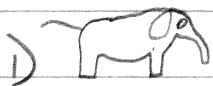




Q15
Physics ws 15
1 - 5, 18, 19


1)  $f = 150 \text{ Hz}$ $v = \lambda f$
 $v = 343 \text{ m/s}$ $\lambda = \frac{v}{f} = \frac{343 \text{ m/s}}{150 \text{ Hz}} = 2.3 \text{ m}$

2)  $d = 75 \text{ m}$ $d = v t$ $t = \frac{d}{v} = \frac{75 \text{ m}}{1460 \text{ m/s}} = 5.1 \times 10^{-2} \text{ s}$
 $v = 1460 \text{ m/s}$

3) 
a) $\lambda = 12 \text{ m}$ $f = \frac{v}{\lambda} = \frac{7.5 \text{ m/s}}{12 \text{ m}} = 0.63 \text{ Hz}$
 $v = 7.5 \text{ m/s}$

b) $v_s = 7.5 \text{ m/s}$ $f = \frac{v}{\lambda} = \frac{15 \text{ m/s} - (-7.5 \text{ m/s})}{12 \text{ m}} = 1.9 \text{ Hz}$
 $v_o = 15 \text{ m/s}$

4) $v_o = 15 \text{ m/s} \rightarrow$
 $v_s = 18 \text{ m/s} \leftarrow$ $f' = f \left(\frac{v + v_o}{v - v_s} \right) = 510 \text{ Hz} \left(\frac{343 \text{ m/s} - 15 \text{ m/s}}{343 + 18 \text{ m/s}} \right) = 460 \text{ Hz}$

5)  $f = 58.0 \text{ kHz}$

a) $f' = f \left(\frac{v + v_o}{v - v_s} \right) = 58.0 \text{ kHz} \left(\frac{343 \text{ m/s}}{343 \text{ m/s} - 4 \text{ m/s}} \right) = 58.7 \text{ kHz} = 59 \text{ kHz}$

b) $f' = f \left(\frac{v + v_o}{v - v_s} \right) = 58.7 \text{ kHz} \left(\frac{343 \text{ m/s} + 4.0 \text{ m/s}}{343 \text{ m/s}} \right) = 59.4 \text{ kHz} = 59 \text{ kHz}$

c) $f' = f \left(\frac{v + v_o}{v - v_s} \right) = 58.0 \text{ kHz} \left(\frac{343 \text{ m/s} + 1.0 \text{ m/s}}{343 \text{ m/s} - 4 \text{ m/s}} \right) = 58.86 \text{ kHz}$

$58.86 \text{ kHz} \left(\frac{343 \text{ m/s} + 4.0 \text{ m/s}}{343 \text{ m/s} - 1.0 \text{ m/s}} \right) = 59.72 \text{ kHz}$
 $\Delta f = 59.72 \times 10^3 - 58.0 \times 10^3$
 $\Delta f = 1.7 \times 10^3 \text{ Hz}$

$$L = .22\text{m} - .03\text{m}$$

8)



$$L = .19 \quad \lambda = 4L$$

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

$$= \frac{343\text{m/s}}{4(.19\text{m})}$$

$$= 451\text{Hz}$$

$$= 450\text{Hz}$$

9)



$$L = .22\text{m} \quad \lambda = 2L = .44\text{m}$$

$$f = \frac{v}{\lambda} = \frac{343\text{m/s}}{.44\text{m}} = 780.\text{Hz}$$



$$f = 780.\text{Hz}$$

$$v = 343\text{m/s}$$

$$\lambda = \frac{4L}{3}$$

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

$$L = \frac{343\text{m/s}}{780.\text{Hz}} = 780\text{Hz}$$

$$\lambda = 1.336 = \frac{343\text{m/s}}{780.\text{Hz}}$$

$$L = .33\text{m}$$

10)

60

$$f_1 = 442\text{Hz}$$

$$f_B = 3\text{Hz}$$

$$f_2 = 445\text{Hz} \quad \text{or } 439\text{Hz}$$

$$f_2 = ?$$

$$f_B = 5\text{Hz}$$

$$f_2 = 439\text{Hz} \quad \text{or } 449\text{Hz}$$

$$f_2 = 439\text{Hz}$$

$$f_3 = 444\text{Hz}$$