32

The radius of a typical human eardrum is about 4.0 mm. Find the energy per second received by an ear drum when it listens to sound that is

1) at the threshold of hearing
2) at the threshold of pain

$I = \frac{P}{A}$ $\quad P = IA$ $\quad A = \pi r^2$

$P = I \pi r^2$ $\quad I_0 = 1E\text{-}12 \frac{W}{m^2}$

$I = 1 W/m^2$

$P_0 = \left(1E\text{-}12 \frac{W}{m^2}\right) \pi \left(4.0E\text{-}3m\right)^2 = 5.03E\text{-}17 W$

$\boxed{5.0E\text{-}17 W}$

$P = \left(1 \frac{W}{m^2}\right) \pi \left(4.0E\text{-}3m\right)^2 = 5.03E\text{-}5 W$

$\boxed{5.0E\text{-}5 W}$