

p 334  
ex 12-10

exercise D



P<sup>348</sup>  
#33

$$343 = \lambda 294$$

$$\lambda = 1.16$$

$$\text{pipe} = .583 \text{ m}$$

$$1005 = 1.16 f$$

$$f = 861 \text{ Hz}$$

Quality or timbre

what vibrates, material, how played

Beats - p 337

If two strings play at frequencies of 440 hz and 442 hz, how many beats can be heard?

2 hz

p 337 ex 12 -13

Exercise E

p 348 # 39

beats = 4 Hz.

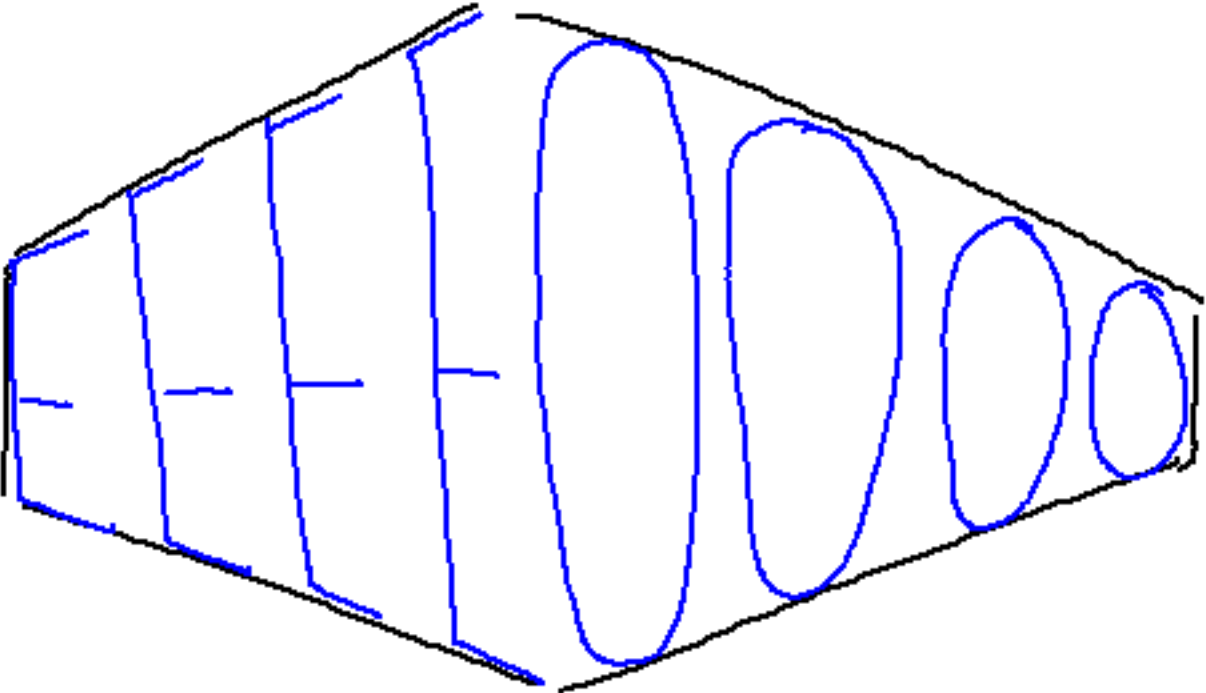
396 Hz or 404 Hz.

beats =  $\frac{1}{2}$  Hz.

