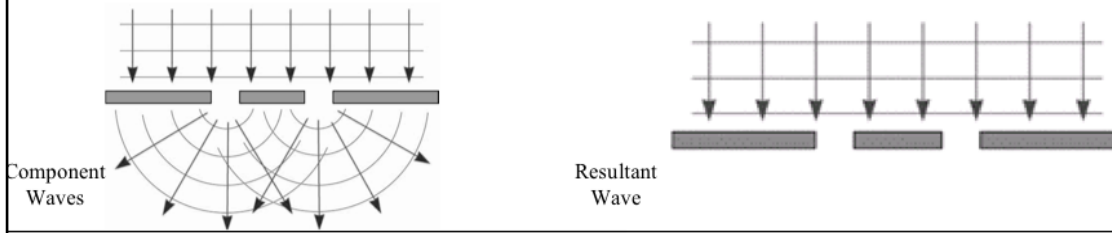


### Double Slit Diffraction and Interference



The diagram shows a source of waves on the left passing through two slits,  $S_1$  and  $S_2$ , separated by a distance  $d$ . The distance to the viewing screen is  $D$ . The path difference between the two slits is labeled  $P.D.$ . The distance from the central maximum to the  $n$ -th maximum is  $X_n$ . The angle of diffraction is  $\theta$ . The diagram also shows the central maximum and several other maxima and minima on the viewing screen.

#### Interference Formulas

**Bright Fringes:**

$$\frac{X_n}{D_n} = \frac{(n\lambda)}{d}$$

**Dark Fringes:**

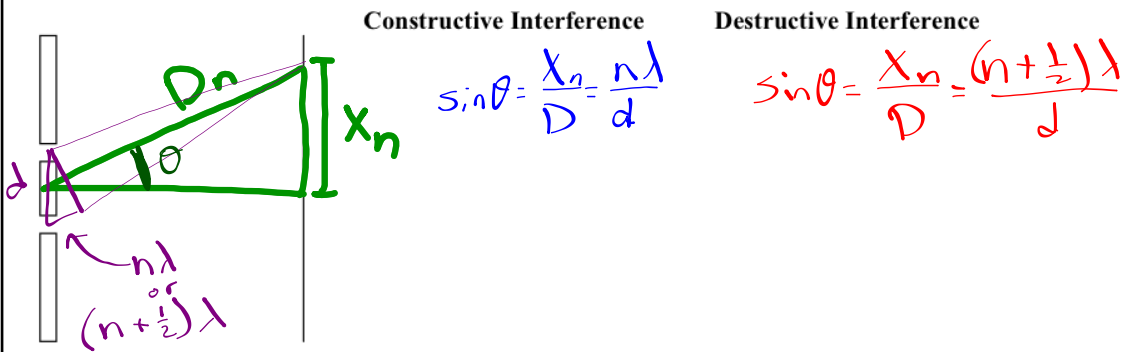
$$\frac{X_n}{D_n} = \frac{(n + \frac{1}{2})\lambda}{d}$$

**Handwritten Formulas:**

$$\sin \theta = \frac{X_n}{D_n}$$

$$\sin \theta = \frac{P.D.}{d}$$

### The Fringe Equations



Variable:	$x_n$	$\theta_n$	$D_n$	$d$	$\lambda$
Quantity:	linear displacement	angular displacement	Dist. from center of sources to screen	distance between sources	wavelength
Units:					

### Thomas Young's Double Slit Diffraction

In 1801 the English scientist Thomas Young (1773–1829) performed an historic experiment that demonstrated the wave nature of light by showing that two overlapping light waves interfered with each other.

Importance of experiment:

- 1.
- 2.

What is the reason for first having a single and then a double slit?

