Given a light bulb with a power $120 \text{ W}$. A book is placed at point $X$, which is at a distance $r = 1 \text{ m}$ away. The book is perpendicular to the incident light. Its area is about $0.1 \text{ m}^2$. For a black surface, the pressure given by light is $\frac{I}{c}$; for a totally reflecting surface, the pressure is $P = \frac{2I}{c}$, where $I$ is the intensity of light at $X$.

If $\frac{1}{4}$ of the light is reflected, find the pressure $P$ on the book.

A) $P = \frac{1}{2} \frac{I}{c}$

B) $P = \frac{3}{4} \frac{I}{c}$

C) $P = \frac{5}{4} \frac{I}{c}$
For the $\frac{1}{4}$ of the light which is reflected, it contributes $\frac{1}{4} \times \frac{2I}{c}$ to the pressure.

For the $\frac{3}{4}$, which is absorbed, it contributes $\frac{3}{4} \times \frac{I}{c}$ to the pressure.

Thus total pressure is $P = \frac{2}{4} + \frac{3}{4} \times \frac{I}{c} = \frac{5I}{4c}$

Answer C.

34.03-03 'Intensity' and 'Pressure' of Light  2006-9-14