Q) A rocket is moving at a speed of $200ms^{-1}$ towards a stationary target. While moving, it emits a wave of frequency $1000Hz$. Calculate the frequency of the sound as detected by the target. (Velocity of sound in air is $330ms^{-1}$)

A) Speed of rocket (source)

$v_s = 200m/s$

Speed of sound in air

$v_{sound} = 330m/s$

Original frequency of sound

$f_o = 1000\ Hz$

Apparent frequency of sound heard by the stationary target,

$$f' = f_o \left[\frac{v_{sound}}{v_{sound} - v_s} \right]$$

$\therefore$

$$f' = 1000 \left[\frac{330}{330 - 200} \right] = 2538.5\ Hz$$