

77. (a) Since the source is moving toward the wall, the frequency of the sound as received at the wall is

$$f' = f \left(\frac{v}{v - v_S} \right) = (440 \text{ Hz}) \left(\frac{343 \text{ m/s}}{343 \text{ m/s} - 20.0 \text{ m/s}} \right) = 467 \text{ Hz} .$$

- (b) Since the person is moving with a speed u toward the reflected sound with frequency f' , the frequency registered at the source is

$$f_r = f' \left(\frac{v + u}{v} \right) = (467 \text{ Hz}) \left(\frac{343 \text{ m/s} + 20.0 \text{ m/s}}{343 \text{ m/s}} \right) = 494 \text{ Hz} .$$