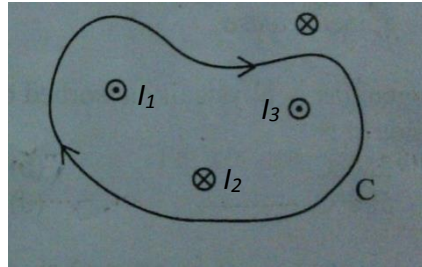# Answer on Question #42902 – Physics – Electric Circuits

49. Four conductors carrying 2.0 A of current into or out of the page are shown in the diagram. A path C is indicated for the line integral $\oint \vec{B}.d\vec{s}$. Find the value of the integral for the part C:

Solution.

According to Ampère's circuital law (a corollary from 4th Maxwell's equation):

$$\oint \vec{B}.d\vec{s} = \mu_0 \sum_i I_i$$

Where I_i – each current that goes through the contour C.

The sign of each current is determined by right-hand rule, so in our case currents I_1 and I_3 are negative and I_2 is positive. So:

$$\oint \vec{B}.d\vec{s} = \mu_0(I_1 + I_1 + I_1) = \mu_0(-2A + 2A - 2A) = -2\mu_0 [A]$$

Answer: (c) $-2\mu_0$