

90. We reduce the parallel pair of identical  $4.0\ \Omega$  resistors to  $R' = 2.0\ \Omega$ , which has current  $i = 2i_1$  going through it. It is in series with a  $2.0\ \Omega$  resistor, which leads to an equivalence of  $R = 4.0\ \Omega$  with current  $i$ . We find a path (for use with the loop rule) that goes through this  $R$ , the  $4.0\ \text{V}$  battery, and the  $20\ \text{V}$  battery, and proceed counterclockwise (assuming  $i$  goes rightward through  $R$ ):

$$20\ \text{V} + 4.0\ \text{V} - iR = 0$$

which leads to  $i = 6.0\ \text{A}$ . Consequently,  $i_1 = \frac{1}{2}i = 3.0\ \text{A}$  going rightward.