

- 1 Fig 1.1 shows a displacement-distance graph for two sound waves A and B, of the same frequency and amplitude. Wave A is travelling to the right and wave B is travelling to the left.

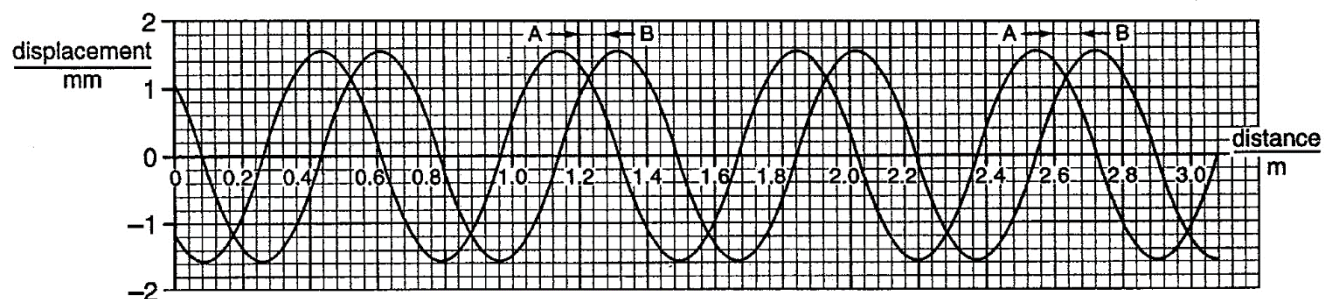


Fig 1.1

- (a) (i) From the graph, deduce the phase difference between the two waves at the instant shown.

phase difference = ..... rad [1]

- (ii) The period of each wave is  $T$ .

Determine the maximum displacement of the resultant of the two waves

1. at the instant shown,

maximum displacement = ..... mm [1]

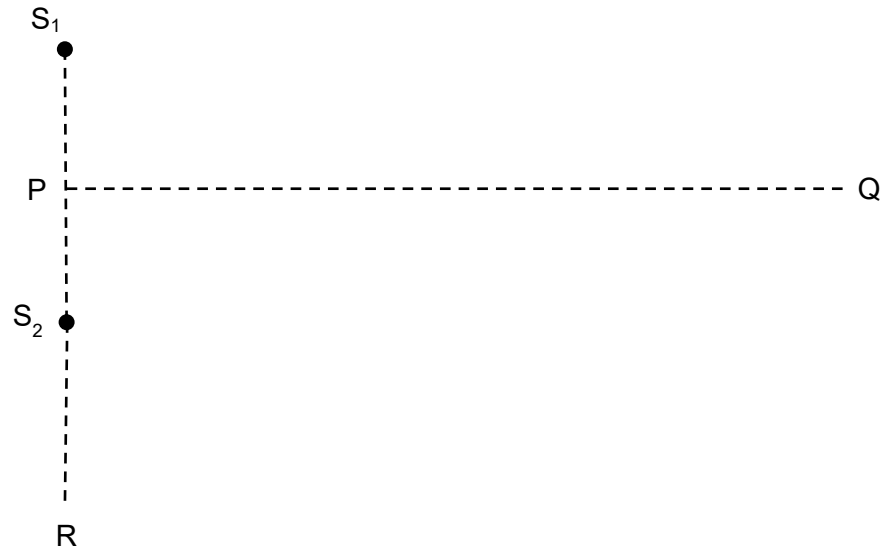
2. at the instant shown +  $\frac{T}{8}$ ,

maximum displacement = ..... mm [1]

3. at the instant shown +  $\frac{3T}{8}$ .

maximum displacement = ..... mm [1]

- (b) Two microwaves sources  $S_1$  and  $S_2$  are located as shown in Fig 1.2. The sources are producing waves that are in phase and of wavelength  $\lambda$ . The distance between  $S_1$  and  $S_2$  is  $3.5\lambda$ . Points lying on the line joining P and Q are equidistant from  $S_1$  and  $S_2$ .



**Fig 1.2**

Assume that any drop in intensity of the wave, from each source, with distance is negligible.

State and explain whether a maximum or minimum is detected by a microwave sensor as it is moved along the line joining

- (i)  $S_1$  and  $S_2$ ,

.....  
 .....  
 .....  
 ..... [2]

- (ii) P and Q,

.....  
 .....  
 ..... [2]

(iii)  $S_2$  and R.

.....  
.....  
..... [2]

[Total: 10]