The current in R_2 is the difference between I_A and I_B.

$$I_2 = (I_A - I_B) = 0.512\text{ mA} - 0.887\text{ mA} = \mathbf{-0.375\text{ mA}}$$

The negative sign indicates that current is the opposite direction to I_A; the positive side of the resistor is the right side.

The current in R_3 is $I_A - I_C$.

$$I_3 = 0.512\text{ mA} - 0.432\text{ mA} = \mathbf{0.08\text{ mA}}$$

The current in R_4 is $I_B - I_C$.

$$I_4 = I_B - I_C = 0.887\text{ mA} - 0.432\text{ mA} = \mathbf{0.455\text{ mA}}$$

The current in R_L is I_C.

$$I_L = \mathbf{0.432\text{ mA}}$$

Related Problem Find the voltage across each resistor.

Use Multisim files E09-10A and E09-10B to verify the calculated results in this example and to confirm your calculations for the related problem.

...ION 9-3
...CKUP

1. Do the loop currents necessarily represent the actual currents in the branches?
2. When you solve for a current using the loop method and get a negative value, what does it mean?
3. What circuit law is used in the loop current method?

–4 NODE VOLTAGE METHOD

...method of analysis of multiple-loop circuits is called the node voltage method. ...sed on finding the voltages at each node in the circuit using Kirchhoff's current ...ecall that a node is the junction of two or more components.

...mpleting this section, you should be able to

...e node analysis to find unknown quantities in a circuit

- Select the nodes at which the voltage is unknown and assign currents
- Apply Kirchhoff's current law at each node
- Develop and solve the node equations

...eneral steps for the node voltage method of circuit analysis are as follows:

1: Determine the number of nodes.
2: Select one node as a reference. All voltages will be relative to the reference node. Assign voltage designations to each node where the voltage is unknown.
3: Assign currents at each node where the voltage is unknown, except at the reference node. The directions are arbitrary.
4: Apply Kirchhoff's current law to each node where currents are assigned.
5: Express the current equations in terms of voltages, and solve the equations for the unknown node voltages using Ohm's law.