation for a convex mirror?

[A] ray 1 —··—··—··
[B] ray 2 ·····
[C] ray 3 - - - - - - - -



4. An object is placed 20 cm away from a lens. The resulting image is 10 cm from the lens and is on the same side of the lens as the object. The image is _____ and the lens is _____.

[A] real, converging.
[B] real, diverging.
[C] virtual, converging.
[D] virtual, diverging.

5. Coherent monochromatic light of wavelength 600 nm passes through two narrow slits. An interference pattern is observed on a screen 4 m away from the slits. The width of the central interference maximum is measured to be 2 mm. What is the separation between the slits?

[A] 0.75 mm [B] 1.2 mm
[C] 1.5 mm [D] 2.4 mm

6. What is the thinnest film of a coating with $n_C = 1.25$ on glass with $n_G = 1.5$ for which destructive interference of light of wavelength 640 nm in air can take place?

[A] 128 nm [B] 160 nm [C] 256 nm [D] 320 nm

7. A diffraction grating is used to obtain a discrete spectral line from a light source of wavelength λ. The spectral line is observed at an angle of 24° when a diffraction grating with 5400 lines per centimeter is used. If the spectral line is observed using a diffraction grating with 7200 lines per centimeter, the angle it is observed at will be

[A] less than 24° [B] equal to 24° [C] greater than 24°.

8. During the summer, you plan to use your newly-learned physics skills to

[A] buy a mail-order UFO detector and modify it so that it detects ghosts.
[B] study reflection by observing images in shiny spoons in your drink cups.
[C] study the diffraction pattern of ice cream.
[D] build a 1,000,000 W solar cooker and test it on a Minion Kevin Banana Eating Action Figure.