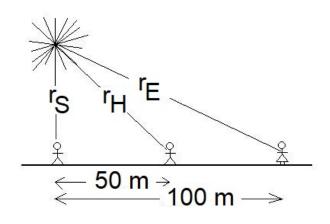HW 12-3 Soln)

We'll assume that the sound is radiated isotropically.
Need to find the distances between the firecracker and each of the persons.

$r_S = 100$ m

$r_H = \sqrt{100^2 + 50^2} = 112$ m

$r_E = \sqrt{100^2 + 100^2} = 141$ m

Since P is the same for all of the people, let

$$\frac{P}{4\pi} = \frac{I_S}{r_S^2} = \frac{I_H}{r_H^2} = \frac{I_E}{r_E^2}$$

and so,

$$\frac{I_H}{I_S} = \frac{r_S^2}{r_H^2} = \frac{100^2}{112^2} = 0.8$$

$$\frac{I_E}{I_S} = \frac{r_S^2}{r_E^2} = \frac{100^2}{141^2} = 0.5$$