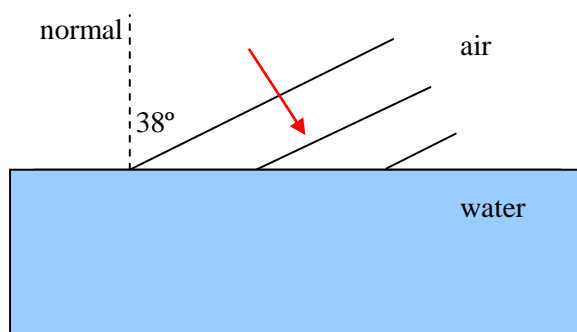


Extension Worksheet – Topic 4, Worksheet 3

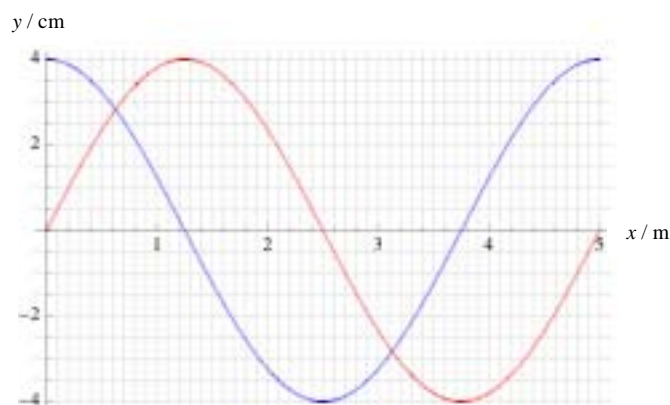
- 1 The diagram shows wavefronts of light approaching a boundary between two media.



The angle between the normal to the boundary and the incident wavefronts is 38° . The refractive index of water is 1.33 and the wavelength of the light in air is 720 mm.

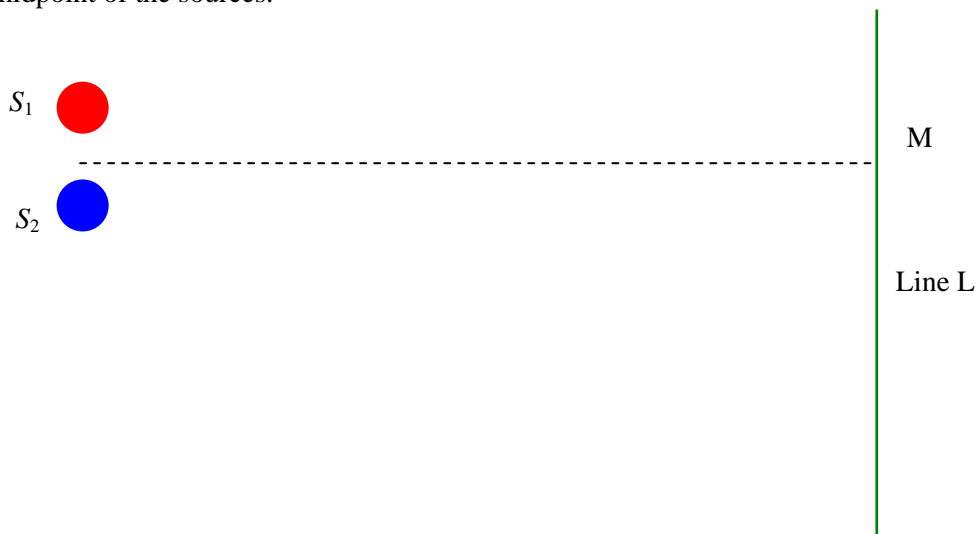
Calculate

- a the wavelength of the light in water. [2]
 - b the angle between the wavefronts in water and the normal to the boundary. [2]
 - c Draw two wavefronts in water. [2]
- 2 The graph shows the variation with time of the displacement (in cm) of two waves at the same point in the same medium.

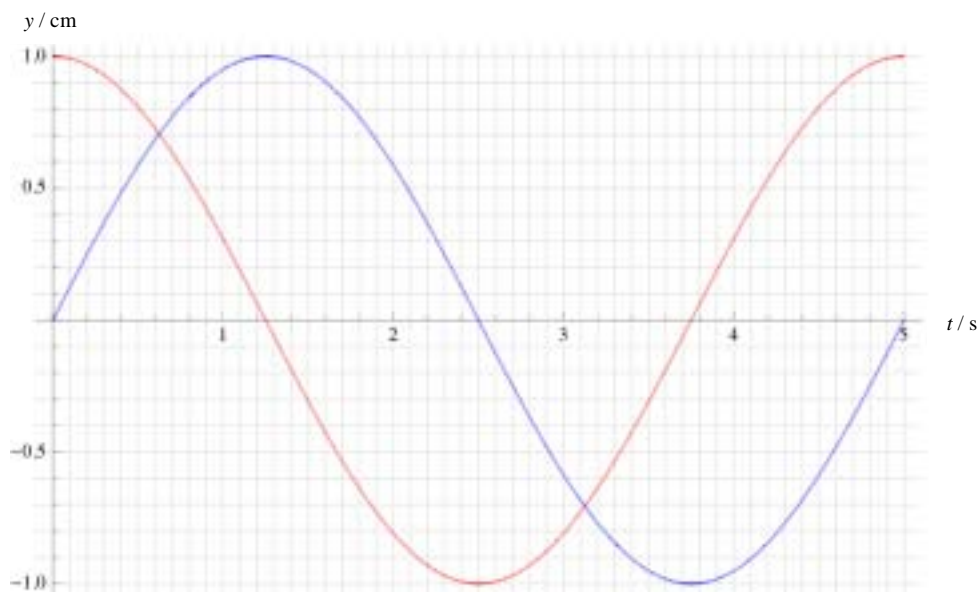


- a State the principle of superposition. [2]
- b Calculate the amplitude of the resulting wave. [2]

- 3 Two sources, S_1 and S_2 , emit waves of the same amplitude and wavelength. The waves are observed along the line L shown. Point M is on the line directly across from the midpoint of the sources.



The variation with time (in s) of the displacement (in cm) of the two waves **at the source** of each wave is shown in the graph. The speed of both waves is 6.0 m s^{-1} . (The wave in red is from S_1 and that in blue is from S_2 .)



The intensity of the waves is measured along the line L.

- a Explain why at M the intensity of the wave is not the maximum intensity along the line L. [3]
- b Calculate the path difference between the waves at the **two** points nearest M where a maximum in intensity is observed. [3]