Factors affecting the fringe separation (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.

• $\uparrow x = \frac{\lambda D\uparrow}{a}$ ∴ x increases i.e fringe separation 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.

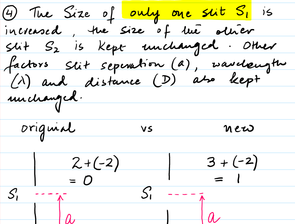
② Light Source is now replaced with a Sound Source

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

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 separation (a), wavelength (λ) and distance (D) constant.

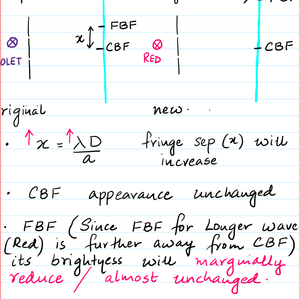


• $x = \frac{\lambda D}{a}$, since λ, D & a are all unchanged ∴ fringe Separation x also remains unchanged

• 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.

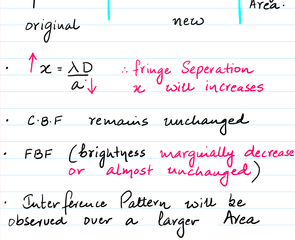
④ The Size of only one slit S_1 is increased, the size of the other slit S_2 is kept unchanged. Other factors slit separation (a), wavelength (λ) and distance (D) also kept unchanged.



• $x = \frac{\lambda D}{a}$ x remains unchanged

• The terms Bright & dark fringes will now be replaced by the terms more bright and Less bright fringes "stopped"

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)

• $\uparrow x = \frac{\uparrow\lambda D}{a}$ fringe sep (x) will increase

• CBF appearance unchanged

• FBF (Since FBF for Longer wavelength (Red) is further away from CBF) ∴ its brightness will marginally reduce / almost unchanged.

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

• $\uparrow x = \frac{\lambda D}{a\downarrow}$ ∴ fringe Separation x will increases

• C.B.F remains unchanged

• FBF (brightness marginally decreases or almost unchanged)

• Interference Pattern will be observed over a larger Area