First, let’s see how a change in will affect .

We’ll make a rectangular loop wide by high, and evaluate Faraday’s law:

Go around counter-clockwise, starting on left leg:

(from your calc class)

Call this equation (1)

Now you try it! Let’s see how a change in will affect .

We’ll make a rectangular loop wide by deep, and evaluate Ampère’s law:

Go around counter-clockwise, starting on left leg:

Call this equation (2)

Now we will separate and :

* Start with equation (1):
* Take of both sides
* Switch the order of the derivatives:
* Substitute for , from equation (2):
* Simplify:

Now you try it:

* Start with equation (2):
* Take of both sides
* Switch the order of the derivatives:
* Substitute for , from equation (1):
* Simplify: