22. (a) The problem asks for the person's pull (his force exerted on the rock) but since we are examining forces and torques *on the person*, we solve for the reaction force N_1 (exerted leftward on the hands by the rock). At that point, there is also an upward force of static friction on his hands f_1 which we will take to be at its maximum value $\mu_1 N_1$. We note that equilibrium of horizontal forces requires $N_1 = N_2$ (the force exerted leftward on his feet); on this feet there is also an upward static friction force of magnitude $\mu_2 N_2$. Equilibrium of vertical forces gives

$$f_1 + f_2 - mg = 0 \implies N_1 = \frac{mg}{\mu_1 + \mu_2} = 3.4 \times 10^2 \text{ N} .$$

(b) Computing torques about the point where his feet come in contact with the rock, we find

$$mg(d + w) - f_1 w - N_1 h = 0 \implies h = \frac{mg(d + w) - \mu_1 N_1 w}{N_1} = 0.88 \text{ m} .$$

(c) Both intuitively and mathematically (since both coefficients are in the denominator) we see from part (a) that N_1 would increase in such a case. As for part (b), it helps to plug part (a) into part (b) and simplify:

$$h = (d + w)\mu_2 + d\mu_1$$

from which it becomes apparent that h should decrease if the coefficients decrease.