**4** **(a)** For a progressive wave, state what is meant by

**(i)** the *period*,

.....

.....[1]

**(ii)** the *wavelength*.

.....

.....[1]

**(b)** Fig. 4.1 shows the variation with time $t$ of the displacement $x$ of two progressive waves P and Q passing the same point.

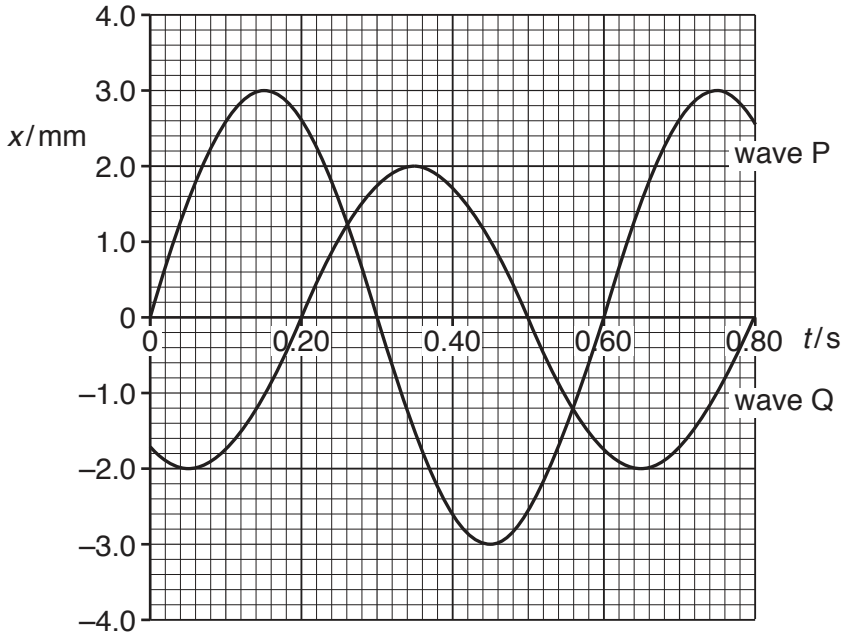


**Fig. 4.1**

The speed of the waves is 20 cm $s^{-1}$.

**(i)** Calculate the wavelength of the waves.

wavelength = ..... cm [2]

**(ii)** Determine the phase difference between the two waves.

phase difference = ..... ° [1]

**(iii)** Calculate the ratio

$$\frac{\text{intensity of wave Q}}{\text{intensity of wave P}}.$$

ratio = ..... [2]

**(iv)** The two waves superpose as they pass the same point. Use Fig. 4.1 to determine the resultant displacement at time $t = 0.45\,\text{s}$.

displacement = ..... mm [1]

[Total: 8]

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