Answer on Question #64283, Physics / Mechanics | Relativity

What is the lift (in newtons) due to Bernoulli's principle on a wing of area 86 m^2 if the air passes over the top and bottom surfaces at speeds of 340 m/s and 290 m/s respectively?

Solution:

$P_b + ½ \rho v_b{}^2 = P_t + ½ \rho v_t{}^2$

$P_b - P_t = ½ \rho v_t{}^2 - + ½ \rho v_b{}^2$

$P_b - P_t = ½ \times 1.00 \times 10^3$ kgm^{-3} x (340 m/s)^2 - + ½ x 1.00 x 10^3 kgm^{-3} x (290 m/s)^2

$P_b - P_t = 1.58 \times 10^7$ N/m^2

$F_{lift} = 1.58 \times 10^7$ N/m^2 x 86 m$^2 = 1.36 \times 10^9$ N

Answer: 1.36 x 10^9 N