2022 Ph H1 Q15

Section: Particles and Waves

Topic: Radiation – Inverse Square Law

Question Summary

Irradiance at 5.0 m is 20.0 W m^{-2}. Source moved to 25.0 m. Find irradiance at new distance.

Worked Solution

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

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

$I_2 = 20.0 \times (5.0/25.0)^2 = 0.80$ W m^{-2} (3 s.f.).

Final Answer

B — 0.80 W m^{-2}

Revision Tips

• Inverse square law: $I = P/(4\pi d^2)$.

• If distance increases by k, irradiance decreases by k^2.

• Use ratio $I_2/I_1 = (d_1/d_2)^2$ to simplify.

• Match significant figures to question data.