Ch. 15 : Q# 7, 8, 18 & P# 18, 19, 24

Q7 speed of sound depends on the temp. of air

distance across stadium = path length of the sound

$$\frac{\text{path length}}{\text{time}}$$

Q8

less dense — sound waves travel faster

tension higher — " " " "

ice = lower density, greater tension (molecules tighter)

water = higher density, less tension (molecules moving around more space)

Q 18

1 ☆ → 50 m/s, speeding up

2 ☆ → 50 m/s, steady speed

3 ☆ → 50 m/s, slowing down

4 ☆ at rest

50 m/s, speeding up ← ☆ 5

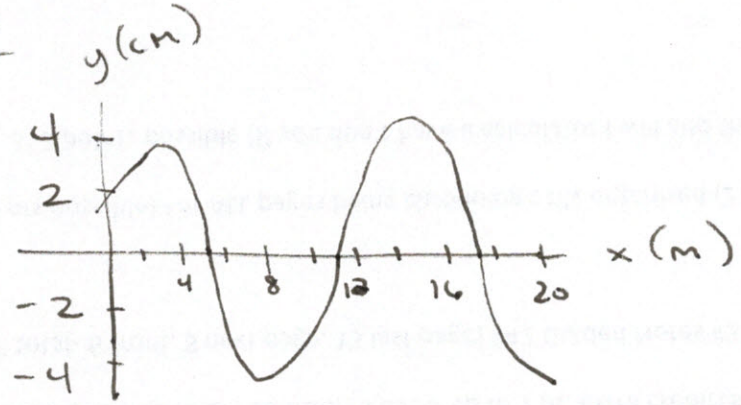
50 m/s steady speed ← ☆ 6

50 m/s, slowing down ← ☆ 7

$$f_5 \Rightarrow f_6 \Rightarrow f_7 > f_4 > f_1 = f_2 = f_3$$

☆ the f is lowered for receding sources and raised for approaching sources

P18



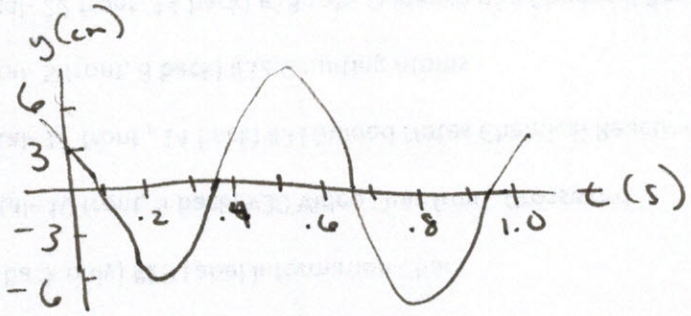
$A = 4\,cm$

$\lambda = 12\,m$ ($14m - 2m$)

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

$$\frac{24\,m/s}{12\,m} = 2.0\,Hz$$

P19



$A = 6.0\,cm$

$T = 0.60\,s$

$f = 1.7\,Hz$

$\left(f = \frac{1}{T} = \frac{1}{0.60\,s} =\right)$

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

$$\frac{2\,m/s}{1.667\,Hz} = 1.2\,m$$

P24

Al speed of sound - 5100 m/s

EM waves - c

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

$$\frac{5100 \text{ m/s}}{2.0 \times 10^6 \text{ Hz}} = 2.55 \times 10^{-3} \text{ m}$$

or

2.6 mm

b) $f = \frac{c}{\lambda}$

$$\frac{3.0 \times 10^8 \text{ m/s}}{2.55 \times 10^{-3} \text{ m}} = 1.2 \times 10^{11} \text{ Hz}$$