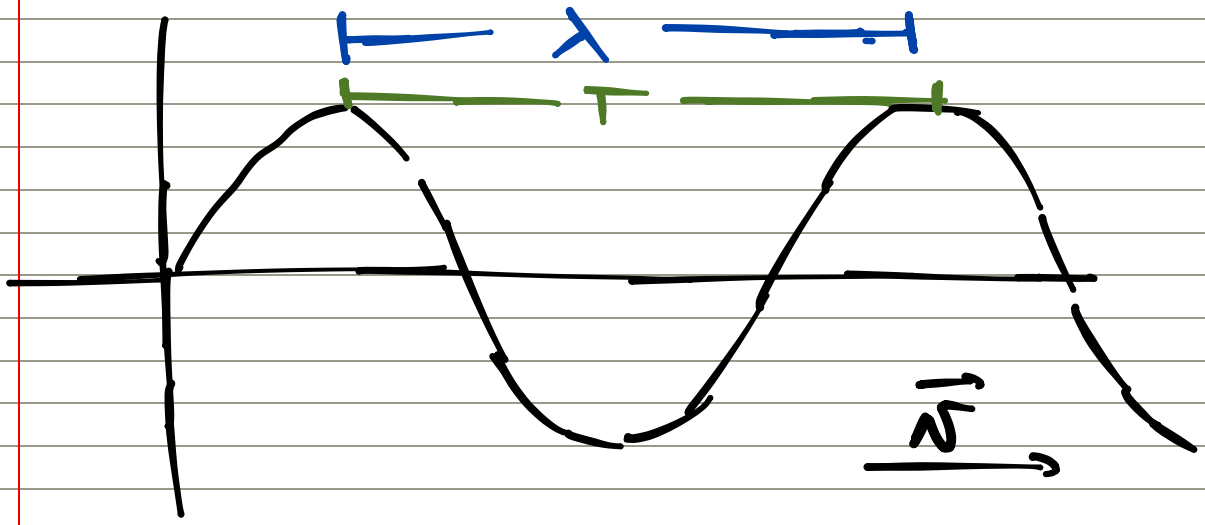
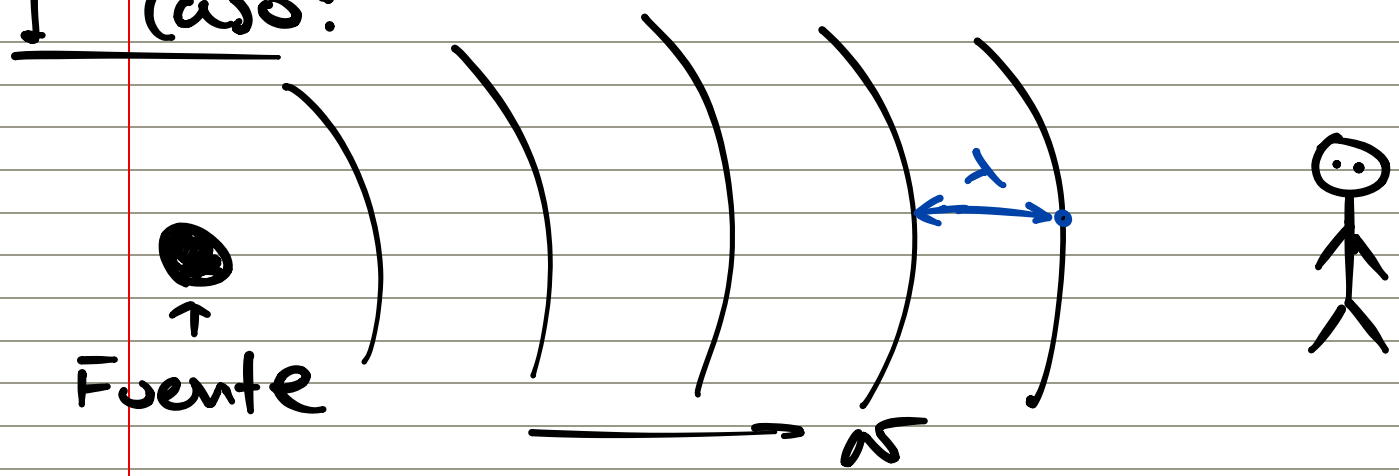
# Resumen: Efecto Doppler



