

















So the force is...  

$$F = \left(\frac{2mv_x}{\Delta t}\right) \left(\frac{1}{2}nAv_x\Delta t\right) = nmv_x^2A$$
So the pressure is...  

$$p = \frac{F}{A} = nmv_x^2 = \frac{N}{V}mv_x^2$$
Use the full velocity instead of x...  

$$v^2 = v_x^2 + v_y^2 + v_z^2$$
Each direction is the same so  

$$v^2 = 3v_x^2$$
or 
$$v_x^2 = \frac{1}{3}v^2$$
so  

$$pV = \frac{1}{3}Nmv^2$$









