2019 Ph H1 Q18

Section: Particles and Waves

Topic: Refraction of Light

Question Summary

A ray of monochromatic light passes from air into water. The wavelength in air is 589 nm. What is the speed of this light in water?

Worked Solution

Refractive index of water n ≈ 1.33.

Speed in medium: v = c / n.

v = (3.00 × 10^8) / 1.33 ≈ 2.26 × 10^8 m s^{-1}.

This matches option C.

Final Answer

C — 2.26 × 10^8 m s^{-1}

Revision Tips

- Use v = c/n for light in a medium (n relative to air).
- Frequency stays constant; wavelength shortens in medium.
- Common values: n_water ≈ 1.33, n_glass ≈ 1.5.