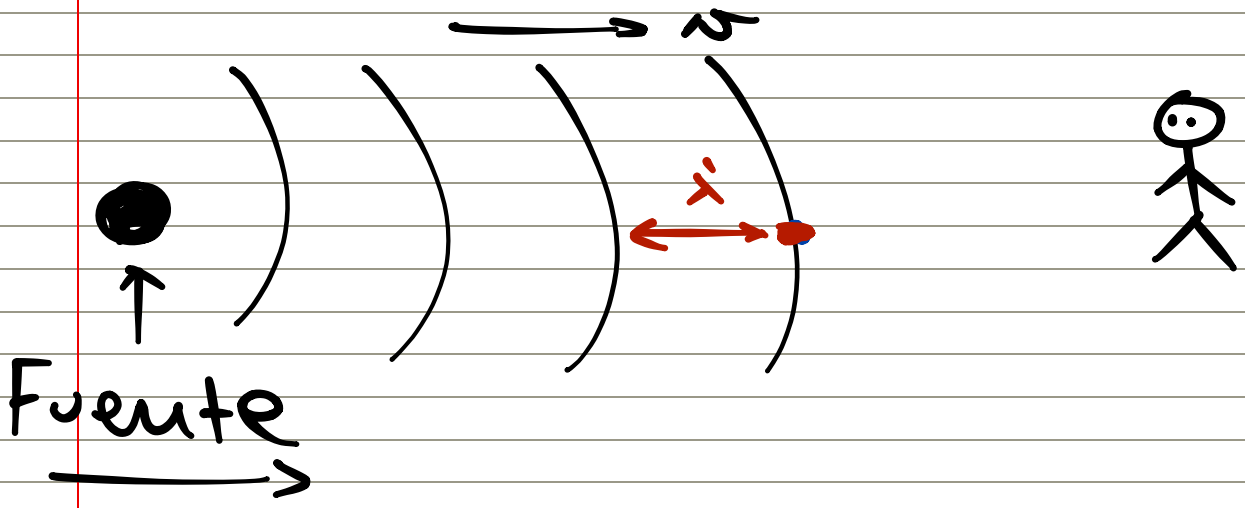

Frecuencia: $f = \frac{1}{T}$

$\rightarrow v = \frac{\lambda}{T} = \lambda \cdot f \Rightarrow \boxed{f = \frac{v}{\lambda}}$

1er caso:




2do caso



$v_s$

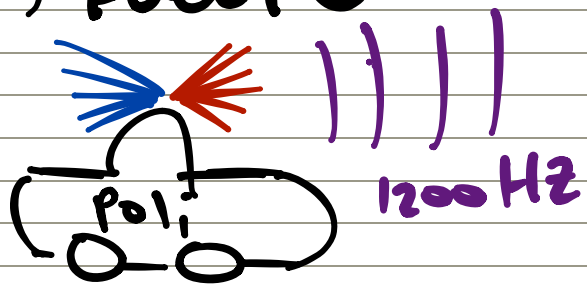
$$f' = f \cdot \frac{v_{onda} + v_{observador}}{v_{onda} - v_{fuente}}$$

→ $v_o$ va positiva si el obs se acerca a la fuente. si no, va negativa

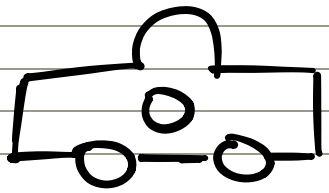
→ $v_s$ (velocidad fuente) va positiva si la fuente se acerca al observador sino va negativa

## Ejercicio 9.2.8

a) Fuente




observador



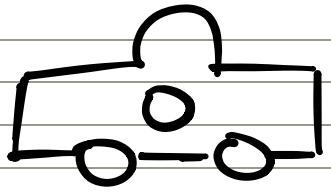
$v_s = 126\ km/h$

$v_o = 72\ km/h$

$$f_{Inicia} = f \cdot \frac{v_{sonido} + v_{auto}}{v_{sonido} - v_{poli}} = 1414\ Hz$$

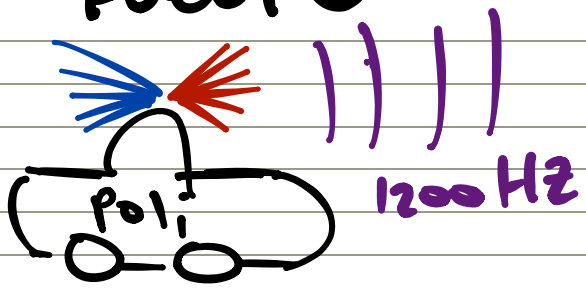
b)

