2018 Ph H1 Q12

Section: Particles and Waves

Topic: Radiation – Inverse Square Law

Question Summary

The irradiance on a surface 0.50 m from a point source is I. What is the irradiance on a surface 1.5 m away?

Worked Solution

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

Compare $d_1 = 0.50$ m and $d_2 = 1.5$ m.

$I_2/I_1 = (0.50/1.5)^2 = (1/3)^2 = 1/9$.

$I_2 = I/9 \approx 0.11\ I$.

Final Answer

A — 0.11 I

Revision Tips

- $I = P/(4\pi d^2)$ for a point source.
- If distance increases by k, irradiance decreases by k^2.
- Ratios simplify calculations — no need for absolute values.
- Match significant figures to given data.