3 **(a)** Describe what is meant by a polarised wave.

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..... [2]

(b) A wave of frequency f and wavelength λ has speed v.

Using the definition of speed, deduce the equation $v = f\lambda$.

[2]

(c) Two radio transmitters, A and B, of the same power are separated by a distance of 5.0 km. They each transmit a radio wave of frequency 1200 kHz. The two waves emitted are in phase at the transmitters. The waves interfere.

A car travels along a line parallel to, and 12 km from, the line joining the two transmitters, as shown in Fig. 3.1. An aerial in the car detects the resultant wave from the two transmitters. At one instant the car is at position P, a distance 12 km from transmitter A.

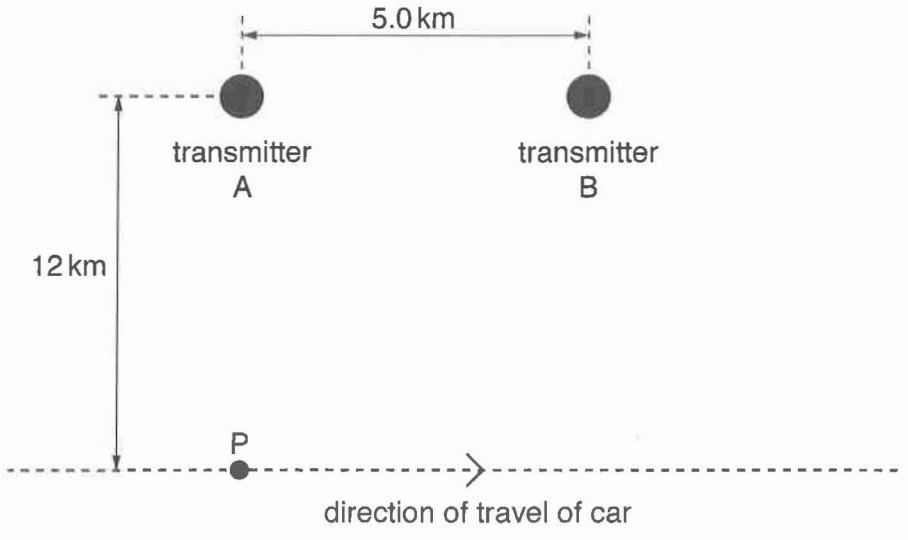

Fig. 3.1 (Not to scale)

(i) State and explain the nature of the interference between the two waves that the aerial will receive at point P.

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..... [3]

(ii) Describe how the resultant amplitude of the two radio waves at the car varies with time as it travels at a constant speed along the line shown in Fig. 3.1.

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..... [1]

(iii) Suggest a change that can be made at the transmitters that will prevent interference between the two waves without changing the frequency.

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..... [2]

(d) Determine the ratio, at point P,

$$\frac{\text{intensity of radio wave from transmitter A}}{\text{intensity of radio wave from transmitter B}}.$$

ratio = ...[3]