

Q- A sound source is located somewhere along the x-axis. Experiments show that the same wave front simultaneously reaches listeners at  $x = -6$  m and  $x = +8.0$  m.

(a) What is the x co ordinate of the source?

(b) A third listener is positioned along the positive y-axis. What is her y coordinate if the same wave front reaches her at the same instant it does the first two listeners?

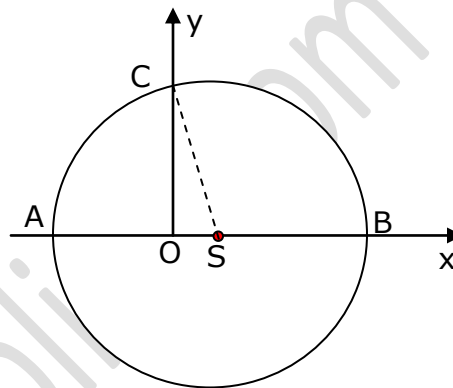
(a) The wave fronts starts from the source and travels uniformly in all directions and hence it is spherical. Let the radius of this spherical wave front is  $R$  and the source is positioned at  $x$  then

For point A  $R - x = 6$  m

And for point B  $x + R = 8$  m

Adding the two we get  $R = 7$  m and thus  $x = 1$  m

$x = 1$  m



(b) The y coordinate of the third listener C is given by

$$OC = \sqrt{SC^2 - OS^2} = \sqrt{R^2 - x^2} = \sqrt{7^2 - 1^2} = 4\sqrt{3} = 6.93\text{m}$$

**$y_c = 6.93$  m**