2017 Ph H1 Q15

Section: Particles and Waves

Topic: Radiation – Inverse Square Law

Question Summary

A point source of light is moved from 8.00 m to 12.0 m away from a surface. The irradiance at 8.00 m is 50.0 mW m^{-2}. What is the irradiance at 12.0 m?

Worked Solution

Inverse square law: $I \propto 1/d^2$.

Ratio: $I_2 = I_1 \times (d_1/d_2)^2$.

$I_2 = 50.0 \times (8.00/12.0)^2$ mW m^{-2}.

$I_2 = 22.2$ mW m^{-2} (3 s.f.).

Final Answer

A — 22.2 mW m^{-2}

Revision Tips

- Inverse square law: $I = P/(4\pi d^2)$.
- If distance increases by factor k, irradiance decreases by k^2.
- Keep significant figures consistent with question data.
- Check units carefully (mW m^{-2} here).