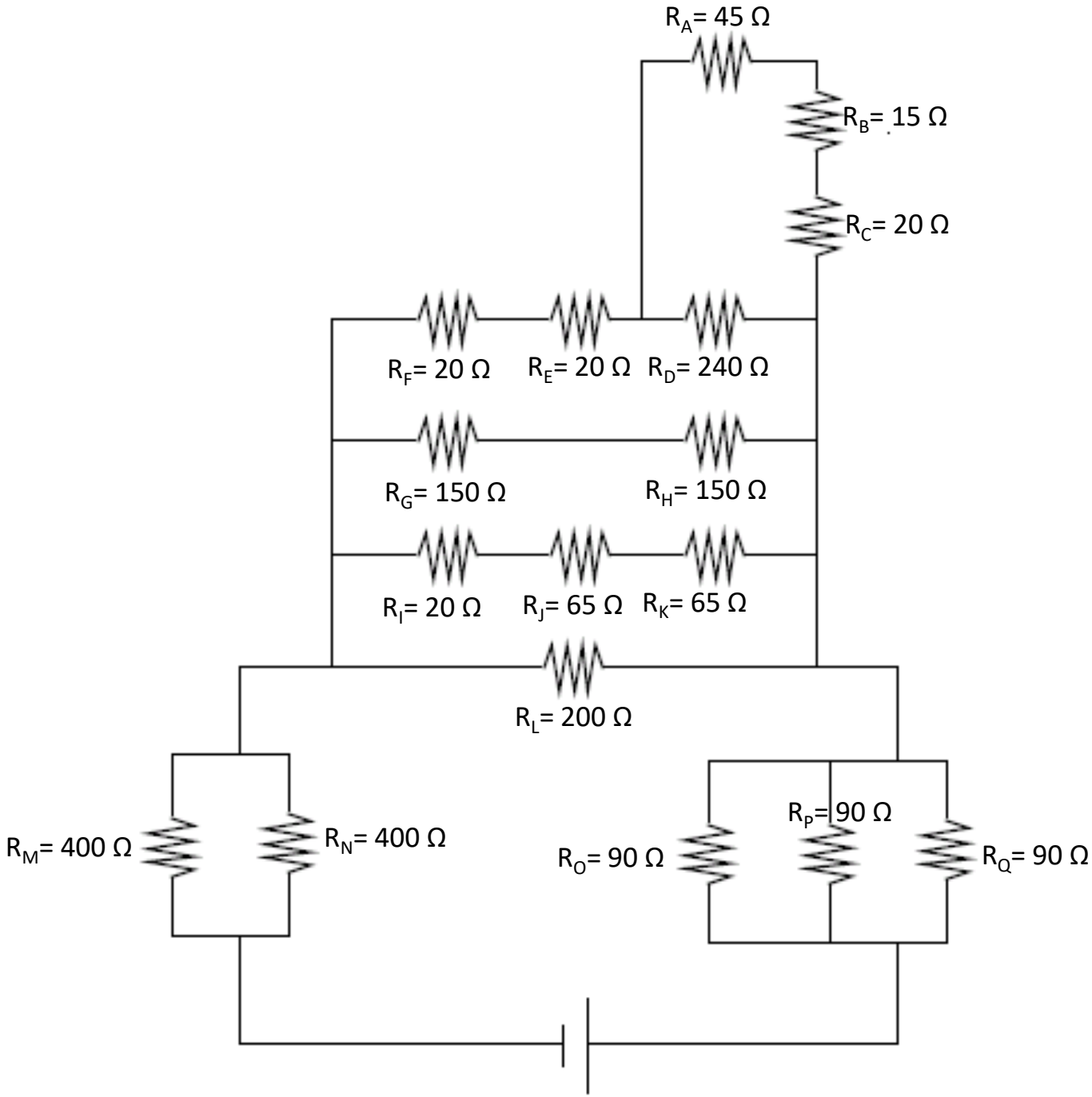
Equivalent Resistance Challenge !!!

Solve for R_{eq}



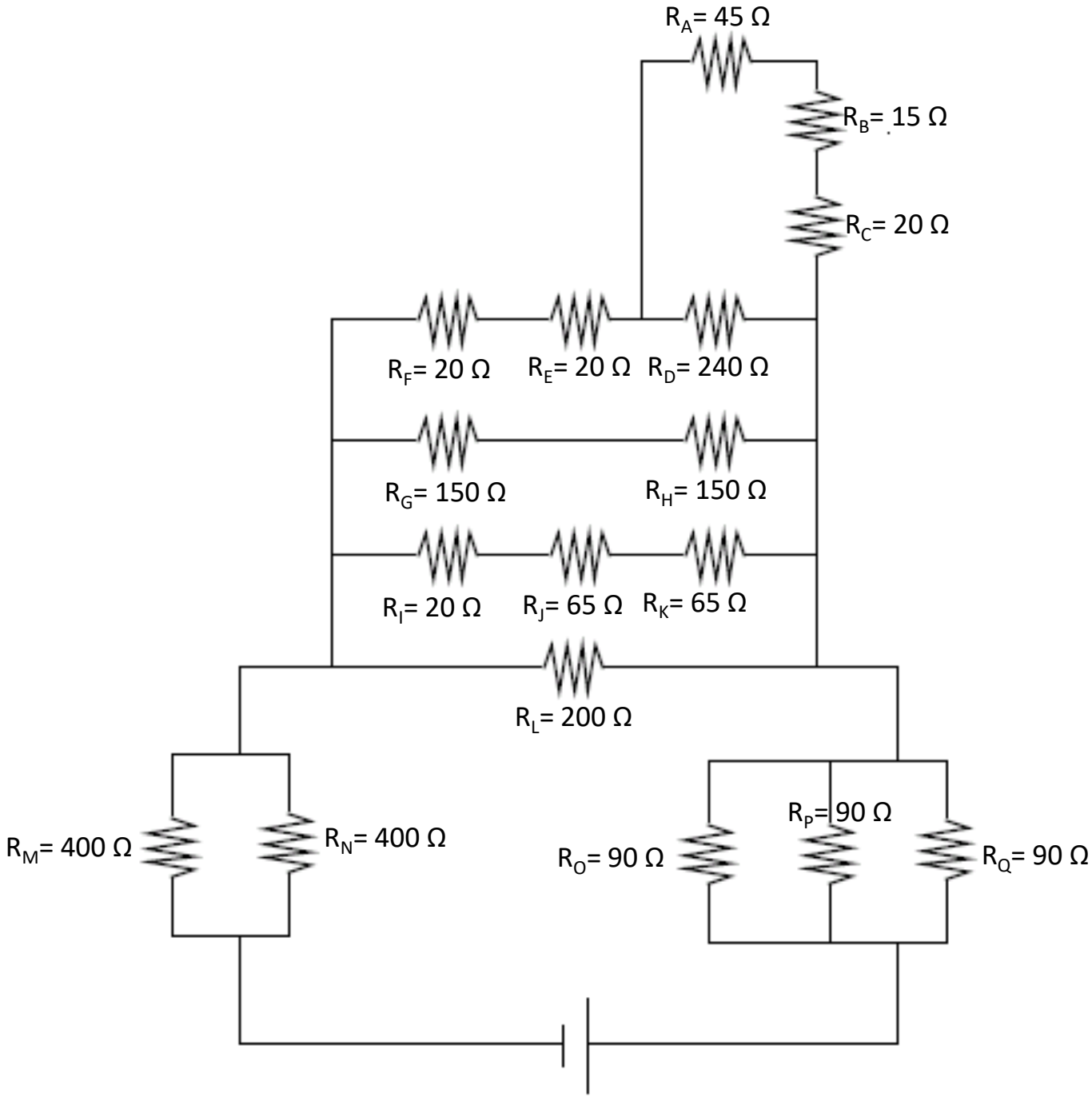
STEP 1:

Series

$$R_{ABC} = R_A + R_B + R_C$$

$$R_{ABC} = 45 + 15 + 20$$

$$R_{ABC} = 80\ \Omega$$



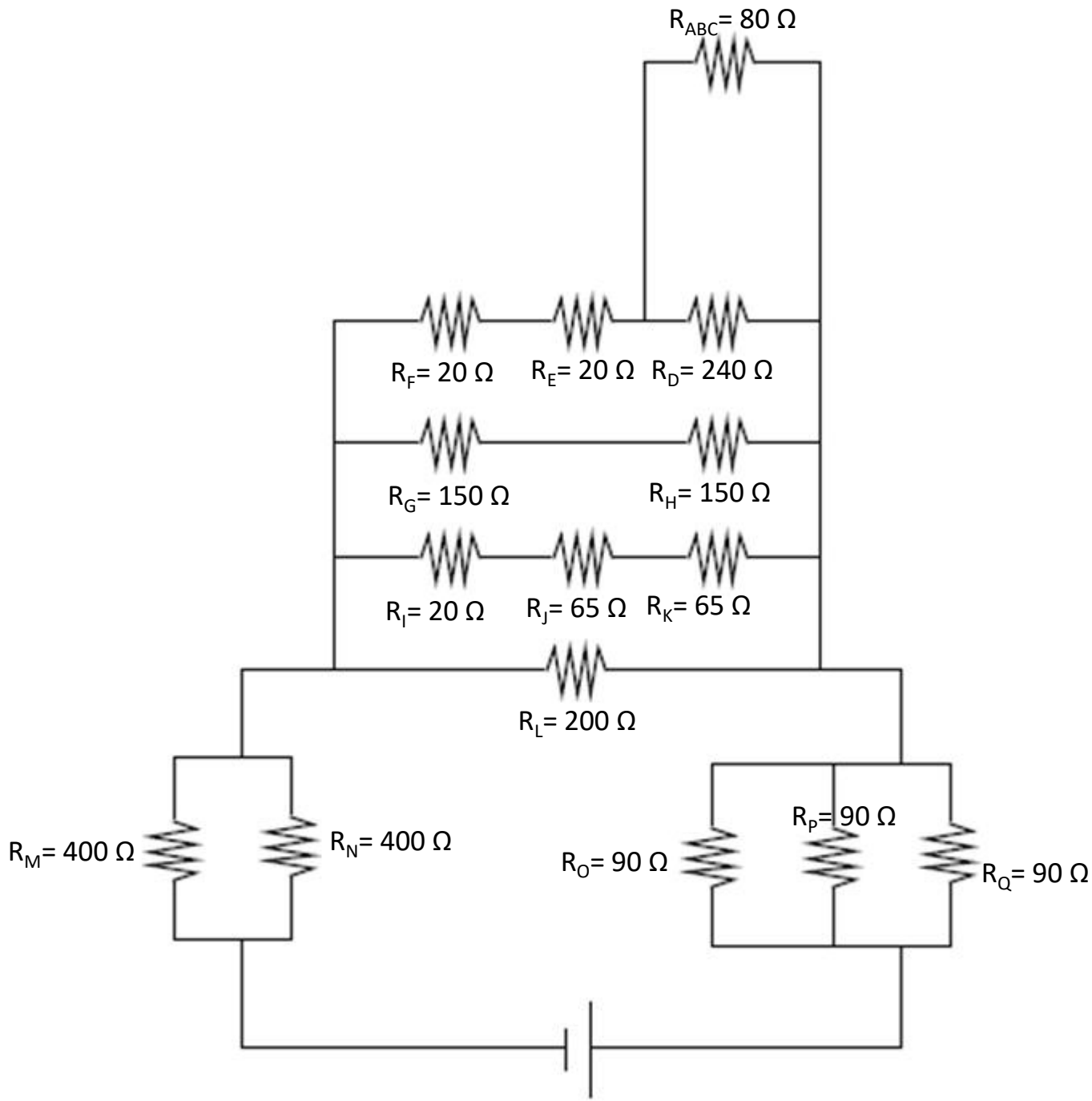
STEP 2:

