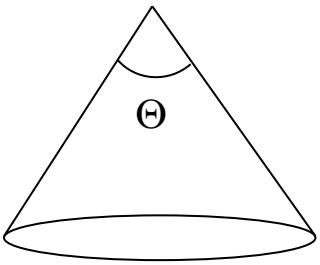
Homework 12.

To solve the problems below I would recommend to look up once again what is the radiant intensity and irradiance. For problem 1 you will probably need the expression for the solid angle of a cone. I had given it to you before, but, just to remind - the solid angle of a cone with the apex angle Θ can be calculated as:

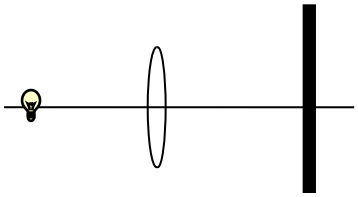
$$\Omega = 2\pi(1 - \cos\left(\frac{\Theta}{2}\right))$$



Problems:

1. An image of the bulb is created on the screen with a converging lens (see image below). Diameter of the lens is 10cm, distance from the lamp to the lens is 2m, radiant intensity of the lamp is 0.2 W/sr, diameter of the bulb's image is 5cm. Find the irradiance of the screen within the bulb's image. (We assume that the bulb, like a point source, emits light in all directions).

2. An image of the bulb is created on the screen with a converging lens (see image below) with the magnification of 2. How the irradiance within the image will change if we change the places of the screen and the bulb?



3. Objects which are 10m away from the lamp post are illuminated 4 times less than objects which are just 5m away. Why if we stand 10 m away from the lamp post it looks as bright as from the 5 meter distance?