In this problem we will use KCL to find the branch currents i1, i2, and i3. To analyze the circuit base on KCL, we first need to identify the circuit's nodes.

A node is a point where two or more elements meet. Look at the two points above i3. They are simply conducting wire. They belong to a single node; we label it as node a. Node b (above i2) connects 5 branches. Node c is the point of connection between the three top branches . The bottom node connects 6 elements, and we label it node d.

KCL says that the algebraic sum of currents at a node is zero. When we perform KCL calculations, we will use a positive sign for the current entering the node and a negative sign for the leaving current.

At node a, (-2 A) enters the node, so we add (-2 A) to our sum. (-5A) is a leaving current, so we negate its value, adding (5 A) to the sum. i3 leaves the node, so we give it a negative sign, and (-5A) and 3A are leaving currents, so they are also negated. Finally, (2A) is entering and should be positive. This sum yields Equation 1:

$(-2) – (-5) – i3 – (-5) -3 + 2 = 0$

Solve for i3. You should find that $i3 = 7$ A.

At node b, the 3 A source gets a positive sign since it enters the node. i1, i2, and the other 3 A current also enter the node, so they are preceded with positive signs. The 1A current is leaving the node, so it is given a negative sign. Setting the sum of these currents equal to zero yields Equation 2:

$3 + i1 + i2 + 3 – 1 = 0$

We have two unknown variables in this equation, so we can't solve it at this point. We have to consider node c.

KCL can also be stated the following way: "the sum of the currents entering a node is equal to the sum of the currents leaving the node." Apply this method to node c: the only entering current is the 1 A current. Set it equal to the sum of the leaving currents, 2 and i1. This gives us $1 = 2 + i1$. So $i1 = -1$ A.

From equation (2) we can calculate that $i2 = -4$ A. At this point, we have solved the problem completely.