2135

Physics 2135 End-Material Test

May 12, 2017

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. **Calculators are NOT allowed!**

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

Your answers:

1. ________

2. ________

3. ________

4. ________

5. ________

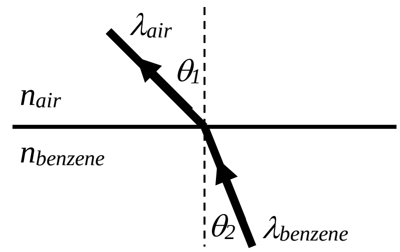
6. ________

7. ________

8. ________

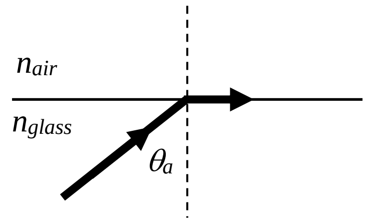
Eight multiple choice questions, 6 points each, except question 8 is worth 8 points. Choose the **best** or **most nearly correct** answer.

1. A beam of light moves from benzene ($n_{benzene}$ = 1.5) into air (n_{air} = 1). The wavelength of the light in benzene is 600 nm and the incident angle θ_2 = 15°. The the wavelength of the outgoing light in air is



[A] 400 nm [B] 800 nm
[C] 900 nm [D] 1200 nm

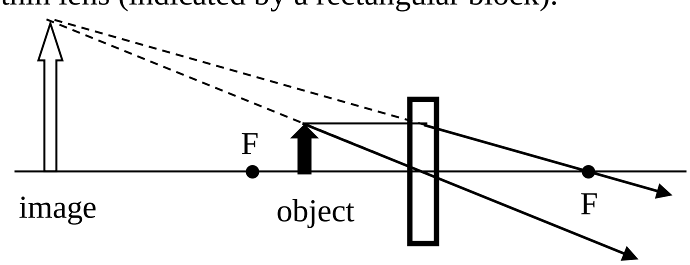
2. Light traveling in glass (n_{glass} = 1.5) is incident on a glass-air interface. You observe that is outgoing ray is parallel to the surface as shown in the picture. In order for total internal reflection to occur, you could



[A] increase the incident angle θ_a
[B] decrease the incident angle θ_a
[C] replace the air with water (n_{water} = 1.33)
[D] increase the intensity of the light

3. An object is placed 2 m in front of a mirror. The resulting image is 1 m away from the mirror and on the opposite side of the mirror as the object. The mirror is _____ and the image is ____.
[A] concave, virtual
[B] convex, virtual
[C] concave, real
[D] convex, real

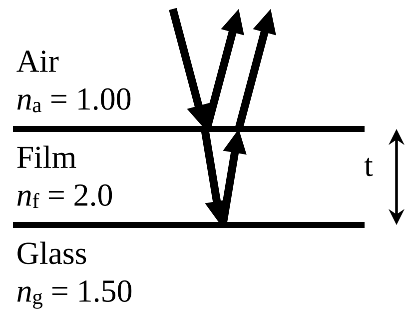
4. The picture to the right shows a ray diagram for a thin lens (indicated by a rectangular block). The lens is __________ and the image is ____.
[A] diverging, real
[B] diverging, virtual
[C] converging, real
[D] converging, virtual



5. Coherent monochromatic light passes through two narrow slits. An interference pattern is observed on a screen far away from the slits. The width of the central interference maximum is measured to be *w*. If the distance between the two slits is doubled, the width of the central interference maximum is (assume the small angle approximation to be valid!)

[A] *w* [B] *w*/2
[C] 2*w* [D] 4*w*

6. A thin film of transparent material (n_f = 2.0) is placed on a sheet of glass (n_g = 1.50). The material is illuminated from above by normally incident mono-chromatic light of wavelength λ = 600 nm. What is the minimum nonzero thickness of the film that minimizes reflection?



[A] 75 nm [B] 150 nm [C] 300 nm
[D] 600 nm

7. You wish to use a diffraction grating to resolve two spectral lines with wavelengths of 597 nm and 603 nm. What is the minimum number of slits the grating needs to have to resolve these two wavelengths using the second order maxima?

[A] 50 [B] 100 [C] 200 [D] 600.

8. A valid SI unit of energy is

[A] J
[B] Nm
[C] Ws
[D] VC
[E] any of the above