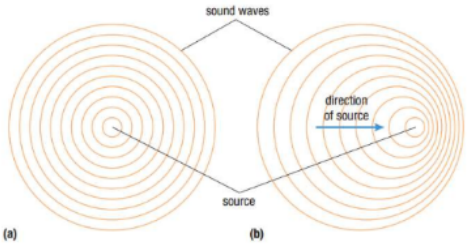
SPH3U 9.5 The Doppler Effect

1. The Doppler Effect

The Doppler Effect:	when an observed frequency changes because the source is moving.
equation	$f_{obs} = \left(\frac{v_s \pm v_{detector}}{v_s \pm v_{source}}\right) f_o$
v_{source}	+ is away from observer, − is towards the observer.



Suppose a fire truck is moving toward a stationary observer at 25.0 m/s. The frequency of the siren on the fire truck is 800.0 Hz. Calculate (a) the frequency detected by the observer as the fire truck approaches and (b) the frequency detected by the observer after the truck passes by. The speed of sound in this case is 342 m/s.

(a) $f_{obs} = \left(\frac{v_s + v_{obs}}{v_s + v_{source}}\right) f_o = \left(\frac{342+0}{342-25}\right) 800$

$= 863 \text{ Hz}.$

(b) $f_{obs} = \left(\frac{342+0}{342+25}\right) 800$

$= 746 \text{ Hz}.$

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