P #52

Ch 14 - pg 459

$f_1 = 480\ Hz$

$T_1 = 300K = 27°C$
$T_2 = 305K = 32°C$

$$v = (331\ m/s)\cdot\sqrt{1+\frac{T}{273}}$$

$$v_1 = (331\ m/s)\cdot\sqrt{1+\frac{27°C}{273}} \qquad v_1 = 346.98\ m/s$$

$$v_2 = (331\ m/s)\cdot\sqrt{1+\frac{32°C}{273}} \qquad v_2 = 349.86\ m/s$$

Find λ_1: $\quad v_1 = f_1 \cdot \lambda_1$

$$(346.98\ m/s) = (480\ Hz)\cdot\lambda_1$$

$$\lambda_1 = .722\ m$$

Find f_2: $\quad \lambda_2 = \lambda_1 = .722$ (because lengths are equal)
$v_2 = 349.86\ m/s$

$$v_2 = f_2 \cdot \lambda_2$$
$$(349.86\ m/s) = f_2 \cdot (.722\ m)$$

$$f_2 = 484\ Hz$$

$$f_B = |f_1 - f_2|$$
$$= |480\ Hz - 484\ Hz|$$

$$\boxed{f_B = 4\ Hz}$$