

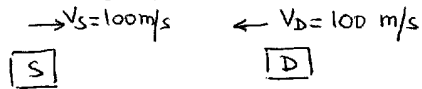
Physics 102Rec
Quiz#2
Chapter 18

12 March, 2002

Name: Key Id: _____ Sect: _____

A source emits sound with a frequency of 1000 Hz.

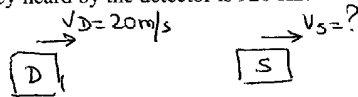
- (a) Both it and a detector are moving toward each other, each with a speed of 100 m/s. If the speed of sound is 340 m/s, what is frequency of sound heard by the detector?



$$f' = f \frac{v + v_D}{v - v_s} = 1000 \frac{340 + 100}{340 - 100} = 1000 \frac{440}{240}$$

$$f' = 1833 \text{ Hz}$$

- (b) Now the detector is following the source and moving at a speed of 20 m/s. What is the speed of the source if the frequency heard by the detector is 920 Hz?



$$f' = f \frac{v + v_D}{v + v_s}$$

$$920 = 1000 \frac{340 + 20}{340 + v_s} \Rightarrow 0.92(340 + v_s) = 360$$

$$v_s = 51.3 \text{ m/s}$$

- (c) What is the wavelength of sound wave as received by the detector of part (b)?

$$v = \lambda f \Rightarrow \lambda = \frac{v}{f} = \frac{340}{920}$$

$$\lambda = 0.37 \text{ m}$$