Ch. 15 : Q # 11, 22 + P # 7, 13, 15

Q 11

$$\lambda = \frac{v}{f}$$

/

inversely proportional to frequency

$$f_1 < f_2 < f_3 \quad = \quad \lambda_1 > \lambda_2 > \lambda_3$$

* wavelength only depends on the frequency

Q 22

Speed of sound in human tissue 1540 m/s

depth of penetration – 200 times the wavelength

$$d = 200\lambda$$

$$200\left(\frac{v}{f}\right)$$

$$200\,(1540\,m/s) / 5 \times 10^6\,Hz$$

6.2 cm

P7

$$\Delta t_p = \frac{\Delta x}{V_p}$$

$$\frac{45\,km}{5000\,m/s} = 9.0s$$

$$\Delta t_s = \frac{\Delta x}{V_s}$$

$$\frac{45\,km}{3000\,m/s} = 15.0s$$

$$15.0_s - 9.0_s = \boxed{6.0s}$$

P13

$$V = \frac{\lambda}{T}$$

$$\frac{2.0\,m}{0.20\,s} = 10\,m/s$$

P. 15

a) Lab temp. 20°C, then speed of sound 343 m/s ← Table 15.1

$f = 40\,kH_2$

$$\lambda = \frac{v}{f}$$

$$\frac{343\,m/s}{40 \times 10^3\,H_2} = 8.6\,mm$$

b)

$$\Delta t = \frac{\Delta x}{v_x}$$

$$\frac{5.0\,m}{343\,m/s} = 0.015\,s$$