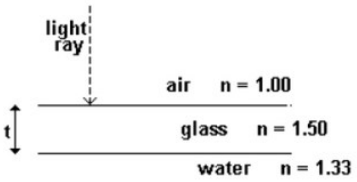
socrative by MasteryConnect

Name: _____ **Date:** _____

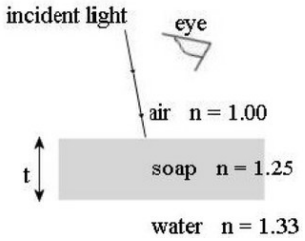
Quiz name: AP Physics 2 - Test 10 - Wave Optics

1. A light ray is incident normal to a thin layer of glass. Given the figure, what is the minimum thickness of the glass that gives the reflected light an orange like color (λvacuum orange light = 600 nm)



(A) 50 nm
(B) 100 nm
(C) 150 nm
(D) 200 nm

2. Light is incident normal to a thin layer of soap. Given the figure, what is the minimum thickness of the soap film that gives the soap a blue like color (λair(blue) = 500 nm)?



(A) 100 nm
(B) 200 nm
(C) 250 nm
(D) 400 nm

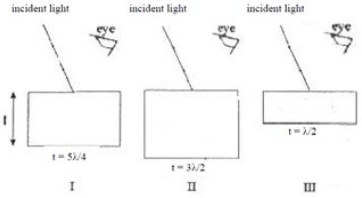
3. An electromagnetic wave generated from a source of single frequency travels from air (with speed of light 3.00 x 10^8 m/s) into water (with speed of light 2.25 x 10^8 m/s). Which statement is true about the wavelength and frequency of the light as it passes from air to water?

(A) The frequency of the light increases and the wavelength increases.
(B) The frequency of the light increases and the wavelength is unchanged.
(C) The frequency of the light is unchanged and the wavelength is decreased.
(D) The frequency of the light is unchanged and the wavelength is increased.

4. Lenses in fine quality cameras are coated to reduce the reflection from the lenses. If the coating material has an index of refraction between that of air and glass, what thickness of coating will produce the least reflection?

(A) one–quarter of the wavelength in the coating
(B) one–third of the wavelength in the coating
(C) one–half of the wavelength in the coating
(D) one wavelength in the coating

5. Light strikes three different thin films, which are in air, as shown. If t denotes the film thickness and λ denotes the wavelength of the light in the film, which films will produce constructive interference as seen by the observer?



(A) I only
(B) II only
(C) III only
(D) II and III only

6. When light passes from water into air, the frequency of the light remains the same. What happens to the speed and the wavelength of light as it crosses the boundary in going from water into air?

(A) Speed: Increases
Wavelength: Remains the same

(B) Speed: Remains the same
Wavelength: Remains the same

(C) Speed: Remains the same
Wavelength: Increases

(D) Speed: Increases
Wavelength: Increases

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7. In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to

(A) D/2
(B) D/sqrt(2)
(C) D*sqrt(2)
(D) 2D

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8. Waves diffract most when going through a slit when the wavelength is

(A) large and the slit is small
(B) large and the slit is large
(C) small and the slit is large
(D) small and the slit is small

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9. You can decrease the separation of bright fringes from a double slit by increasing the

(A) distance to screen
(B) wavelength
(C) separation
(D) all three

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10. To see emission lines (bright fringes from a diffraction grating) clearly, we need them to be very bright and widely separated. For this reason spectroscopes must have gratings with slits that are very

(A) close together, very numerous
(B) thin, very numerous
(C) thin, very close together
(D) all three

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11. You have a polarizing filter. It will reduce unpolarized light by

(A) 75%
(B) 50%
(C) 25%
(D) Depends on the angle

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12. You place a second polarizing filter after the first one. It will further reduce the light by

(A) 75%
(B) 50%

C 25%

D Depends on the angle

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13. You have two polarizing filters lined up the same way. You can reduce the light passing through these filters to zero emission by rotating

A one by 45 degrees

B one by 180 degrees

C one by 45 degrees and the other by –45 degrees

D one by 30 degrees and the other by -30 degrees

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14. You have two polarizing filters that are lined up so they block all the light. You can increase the light that gets through by

A placing a third filter in front of the first

B placing a third filter after the second

C placing a third filter in between the two

D a third filter won't help

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15. Thin film interference is caused by interference after

A reflection, refraction

B reflection, , diffraction

C refraction, diffraction

D all three

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16. The colours in white light can be separated by

A reflection, thin film interference, refraction

B reflection, refraction, diffraction

C reflection, thin film interference, diffraction

D thin film interference, refraction, diffraction

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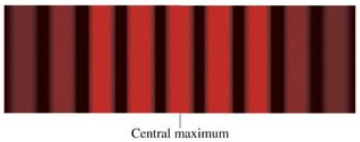
17. A laboratory experiment produces a double-slit interference pattern on a screen. If the screen is moved farther away from the slits, the fringes will be

A Closer together.

B In the same positions.

C Farther apart.

D Fuzzy and out of focus.



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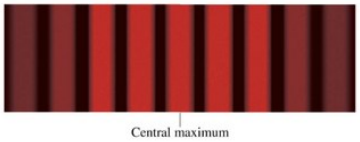
18. A laboratory experiment produces a double-slit interference pattern on a screen. If green light is used, with everything else the same, the bright fringes will be

A Closer together.

B In the same positions.

C Farther apart.

D Fuzzy and out of focus.



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19. In a laboratory experiment, a diffraction grating produces an interference pattern on a screen. If the number of slits in the grating is increased, with everything else (including the slit spacing) the same, then

(A) The fringes stay the same brightness and get closer together.

(B) The fringes stay the same brightness and get farther apart.

(C) The fringes stay in the same positions but get brighter and narrower.

(D) The fringes stay in the same positions but get dimmer and wider.

(E) The fringes get brighter, narrower, and closer together.

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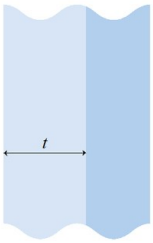
20. A film with thickness t gives constructive interference for light with a wavelength in the film of λfilm. How much thicker would the film need to be in order to give destructive interference?

(A) $2\lambda_{film}$

(B) λ_{film}

(C) $\lambda_{film}/2$

(D) $\lambda_{film}/4$



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21. A vertically polarized light wave of intensity 1000 mW/m2 is coming toward you, out of the screen. After passing through this polarizing filter, the wave's intensity is

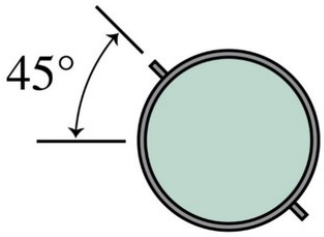
(A) 707 mW/m^2

(B) 500 mW/m^2

(C) 333 mW/m^2

(D) 250 mW/m^2

(E) 0 mW/m^2



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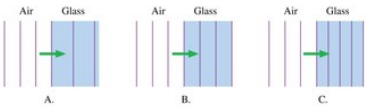
22. A light wave travels, as a plane wave, from air (n = 1.0) into glass (n = 1.5). Which diagram shows the correct wave fronts?

(A) A

(B) B

(C) C



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23. The figure shows a model of an electromagnetic wave where E is the electric field and B is the magnetic field. In what direction is the energy of the wave transmitted (velocity of wave)?

(A) Along the x-axis only

(B) Along the y-axis only

(C) Along the z-axis only

(D) In a direction that is at a nonzero angle to each of the axes.