Observador



$v_o = 72\ km/h$

Fuente




$v_s = 126\ km/h$

$$f'_{final} = f \cdot \frac{v_{sonido} + (-v_{auto})}{v_{sonido} - (-v_{poli})}$$

$$= f \frac{v_{sonido} - v_{Auto}}{v_{sonido} + v_{poli}}$$

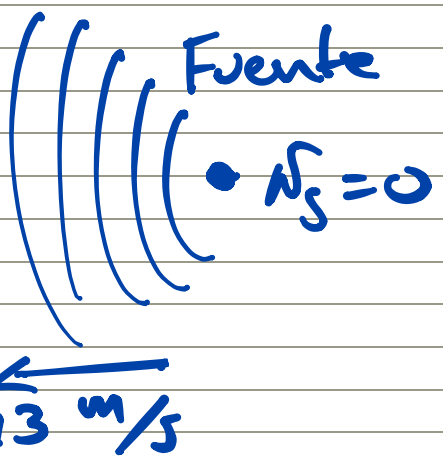
$$= 1025\ Hz$$

$$|\Delta f| = |f_{final} - f_{Inicial}| = 389\ Hz$$

## Ejercicio 9.2.10

$v_o = 12\ m/s$

$f' = 57{,}0\ Hz$



## Ondas Estacionarias:

"Modo fundamental" $\equiv n = 1$

$$f_n = \frac{n}{2L} \cdot v_{cuerda} \qquad f_1 = \frac{v_{cuerda}}{2L}$$

$$v_{cuerda} = 120\ m/s$$

$$f' = f \cdot \frac{v_{sonido} + v_o}{v_{sonido} - v_s)_{=0}}$$

$$= f \cdot \frac{v_{sonido} + v_o}{v_{sonido}}$$

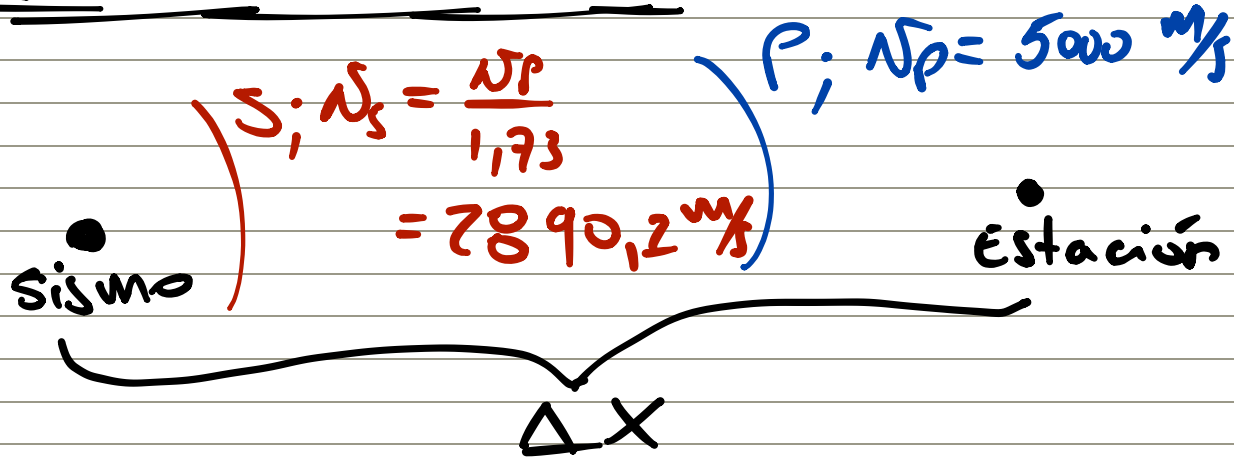
$$f_1 = \frac{f' \cdot v_{sonido}}{v_{sonido} + v_o}$$

$$f_1 = \frac{57{,}0 \cdot 343}{343 + 12{,}0} = 55{,}07\ Hz$$

$$f_1 = \frac{v_{cuerda}}{2L} \Rightarrow L = \frac{2 f_1}{v_{cuerda}}$$

$$\Rightarrow L = \frac{2.55,07}{120} = 0,9\ m$$

## Ejercicio 4.2.6:




para S: $v_s = \frac{\Delta x}{t_s}$

$$\Rightarrow v_s \cdot t_s = \Delta x \leftarrow$$

para P: $v_p = \frac{\Delta x}{t_p}$

$$\Rightarrow \boxed{v_p \cdot t_p = \Delta x \leftarrow}$$

$$v_s t_s = v_p t_p$$

$$\boxed{t_s = t_p + t \quad \text{Donde } t = 2.19\,s}$$

$$\Rightarrow v_s (t_p + t) = v_p t_p$$

Despejando:

$$N_s t_p + N_s t = N_p t_p$$

$$t_p (N_s - N_p) + N_s t = 0$$

$$t_p = - \frac{N_s t}{N_s - N_p} =$$

$$= \frac{2890,2 \cdot 2,19}{2890,2 - 5000} = 3,00 \text{ s}$$

$$\Rightarrow \Delta x = 5000 \cdot 3,00 = 15.000 \text{ m}$$