Physics 2135

Total

End-Material Test
May 7, 2018

Name: _____

Recitation: _____

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 End-Material Test and the Final Exam, turn both in to the test proctor with all pages, including this page, stapled together. **Calculators are NOT allowed!** You may keep the starting equation sheets, recycle them or leave them with the test proctor to be recycled. Please do not throw them in the trash.

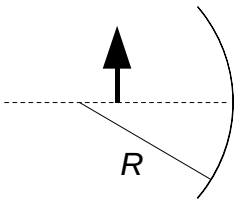
Each question is worth 6 points, except question 10, which is worth 8 points.

Your answers:

1. D
2. A
3. D
4. B
5. A
6. B
7. C
8. A
9. D
10. _____

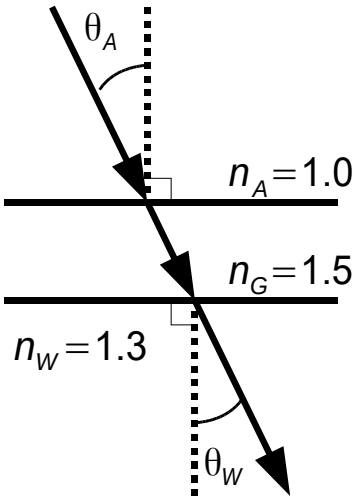
End-Material Test

1. An object is placed $6\,\text{cm}$ from a concave spherical mirror of radius, $R = 8\,\text{cm}$. Which of the following is true of the image distance?



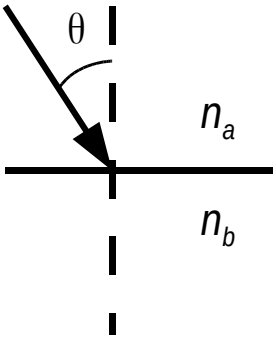
[A] $s' \leq 0$
[B] $0 < s' \leq f$
[C] $f < s' < R$
[D] $s' > R$

2. light passes from air through a glass window into water, as illustrated. The two surfaces are parallel. Which of the following is true? $\theta_A \neq 0$



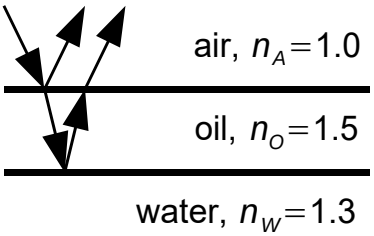
[A] $\theta_W < \theta_A$
[B] $\theta_W = \theta_A$
[C] $\theta_W > \theta_A$
[D] The relative size of θ_W and θ_A cannot be determined from the given information.

3. Light incident upon a surface between two materials at an angle, θ_1, relative to the normal is partially reflected and partially transmitted. However, light incident upon the same surface at an angle, θ_2, relative to the normal is totally reflected. The two materials have indices of refraction, n_a and n_b, with the light initially in the material with index of refraction, n_a. Which of the following is true?



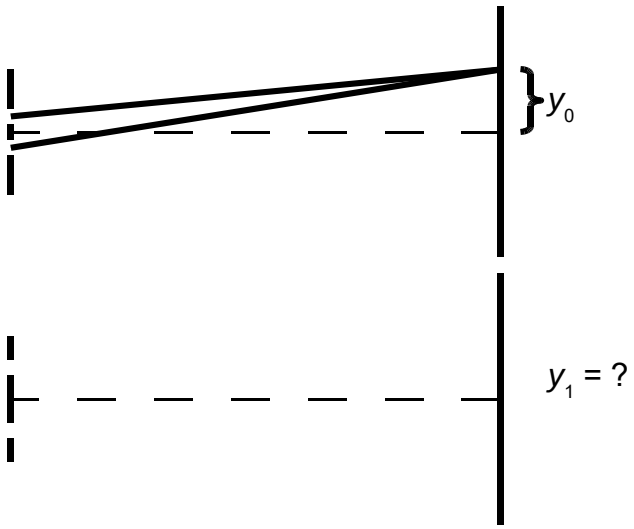
[A] $\theta_2 < \theta_1$ and $n_a < n_b$
[B] $\theta_2 < \theta_1$ and $n_a > n_b$
[C] $\theta_2 > \theta_1$ and $n_a < n_b$
[D] $\theta_2 > \theta_1$ and $n_a > n_b$

4. A thin film of oil is floating on top of water. For what oil thickness will normally incident reflected light with a wavelength of λ in air undergo constructive interference?



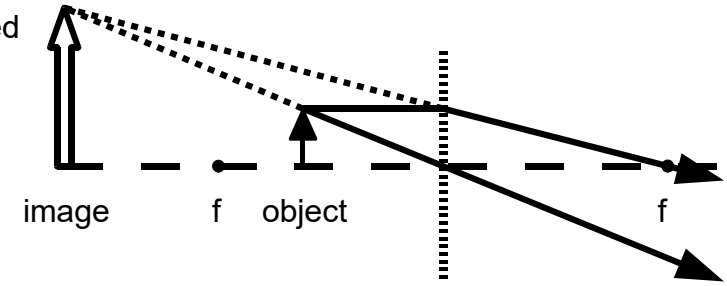
[A] $\dfrac{\lambda}{4n_W}$
[B] $\dfrac{\lambda}{4n_O}$
[C] $\dfrac{\lambda}{2n_W}$
[D] $\dfrac{\lambda}{2n_O}$

5. Light from a laser passes through a pair of slits producing an interference pattern on a distant screen such that the distance from the central maximum to the first order maximum is y_0. Subsequently, the slits are moved farther apart. After moving, the distance between the central maximum and the first order maximum is y_1.



[A] $y_1 < y_0$
[B] $y_1 = y_0$
[C] $y_1 > y_0$

6. An image (outlined arrow) is created of an object (solid arrow) by a thin lens, as illustrated. The lens is _____ and the image is _____.



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

7. A 3 cm tall object is placed 72 cm from a concave spherical mirror yielding a real image 36 cm from the mirror. The image is _____ and _____ tall.

[A] upright, 1.5 cm
[B] upright, 6 cm
[C] inverted, 1.5 cm
[D] inverted, 6 cm

8. A laser shines upon a single slit producing an interference pattern on a distant screen. If the laser is replaced by a laser with a shorter wavelength, the spacing between bright fringes on the screen will

[A] decrease
[B] not change.
[C] increase.

9. A ray of light passes from glass (n_G = 1.5) into water (n_W = 1.3). Which of the following is true?

[A] Both speed and wavelength decrease.
[B] Speed decreases and wavelength increases.
[C] Speed increases and wavelength decreases.
[D] Both speed and wavelength increase.

10. What was the most interesting topic in this section?

[A] Making holograms
[B] Designing reading glasses
[C] Coating for stealth
[D] Identifying elements in stars
[E] Creating rainbows