Sound Waves Review

① $v = 331 + .6T$

$= 331 + .6(-30)$

$= 313 \text{ m/s}$

② $v = f\lambda$ $\quad v = 331 + .6T$

$\lambda = \frac{v}{f}$ $\quad = 331 + .6(22)$

$= 344.2 \text{ m/s}$

$= \frac{344.2}{90 \times 10^3}$

$= 0.0038 \text{ m}$ $\quad 3.8 \times 10^{-3} \text{ m}$ $\quad 3.8 \text{ mm}$

③ $v = \frac{d}{t}$

$t = \frac{d}{v} = \frac{100 \text{ m}}{350 \text{ m/s}} = 0.29 \text{ s}$

④ $v = \frac{d}{t}$ $\quad v = 331 + .6T$

$= 331 + .6(20)$

$= 343 \text{ m/s}$

$d = vt$

$= 343(10)$

$= 3430 \text{ m}$ $\quad 3.4 \text{ km}$

(5) $v = \frac{d}{t}$ $\quad t = \frac{1.2\,s}{2} = 0.6\,s$

$d = vt$
$= 340(.6)$
$= \underline{204\ m}$

(6) $v = \frac{d}{t}$ $\quad t = \frac{4.5}{2} = 2.25\,s$

$d = vt$
$= 1450(2.25)$
$= \underline{3625\,m}$ $\quad \underline{3.6\,km}$

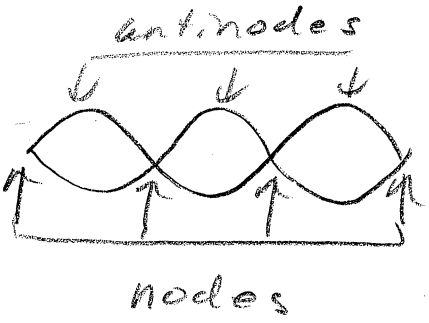
(7) 56 dB to 60 dB (doubling of perceived volume 6 – 10 dB)

(8) (a) C (pitch = frequency)

(b) B (perceived volume is related to Intensity which is proportional to the square of the amplitude.)

(9) The observer hears an increase in pitch as the train approaches and a decrease in pitch as the train moves away.

(10)



(11) $f_1 = \frac{v}{2L} = \frac{250}{2(1)} = \underline{125\ Hz}$

(12) $f_3 = \frac{3v}{2L}$

$L = \frac{3v}{2f_3} = \frac{3(340)}{2(1600)} = \underline{0.32\ m}$

(13) $f_n = \frac{nv}{4L} = 200 \qquad f_{n+1} = \frac{(n+1)v}{4L} = 250$

v must be the same for both.

$v = \frac{200(4L)}{n} \qquad v = \frac{250(4L)}{n+1}$

$\frac{200(4L)}{n} = \frac{250(4L)}{n+1}$

$200(n+1) = 250n$

$200n + 200 = 250n$

$200 = 50n$

$n = 4$

$\frac{nv}{4L} = 200$

$L = \frac{nv}{4(200)} = \frac{4(340)}{4(200)} = \underline{1.7\ m}$

(14) beat frequency = $|302 - 300| = \underline{2\ Hz}$

(15) $f = \frac{20}{5} = 4\ Hz$

436 Hz or 444 Hz