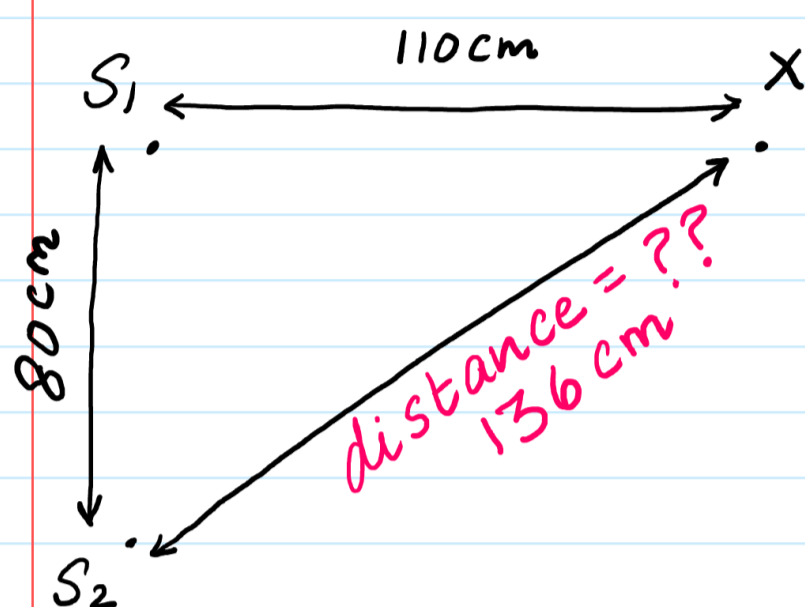


Ex. The diag shows two Sources S_1 & S_2 .
 The waves produced meet at X .
 It is given that the freq. of both Sources is simultaneously varied from 1000 Hz until it reaches 4000 Hz.
 The speed of the waves is 340 m/s.
 Cal on how many occasions would you expect the phenomena of Destructive Interference to occur at the point X .



for D.I to occur,
 path diff = $\frac{1}{2}\lambda, \frac{3}{2}\lambda, \frac{5}{2}\lambda \dots$

$136 - 110$
 $26 = \frac{1}{2}\lambda, \frac{3}{2}\lambda, \frac{5}{2}\lambda, \frac{7}{2}\lambda, \frac{9}{2}\lambda$

- $\lambda = 52 \text{ cm}$ ✗
- $\lambda = 17.3 \text{ cm}$ ✓
- $\lambda = 10.4 \text{ cm}$ ✓
- $\lambda = 7.4 \text{ cm}$ ✗
- $\lambda = 6.5 \text{ cm}$ ✗

$v = 340$
 $f = 1000$
 $v = f\lambda$

$\lambda = 34 \text{ cm}$

$v = 340$
 $f = 4000$
 $v = f\lambda$

$\lambda = 8.5 \text{ cm}$

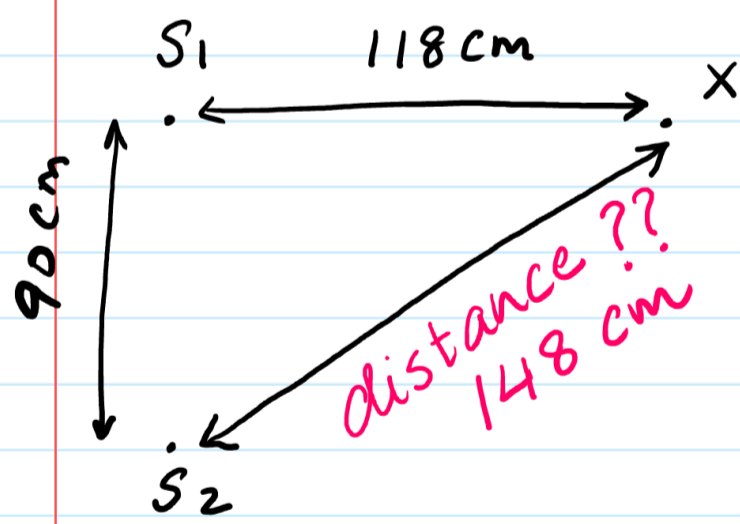
$8.5 \leq \lambda \leq 34$

= 2 occasions

Q $f = 200 \text{ Hz} \rightarrow f = 4500 \text{ Hz}$.

$v = 250 \text{ m/s}$.

(Use 3 s.f while working)



On how many occasions will Constructive Interference occur at X .

for C.I to occur

Path diff = $1\lambda, 2\lambda, \dots$

$148 - 118$

$30 = 1\lambda, 2\lambda, 3\lambda, 4\lambda, 5\lambda, 6\lambda \dots$

- $\lambda = 30 \text{ cm}$
- $\lambda = 15 \text{ cm}$
- $\lambda = 10 \text{ cm}$
- $\lambda = 7.5 \text{ cm}$
- $\lambda = 6 \text{ cm}$
- $\lambda = 5 \text{ cm}$

$f = 200$ $v = 250$
 $v = f\lambda$

$\lambda = 80 \text{ cm}$

$f = 4500$ $v = 250$
 $v = f\lambda$

$\lambda = 5.55 \text{ cm}$

$5.55 \leq \lambda \leq 80$

= 5 occasions Ans.