

*PHYC 463 Advanced Optics I*  
Fall 2007  
Homework #2, Due Wednesday Sept. 5

1- Consider an astronaut floating in free space with only a 10 W lantern. How long will it take to reach a speed of 10 m/sec using the radiation as propulsion? The astronaut's total mass is 100 kg.

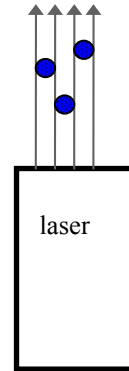
2-Problem 2.8 (K&F)

3-Problem 2.9 (K&F)

4-Suppose we want to suspend spherical particles of radius  $r$  and density  $\rho$  (gr./cm<sup>3</sup>) in vacuum using radiation pressure.

a- Assuming the particles are highly reflecting ( $R \approx 1$ ), what is the irradiance required to suspend these particle against earth's gravitational force?

b- For aluminum particles having  $\rho = 2.7$  gr/cm<sup>3</sup> and  $r = 100$   $\mu\text{m}$ , calculate the suspension irradiance  $I_s$ . (Note:  $g = 980$  cm/sec<sup>2</sup>)



**Have a Safe Labor Day Weekend!**