An incompressible fluid flows steadily through a two-dimensional infinite row of fixed airfoils (e.g. a stator blade row). The blade row is contained in a constant area annulus, as shown on the right side of the figure below. The spacing between the airfoils is $s$. Assume that the velocities and pressures $V_a$, $V_b$, $p_a$, $p_b$, are constant at stations (a) and (b), and that the flow angles are given by $\beta_a$ and $\beta_b$.

a) Does the magnitude of the flow velocity increase/stay the same/decrease across the stator and why?

b) Using the control volume shown above (the upper and lower surfaces are streamlines), apply conservation of mass and momentum to determine the forces $R_x$ and $R_y$ that must be applied to the fluid (these are equal and opposite to the forces needed to keep each vane in place).