PARALLEL

$$1/R_{ABCD} = 1/R_{ABC} + 1/R_{ABC}$$

$$1/R_{ABCD} = 1/80 + 1/240$$

$$R_{ABCD} = 60\ \Omega$$



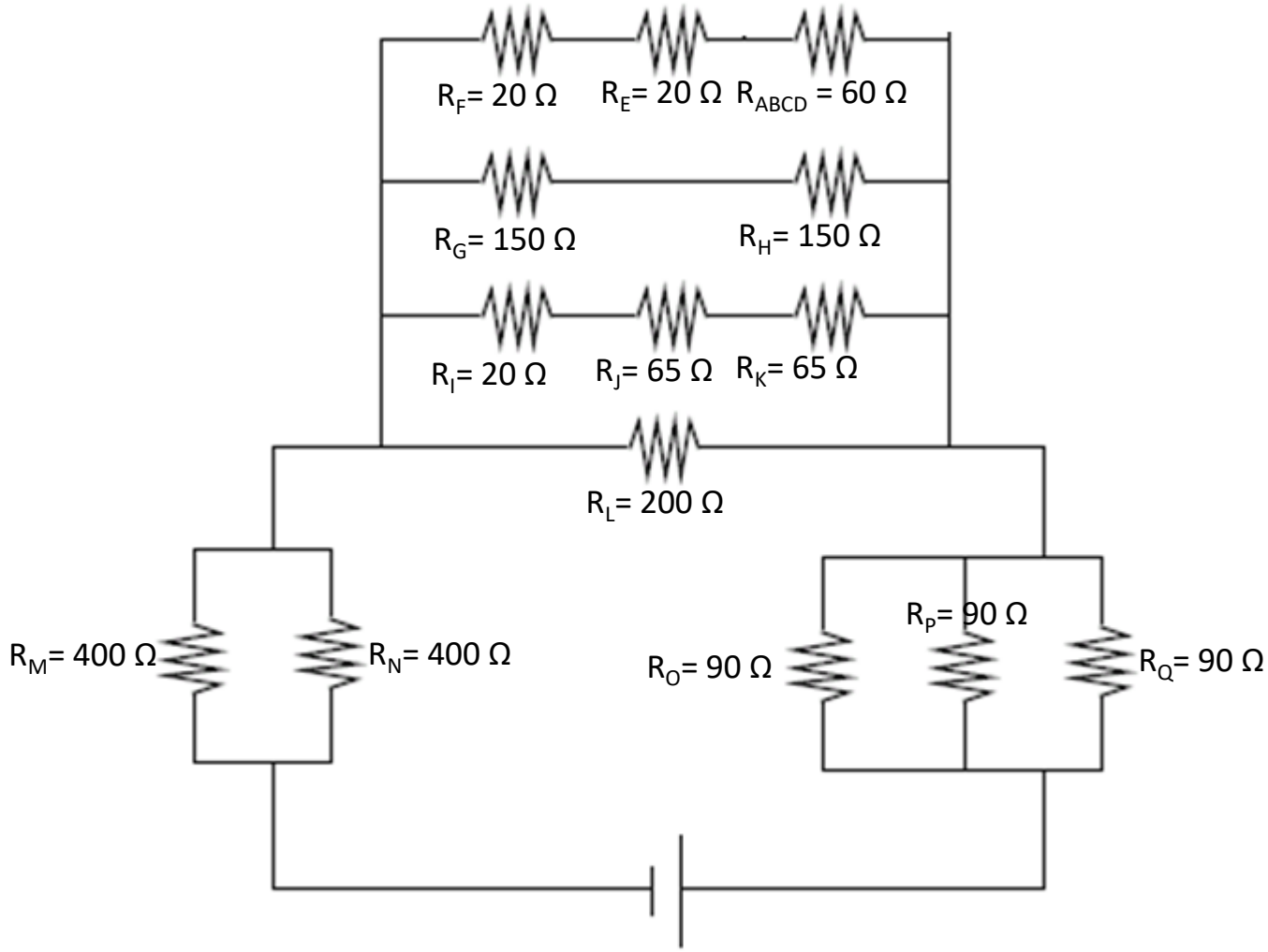
STEP 3:

