

43. Let i_1 be the current in R_1 and R_2 , and take it to be positive if it is toward point a in R_1 . Let i_2 be the current in R_s and R_x , and take it to be positive if it is toward b in R_s . The loop rule yields $(R_1 + R_2)i_1 - (R_x + R_s)i_2 = 0$. Since points a and b are at the same potential, $i_1 R_1 = i_2 R_s$. The second equation gives $i_2 = i_1 R_1 / R_s$, which is substituted into the first equation to obtain

$$(R_1 + R_2)i_1 = (R_x + R_s) \frac{R_1}{R_s} i_1 \implies R_x = \frac{R_2 R_s}{R_1} .$$