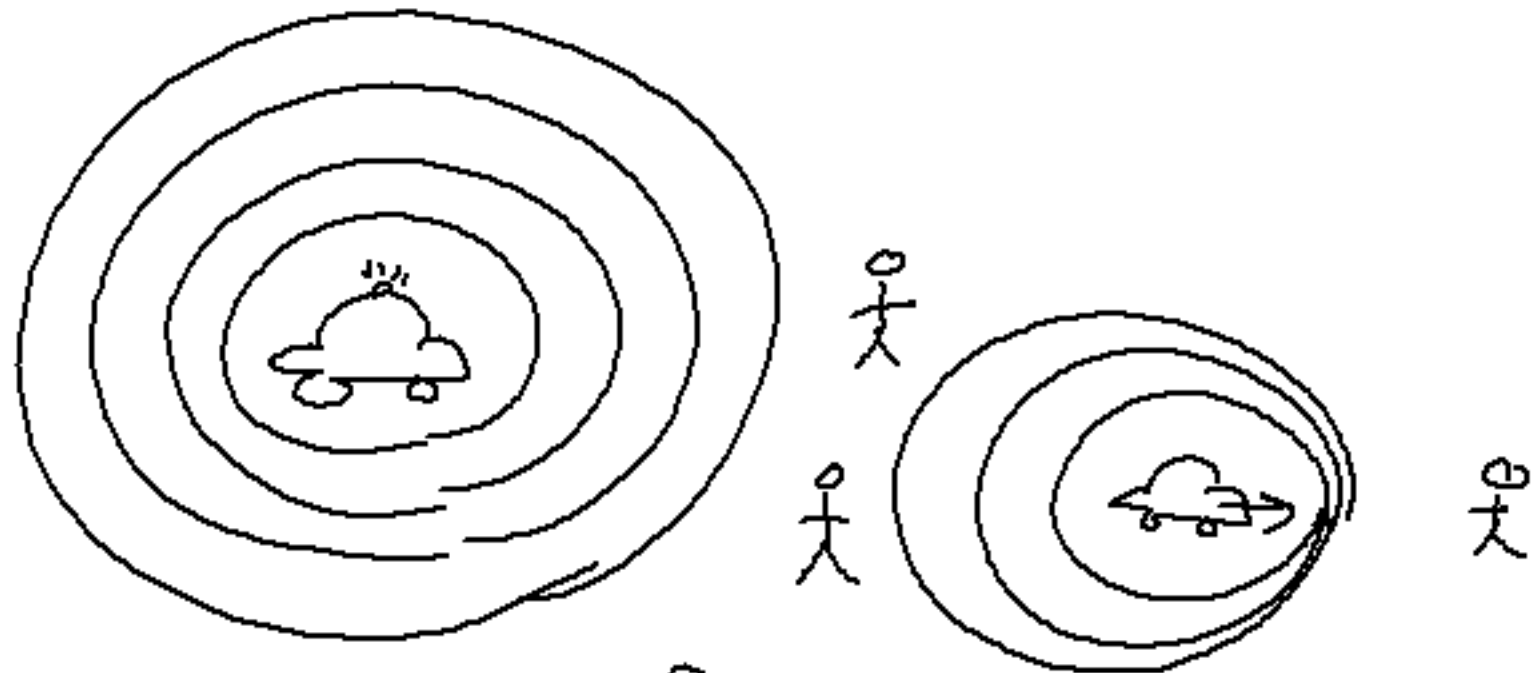
Resonance or natural frequency

sympathetic vibrations  
two tuning forks  
sing into piano

# Doppler Effect



# Doppler Effect



$$v = \lambda f$$

Sonic Boom - p 342

Mach II

Properties of waves:

reflection

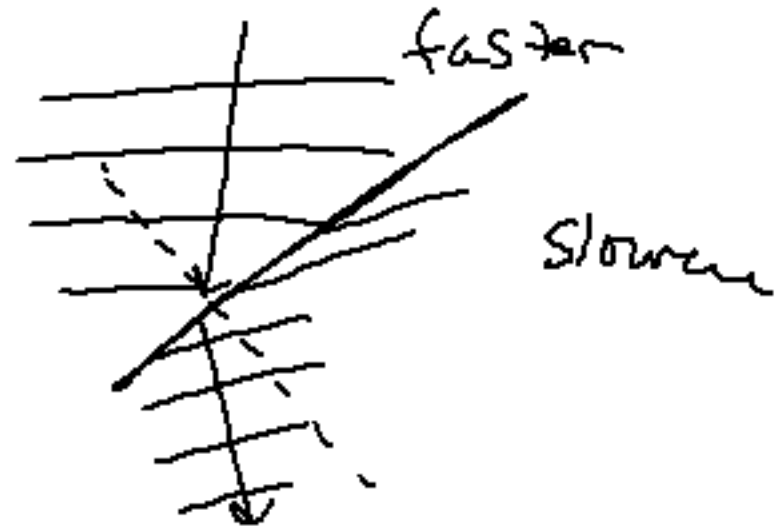
interference

diffraction



refraction

Day



Night:

