Announcements

- Homework
  - Last WebWork due on Friday!
  - I still need to extend all the old deadlines to make them available. I'll try to get that done today.
  - You'll just have a last Video HW due on Monday
- Monday will be largely about a semester review
- I'll have final instructions for what the final is going to look like on Monday as well
  - Will be due at noon on May 9th, since that is when our final timeslot would normally finish.
- Polling: `rembold-class.ddns.net`

Review Question

Two waves are given by:

$$A = 10\cos(10t - 5x)$$
$$B = 9\cos\left(8t + 4x + \frac{\pi}{3}\right)$$

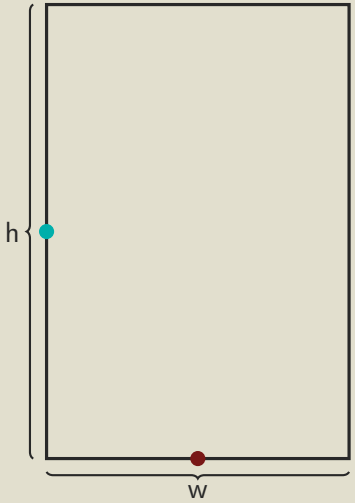
At $t = 4$ at the point $x = 5$, how would you describe the interference?

A. Constructive Interference
B. Destructive Interference
C. No interference because the wavenumber is different
D. No interference because the angular frequency is different

Solution: Constructive Interference

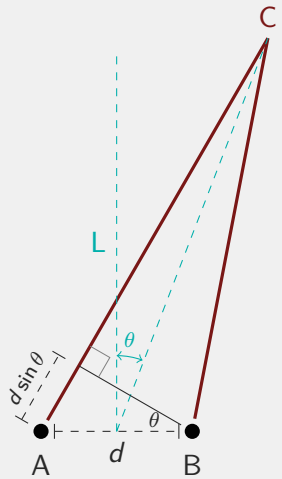
Finding Constructive Interference

Suppose you have a rectangular room in which a polarized, coherent, single frequency wave is emitted from the left and bottom centers of the room as indicated by the dots. What are three possible widths and heights of the room that would assure constructive interference of the two waves in the center of the room?



Double Slit Interference

- Coherent, monochromatic light shone through two slits
- Want to determine where it will constructively and destructively interfere on a viewing screen
- Requires knowing how the path difference ($\Delta\ell$) compares to the wavelength
  - Constructive = integer wavelength
    $$\Delta\ell = m\lambda$$
  - Destructive = $\frac{1}{2}$ integer wavelength
    $$\Delta\ell = \left(m + \tfrac{1}{2}\right)\lambda$$



Double Slit Example

600 nm light is shining through two slits 1 mm apart onto a wall 2 m away. Where are the first 4 **dark** peaks on one side located?

Solution: 0.6 mm, 1.8 mm, 3 mm and 4.2 mm

Tricks of the Trade

- In truth, want the total phase difference to be a full or half multiple of π

$$f = A\cos\underbrace{(\omega t - kx + \phi_0)}_{\text{phase}}$$

$$\Delta(\text{phase}) = k\Delta x + \Delta\phi_0 = \begin{cases} \pm 2\pi m & \text{constructive} \\ \pm 2\pi(m + \frac{1}{2}) & \text{destructive} \end{cases}$$

where m can be $0, 1, 2, 3, \ldots$