Factors

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factors affecting the fringe seperation (x) and the brightness of the fringes.

① The distance (D) b/w the double slit and the screen is increased, while all other factors stay unchanged.

- $\uparrow x = \frac{\lambda D}{a}\uparrow$ ∴ x increases i.e fringe seperation increases
- Since $I \propto \frac{1}{d^2}$ ∴ as distance increases, the intensity of Light falling on the screen will decrease hence fringes will be less bright.

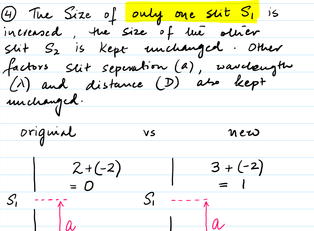
② Light Source is now replaced with a Sound Source

- since $\lambda_{sound} > \lambda_{Light}$ ∴ $\uparrow x = \uparrow\frac{\lambda D}{a}$

hence x increases

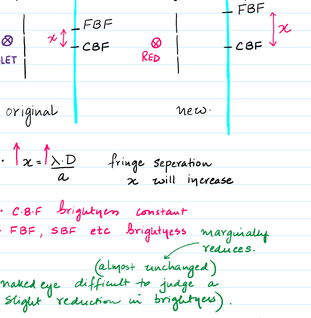
- Interference pattern will disappear Bright & Dark fringes will now be replaced by the term Loud Sound & Soft Sound / Zero Sound.

③ The Size of each slit is increased while keeping the slit seperation (a), wavelength (λ) and distance (D) constant.



- $x = \frac{\lambda D}{a}$, since λ, D & a are all unchanged ∴ fringe Seperation x also remains unchanged
- Since Size of each slit is increased ∴ brightness of the fringes will also increase
- As slit size is increased, less diffraction occurs ∴ Interference pattern will now be observed over a limited area / less # of fringes detected.

④ The Size of only one slit S_1 is increased, the size of the other slit S_2 is kept unchanged. Other factors slit seperation (a), wavelength (λ) and distance (D) also kept unchanged.



- $x = \frac{\lambda D}{a}$ x remains unchanged
- The terms bright & dark fringes will now be replaced by the terms more bright and Less bright fringes

stopped.

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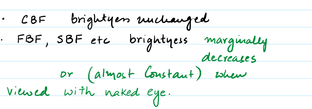
⑤ One of the slit is completely closed while the other slit is left unchanged.



- No interference pattern is formed hence no appearance of bright & dark fringes.
- A large area on the screen will be lit up & the intensity continues to fade as we approach the end of the screen on either side. $I \propto \frac{1}{d^2}$.

⑥ The violet Light (400nm) is now replaced with a red light (700nm)

- $\uparrow x = \uparrow\frac{\lambda D}{a}$ fringe seperation x will increase
- C.B.F brightness constant
- FBF, SBF etc brightness marginally reduces. (almost unchanged)

naked eye difficult to judge a slight reduction in brightness).

- more diffraction in case of Red. (b/c $\lambda_{red} > \lambda_{violet}$)

⑦ The slit seperation (a) is now reduced, while all other factors remain unchanged

- $\uparrow x = \frac{\lambda D}{a}\downarrow$ fringe Sep x will increase
- CBF brightness unchanged
- FBF, SBF etc brightness marginally decreases or (almost constant) when viewed with naked eye.