

- 5 A ripple tank is used to demonstrate the interference of water waves. Two dippers D1 and D2 produce coherent waves that have circular wavefronts, as illustrated in Fig. 5.1.

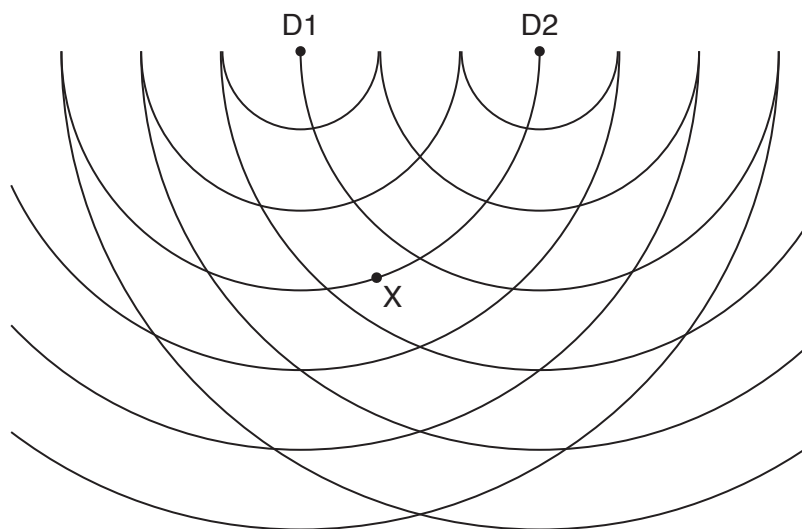


Fig. 5.1

The lines in the diagram represent crests. The waves have a wavelength of 6.0 cm.

- (a) One condition that is required for an observable interference pattern is that the waves must be coherent.

- (i) Describe how the apparatus is arranged to ensure that the waves from the dippers are coherent.

.....
 [1]

- (ii) State one other condition that must be satisfied by the waves in order for the interference pattern to be observable.

.....
 [1]

- (b) Light from a lamp above the ripple tank shines through the water onto a screen below the tank. Describe one way of seeing the illuminated pattern more clearly.

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 [1]

- (c) The speed of the waves is 0.40 m s^{-1} . Calculate the period of the waves.

period = s [2]

- (d) Fig. 5.1 shows a point X that lies on a crest of the wave from D1 and midway between two adjacent crests of the wave from D2.

For the waves at point X, state:

- (i) the path difference, in cm

path difference = cm [1]

- (ii) the phase difference.

phase difference = ° [1]

- (e) On Fig. 5.1, draw **one** line, at least 4 cm long, which joins points where only maxima of the interference pattern are observed. [1]

[Total: 8]