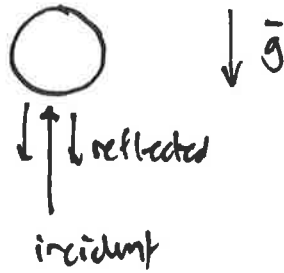


B&B 3.8

What is the most massive sphere that can be supported with a 10kW laser beam?



From eqn. (3.128) $P_{\text{light}} = \frac{W_A}{c} + 2 \frac{W_R}{c}$

Labels: 'observed energy' points to $\frac{W_A}{c}$, 'reflected energy' points to $\frac{W_R}{c}$. A bracket below the equation is labeled 'momentum transferred to sphere by light'.

Since $W_A = 0$, $P_{\text{light}} = 2 \frac{W_R}{c}$

The rate of momentum transfer is $\frac{dP_{\text{light}}}{dt} = 2 \frac{1}{c} \frac{dW_R}{dt}$

So the weight supported $mg = \frac{2}{c} \frac{dW_R}{dt}$

$$m = \frac{2 dW_R/dt}{cg}$$

$$= \frac{(2)(10\text{kw})}{(3e8)(9.8)} = \boxed{6.8 \text{ milligrams}}$$