5 Two dippers S_1 and S_2, oscillating in phase with equal amplitude at a frequency of 8.0 Hz, generate waves of wavelength 6.0 cm in a ripple tank as shown in Fig. 5.1.

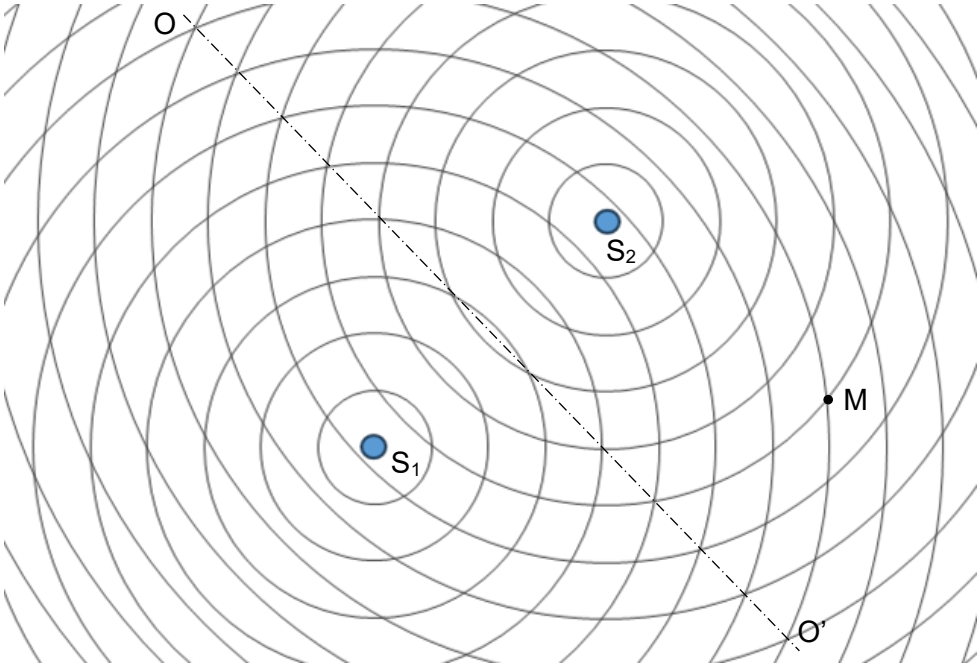

Fig. 5.1

The superposition of the waves generated produce an interference pattern of maxima and minima.

(a) State the *Principle of Superposition*.

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.....[2]

(b) For the waves from S_1 and S_2 meeting at point M, state

(i) their path difference,

.....[1]

(ii) their phase difference.

.....[1]

(c) The waves radiate uniformly from the dippers in all directions on the surface of the water. Given that the amplitude of the wave at M when only S_1 is oscillating is 4.2 mm, deduce the amplitude of the wave at M

(i) when only S_2 is oscillating,

amplitude = ... mm [2]

(ii) when both S_1 and S_2 are oscillating.

amplitude = ... mm [1]

(d) OO' is the perpendicular bisector of S_1S_2.

(i) Draw a line on Fig 5.1 to represent the third minima from OO' and label it XX'. [1]

(ii) Explain why the amplitude of the wave along XX' is not zero.

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.....[1]

(e) The frequency of S_1 is kept at 8.0 Hz and the frequency of S_2 is decreased slightly to 7.8 Hz.

Describe what will be observed at M.

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.....[2]

[Total: 11]