Ch 24 #8

This is still just a 2-slit problem, even though the waves are water waves. The only other weird thing is that it's asking for the angle at which "little or no wave action" occurs. This means destructive interference, so think about the conditions necessary for destructive interference to occur in a 2-slit experiment, and how this effects your m-value in the equation.

Ch 24 #12

The reason that the water matters is that the light will not have the same wavelength in water that it has in air. So begin by calculating the new wavelength in water based on the following:

$$n = c/v = (f\lambda)/(f\lambda') = \lambda/\lambda'$$

(because f doesn't change)

Once you know λ' , it's just a regular 2-slit problem.

Ch 24 #18

If you're getting a wrong answer, maybe you need to pay better attention to what was really said about the 35° angle. It's the full angle from the 1st dark fringe on one side of the central axis to the 1st dark fringe on the other side. So you need to divide this angle by 2 before you can plug into your formula.

Ch 24 #19

Since you're dealing with bright fringes in single-slit patterns, you must think hard about the m-value to use in your equation. Hint: the first dark fringe happens at m=1, and the second one at m=2. So this first bright fringe that this problem's talking about must happen between them at m=…

Ch 24 #21

The hint for this problem just needs to be a combo of the hints from #18 and #19. Look back at those, and you should be able to at least try this one.

Ch 24 #30

To answer this, you need to calculate the highest integer m-value that can be observed when this white light shines through the grating. But since they told you a range of wavelengths, what should you plug in for λ in the formula? Think about whether large or small wavelengths bend more, and this should lead you to which one of those λ values to plug in.

Ch 24 #32

‘Angular spread’ simply means the difference in angles between where the two extreme wavelengths are bent.

Ch 24 #36

To find how wide the first-order spectrum is on the viewing screen, you need to find the locations of the two edges of the spectrum, and then subtract to find how far apart the two edges are.

Ch 24 #39

It's pretty straightforward to solve for λ. But then remember that the λ that your equation will give you is $\lambda_{substance}$. But the problem wants to know the λ that is seen in the air, so you'll have to finish the problem with a quick multiplication by $n_{substance}$.

Ch 24 #41

The different little twist about this one is that you're being asked for the thickness that "would appear black if illuminated". This means that you're looking for a thickness that leads to destructive interference, rather than the constructive interference you're thinking about in most of these problems.

Ch 24 #45

This one is similar to the other thin film problems, except now your film is made of air between two pieces of glass. This actually makes it a little easier because the wavelength in the film is the same as the wavelength in air on this one.