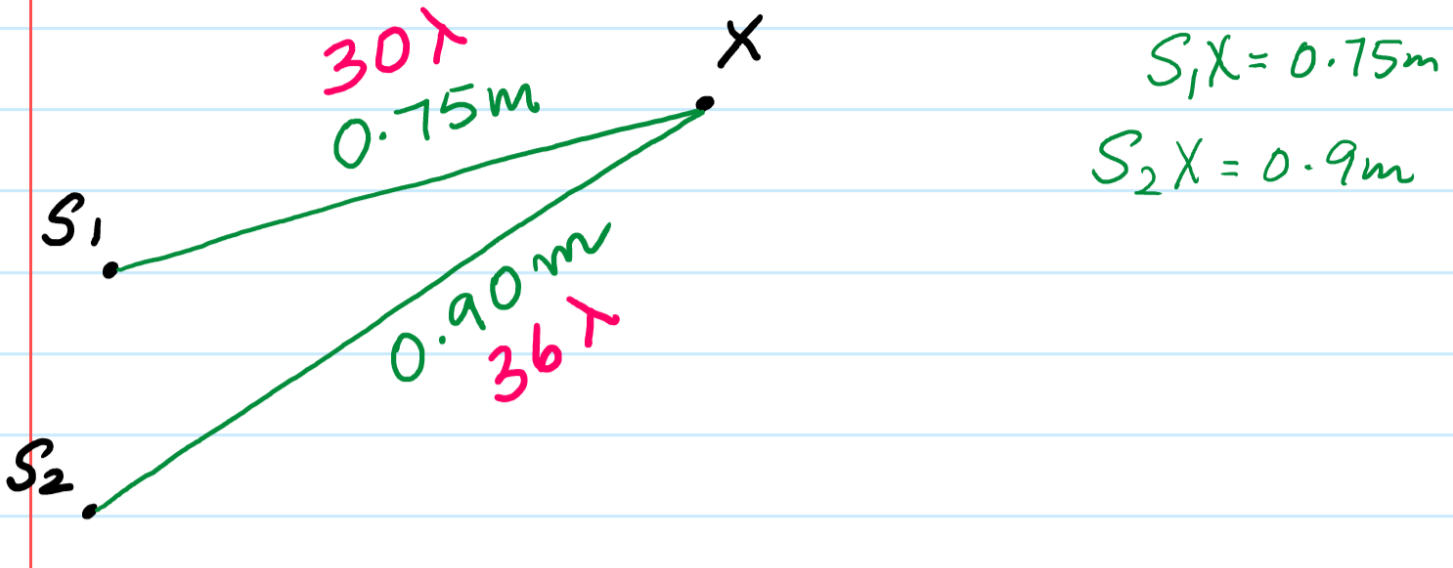


Waves 2

14 January 2021 07:06

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?



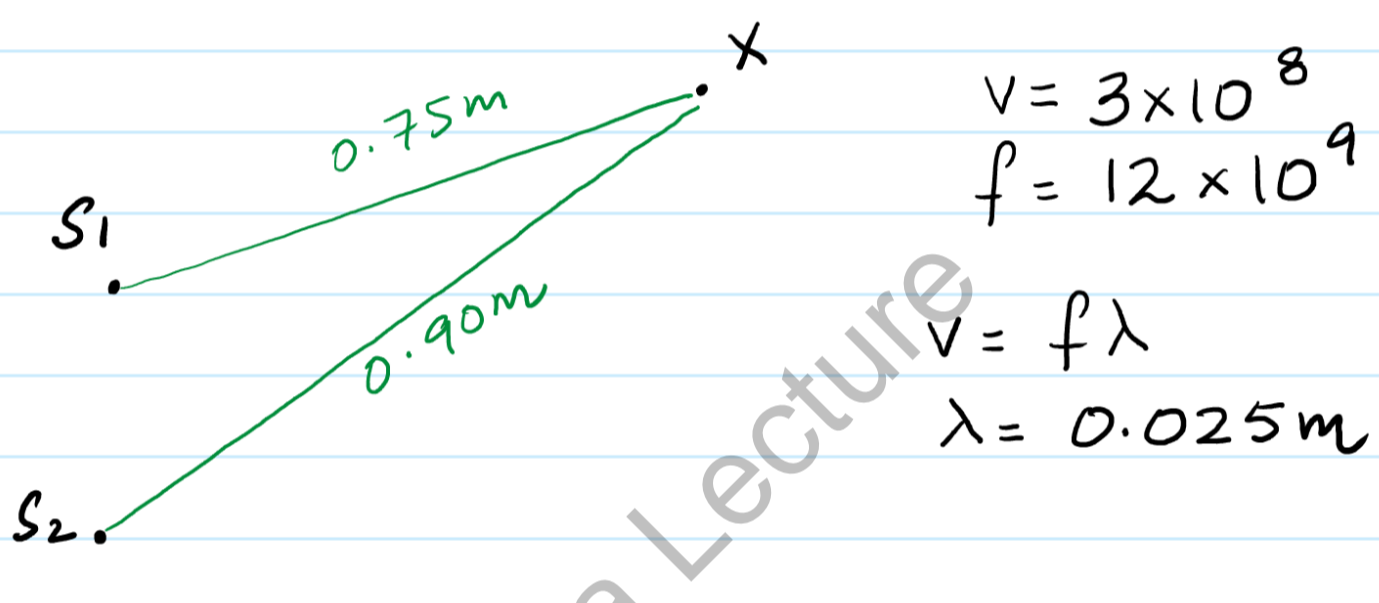
1st method.

- $v = f\lambda$
 $3 \times 10^8 = (12 \times 10^9) \cdot \lambda$
 $\lambda = 0.025\text{m}$
- 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
 $\frac{0.90}{0.025} = 36 \text{ waves or } 36\lambda$

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 0.15m
 $\frac{0.15}{0.025} = 6 \text{ waves or } 6\lambda$ *
- 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.