SERIES

$$R_{A\text{-}F} = R_{ABCD} + R_E + R_F$$

$$R_{A\text{-}F} = 60 + 20 + 20$$

$$R_{A\text{-}F} = 100\ \Omega$$



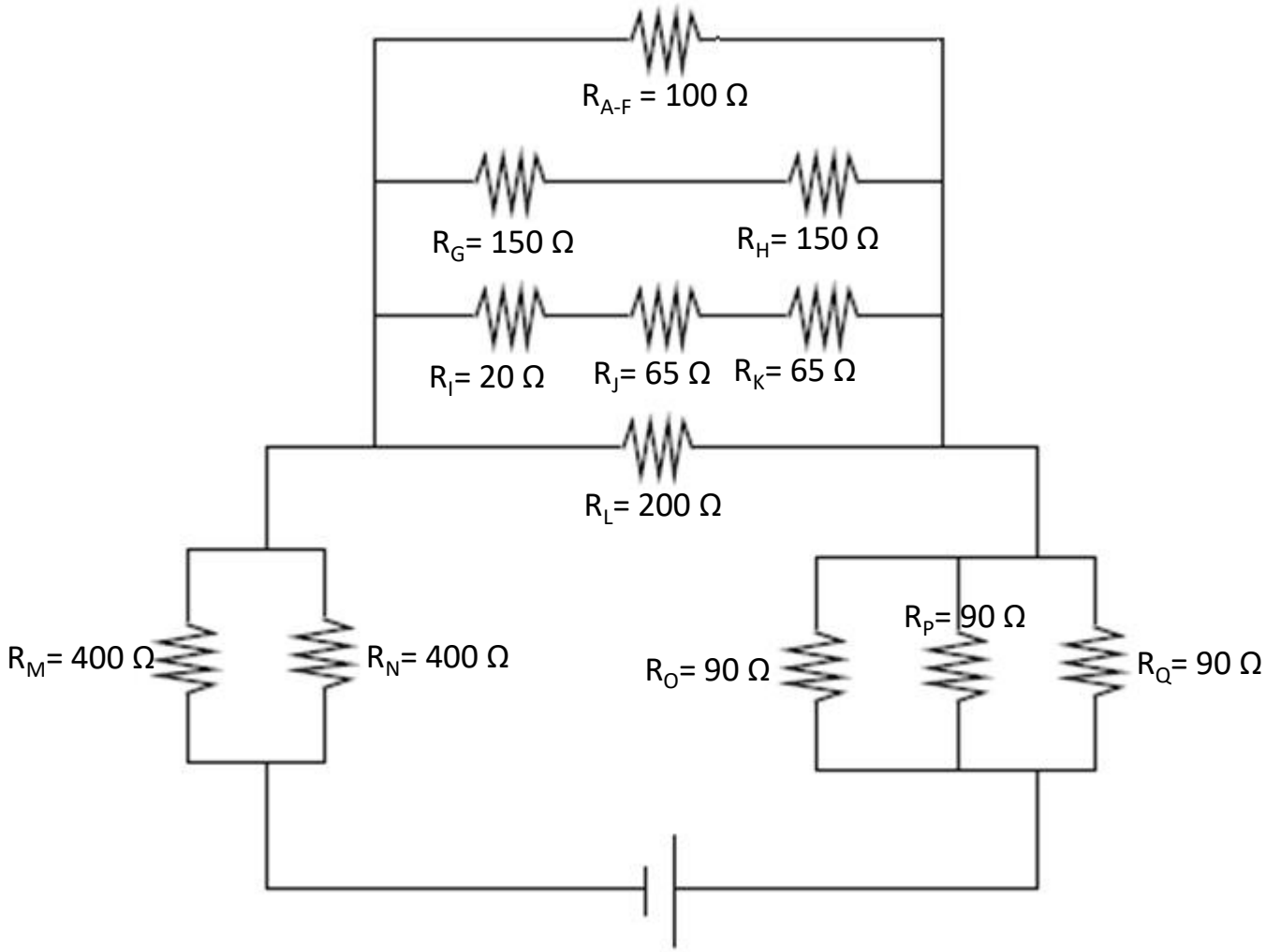
STEP 4:

SERIES

$$R_{GH} = R_G + R_H$$

$$R_{GH} = 150 + 150$$

$$R_{GH} = 300\ \Omega$$



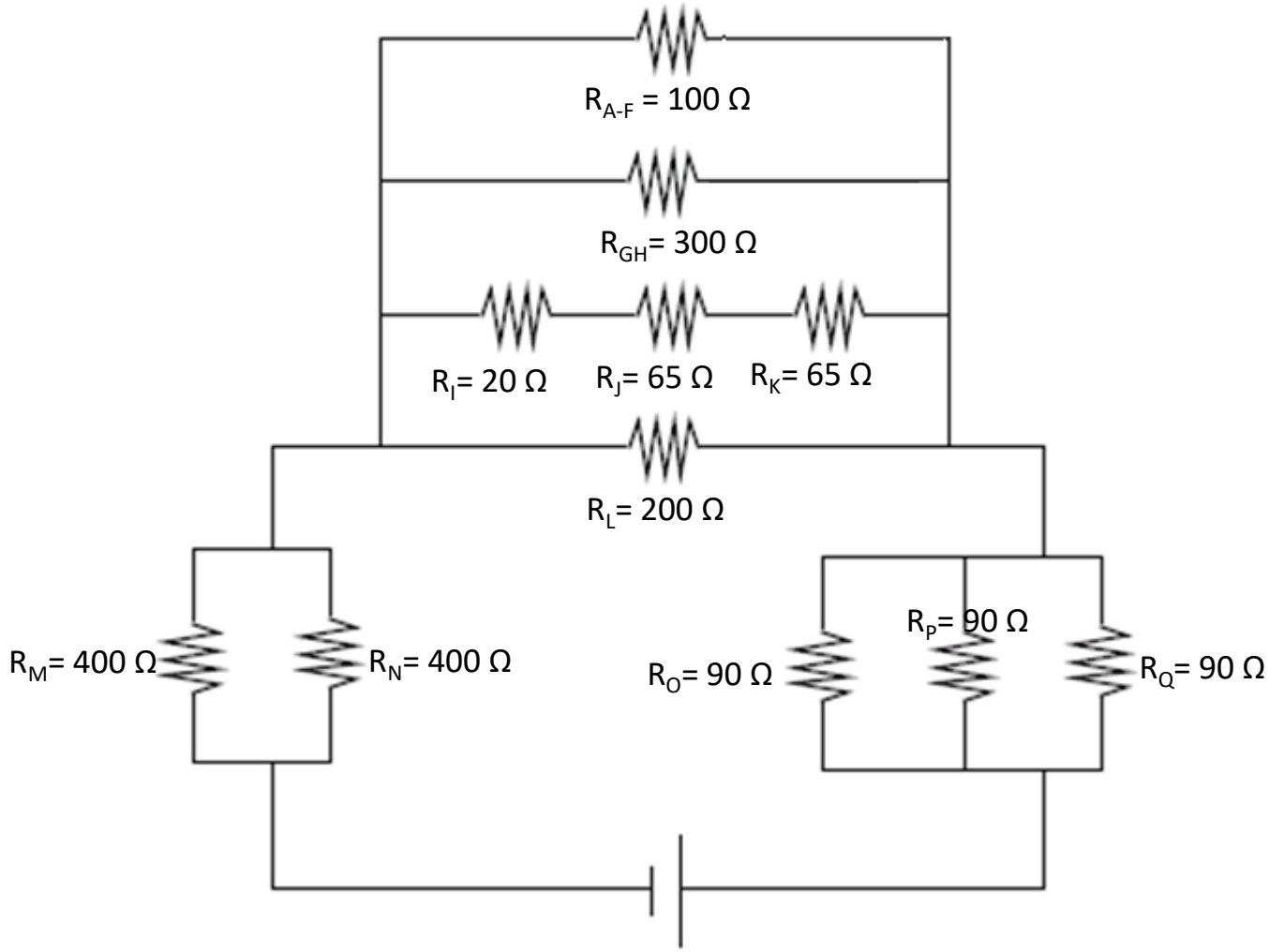
STEP 5:

SERIES

$$R_{IJK} = R_I + R_J + R_K$$

$$R_{IJK} = 20 + 65 + 65$$

$$R_{IJK} = 150\ \Omega$$



STEP 6:

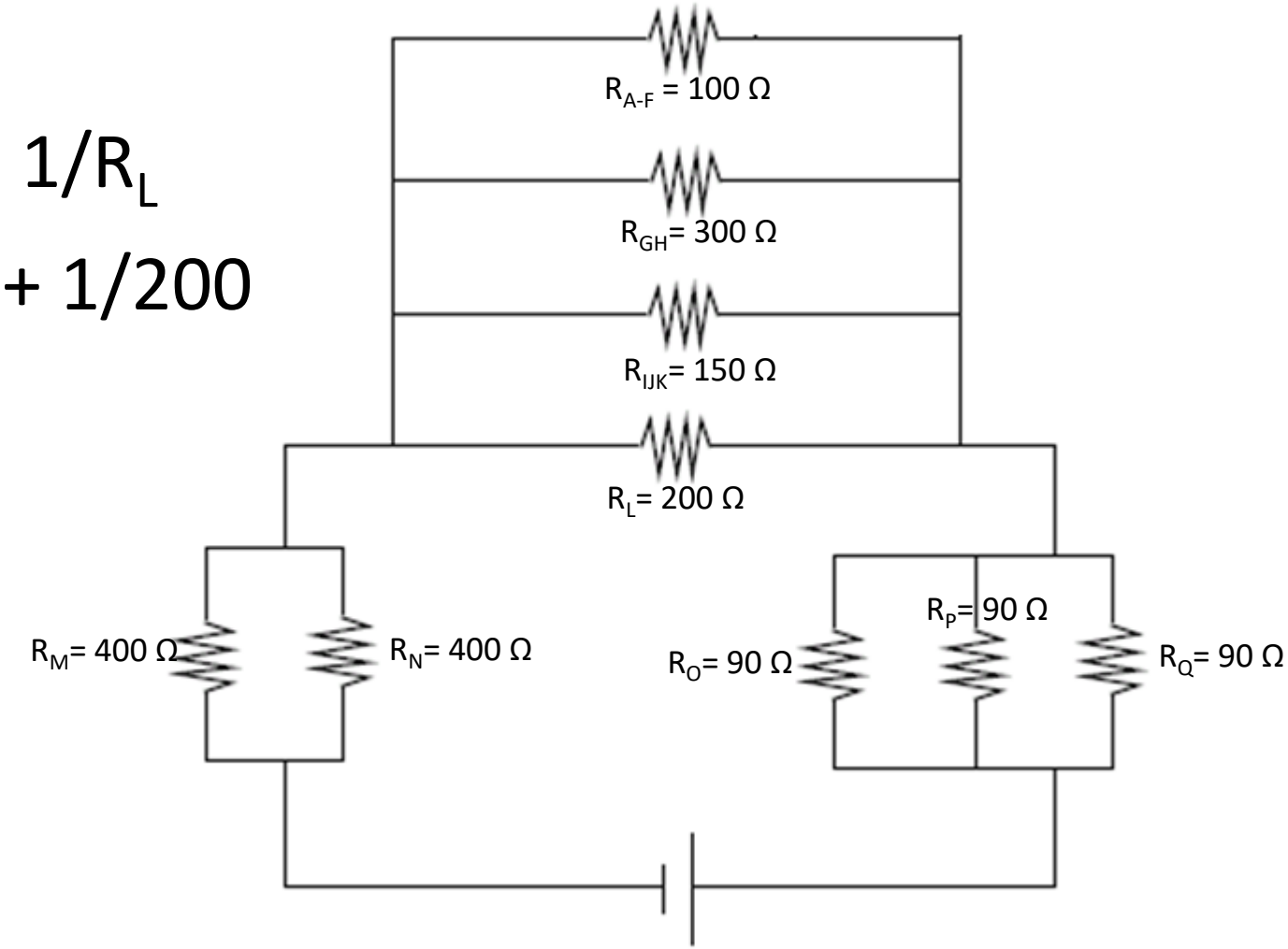
PARALLEL

$$1/R_{A\text{-}L} = 1/R_{A\text{-}F} + 1/R_{GH} + 1/R_{IJK} + 1/R_L$$

$$1/R_{A\text{-}L} = 1/100 + 1/300 + 1/150 + 1/200$$

$$1/R_{A\text{-}L} = (6+2+4+3)/600$$

$$R_{A\text{-}L} = 40\ \Omega$$



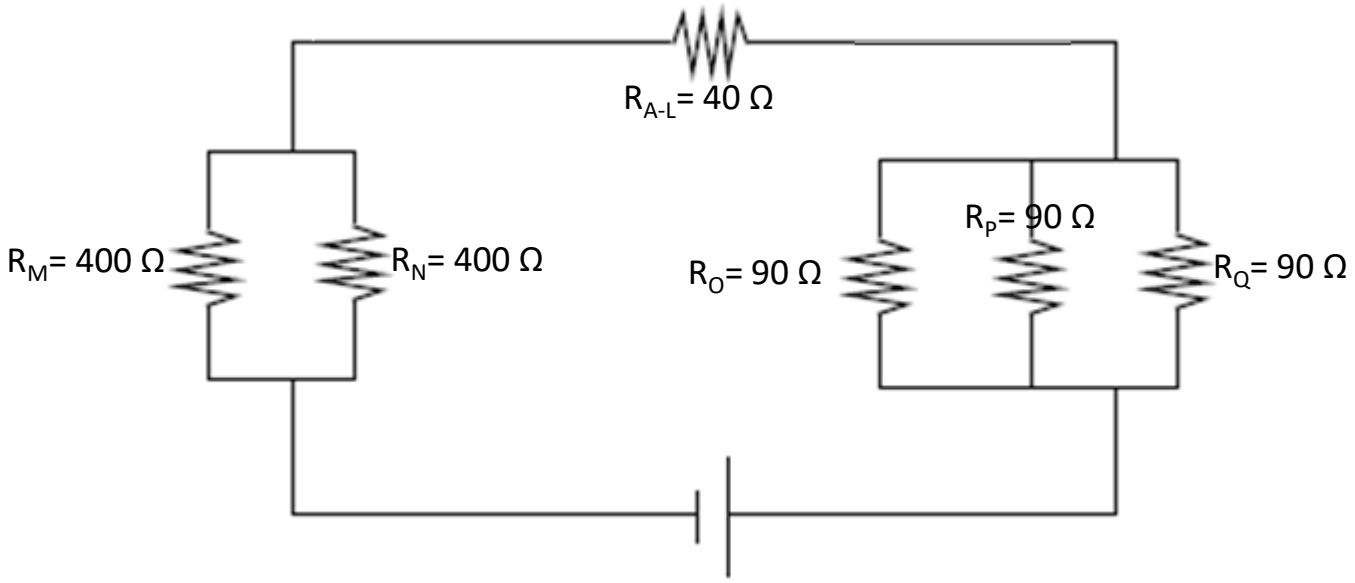
STEP 7:

PARALLEL

$1/R_{MN} = 1/R_M + 1/R_N$

$1/R_{MN} = 1/400 + 1/400$

$R_{MN} = 200\ \Omega$



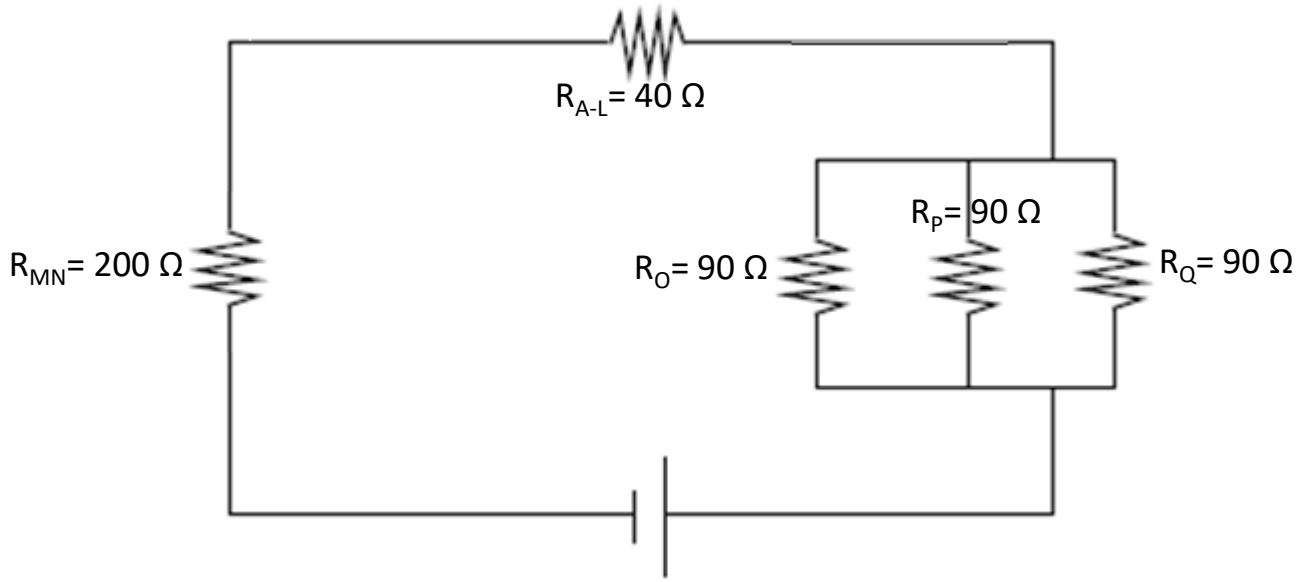
STEP 8:

PARALLEL

$$1/R_{OPQ} = 1/R_O + 1/R_P + 1/R_Q$$

$$1/R_{OPQ} = 1/90 + 1/90 + 1/90$$

$$R_{OPQ} = 30\ \Omega$$



STEP 9:

SERIES

$R_T = 1/R_{A\text{-}L} + 1/R_{MN} + 1/R_{OPQ}$

$R_T = 40 + 200 + 30$

$R_T = 270\ \Omega$