

- 4 (a) A fire alarm on a wall produces a loud sound during a fire drill in SAJC. The speed and frequency of the sound waves are 330 m s^{-1} and 5000 Hz respectively. [2]

- (i) Determine the phase difference between any two air molecules which are 3.3 cm apart in the direction of propagation.

phase difference =rad [2]

Hence state whether they are oscillating *in phase* or *in anti-phase*.

.....[1]

- (ii) The surface area of a human eardrum is approximately $5.5 \times 10^{-5} \text{ m}^2$. Calculate the energy received at a person's eardrum given he is at 24 m away from the alarm for 15 s and the average sound intensity at the eardrum is $3.0 \times 10^{-2} \text{ W m}^{-2}$.

energy =J [2]

- (iii) State the assumption that you have made.

.....
[1]

- (b) Distinguish between a *polarised* wave and an *unpolarised* wave.

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[2]