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Physics 2135 End-Material Test

December 15, 2016

EM Test Total
50 / 50

Printed Name: Key

Rec. Sec. Letter: N/A

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. ____B____

5. ____B____

6. ____C____

7. ____C____

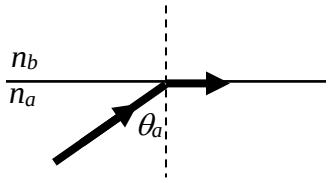
8. ____ABCDE____

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 glass (n_G=1.50) into water (n_W=1.33). Which of the following is true?

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

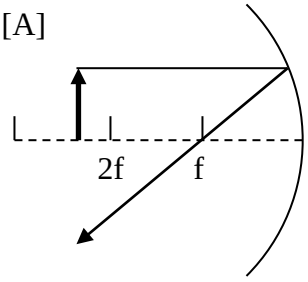
2. Light traveling in a medium of index of refraction n_a is incident on a second medium of index of refraction n_b. In order for total internal reflection to occur, it must be true that



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

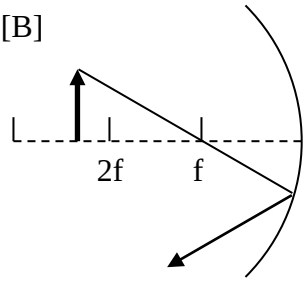
3. Which of the three ray diagrams below shows a valid principle ray for illustrating image formation for a concave mirror?

[A]



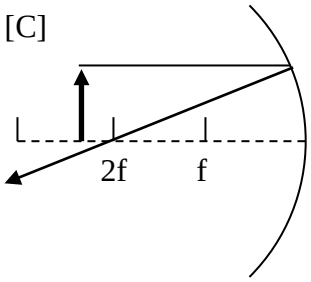
[A] diagram A

[B]



[B] diagram B

[C]



[C] diagram C

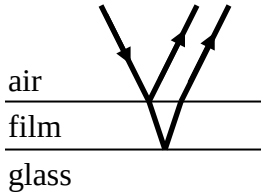
4. A thin lens is used to form an image of an object 40 cm from the lens. The resulting image is virtual and 20 cm from the lens. The lens is _____ and has a focal length of ____.

[A] diverging, +40 cm
[B] diverging, -40 cm
[C] converging, -40 cm
[D] converging, +40 cm

5. Coherent light of wavelength λ passes through two slits that are placed 40 cm from a screen. The two slits are 5 μm apart. The first dark fringe occurs 2 cm from the central bright fringe. What is the wavelength λ of the incident light?

[A] 50 nm [B] 500 nm
[C] 750 nm [D] 1000 nm

6. Glass of index of refraction n_G is coated with a thin film of index of refraction n_F. Light of wavelength λ in air is perpendicularly incident on the film. The film thickness is exactly $4\lambda/n_F$, where λ/n_F is the wavelength of the light in the film. When viewed from above, the light reflected from the top of the film interferes constructively with the light reflected from the bottom of the film. What can you say about the index of refraction of the film?



[A] $n_F > n_G$ [B] $n_F = n_G$
[C] $n_F < n_G$

7. A diffraction grating produces its first order bright band at 30° for incident light of wavelength λ. There are 10,000 slits per centimeter of grating. What is the wavelength λ of the incident light?

[A] 250 nm [B] 300 nm
[C] 500 nm [D] 750 nm

8. In which movie did this famous flying pig appear?

[A] Alfred Hitchcock's "The Pigs"
[B] "The Lord of the Pigs"
[C] "The Amazing Spider-Pig"
[D] "The Piglet: an Unexpected Journey"
[E] Oh, come on, everybody knows only dogs can fly