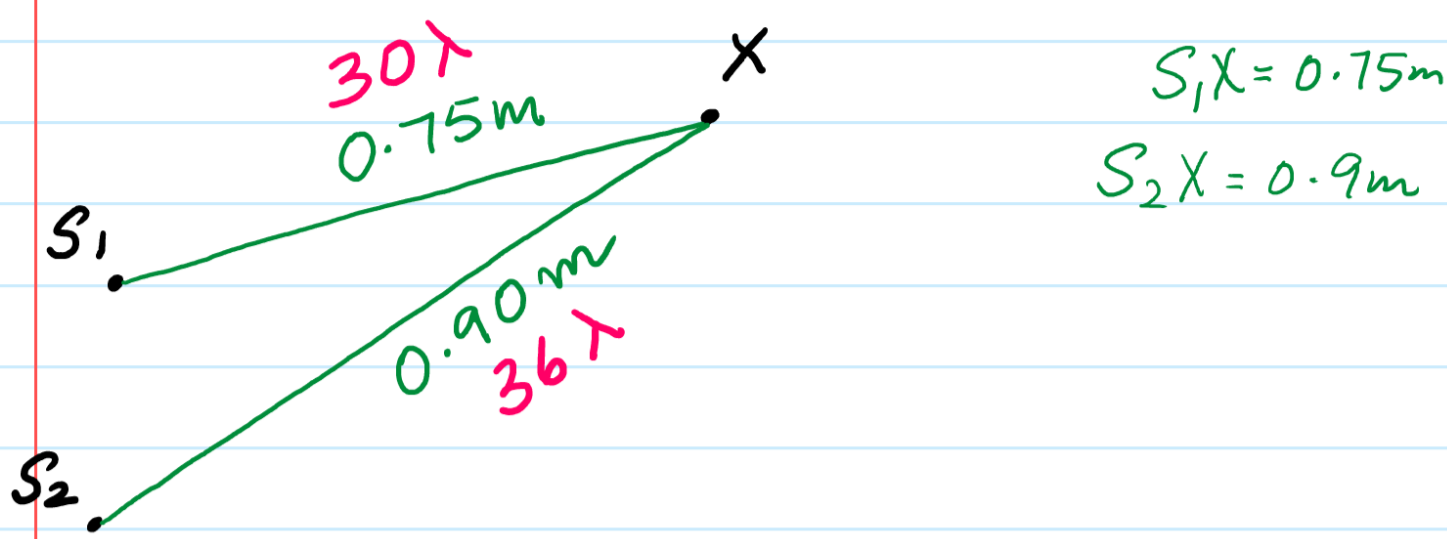


Ex. Sources  $S_1$  &  $S_2$  microwaves  
(EMW)  $v = 3 \times 10^8 \text{ m/s}$ ,  $f = 12 \text{ GHz}$ .

Determine what type of Interference will occur when waves from  $S_1$  &  $S_2$  meet at a point X?



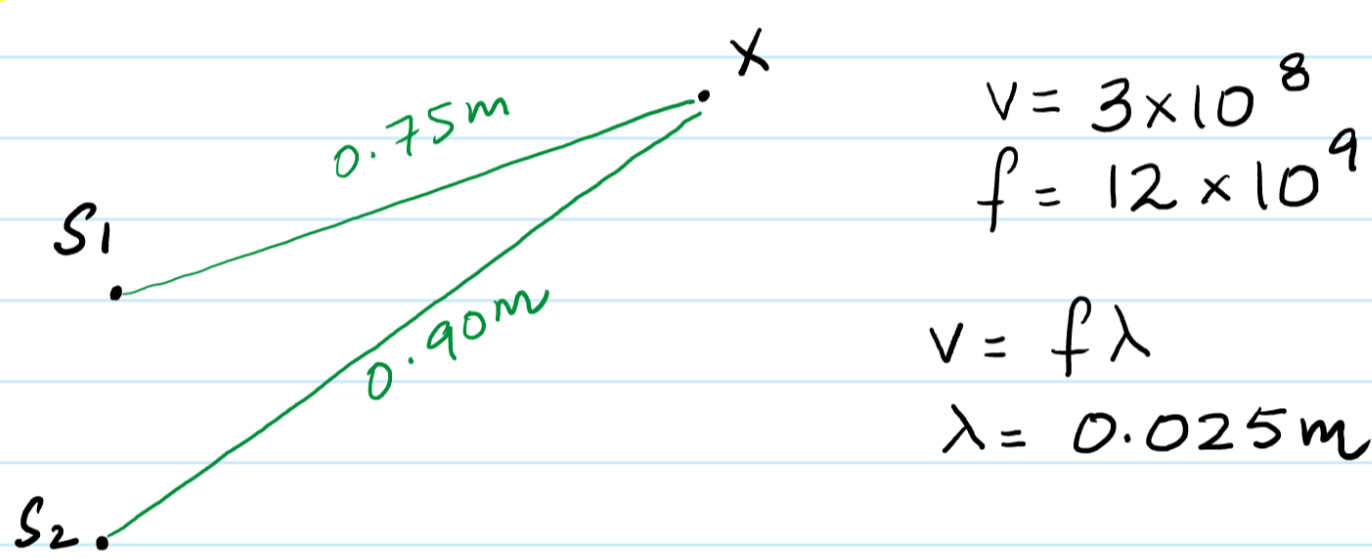
### 1st method.

- $v = f\lambda$   
 $3 \times 10^8 = (12 \times 10^9) \cdot \lambda$   
 $\lambda = 0.025 \text{ m}$
- How many waves will be formed along the path  $S_1X$   
 $\frac{0.75}{0.025} = 30 \text{ waves or } 30\lambda$
- How many waves will be formed along the path  $S_2X$   
 $\frac{0.90}{0.025} = 36 \text{ waves or } 36\lambda$

$$\text{Path diff} = 36\lambda - 30\lambda = 6\lambda *$$

$\therefore$  They meet in phase at pt X hence Constructive Interference occurs at X.

### 2nd method



- firstly you calculate the path diff. b/w  $S_2X$  and  $S_1X = 0.90 - 0.75 = 0.15 \text{ m}$
  - Then you find out how many waves can be formed in this path diff of  $0.15 \text{ m}$   
 $\frac{0.15}{0.025} = 6 \text{ waves or } 6\lambda *$
- They meet in-phase at X hence Constructive interference occurs at X.

Conditions Required for Interference to take place.

- waves must meet at a common pt
- waves must be of the same type
- waves must travel in the same plane
- waves must be coherent  
(the term coherent means that the path diff or phase diff. b/w the two waves must remain CONSTANT)

Q: What additional condition must be satisfied if the waves were to interfere  
(a) Constructively (b) Destructively

"C.I" extra pt.

- They must meet IN-PHASE with each other

"D.I" extra pt

- They must meet OUT OF PHASE with each other.