21. Consider a (thin) strip of area of height dy and width $\ell = 0.020$ m. The strip is located at some $0 < y < \ell$. The element of flux through the strip is

$$d\Phi_B = B\,dA = (4t^2 y)(\ell\,dy)$$

where SI units (and 2 significant figures) are understood. To find the total flux through the square loop, we integrate:

$$\Phi_B = \int d\Phi_B = \int_0^\ell \left(4t^2 y\ell\right) dy = 2t^2\ell^3 \ .$$

Thus, Faraday's law yields

$$|\mathcal{E}| = \left|\frac{d\Phi_B}{dt}\right| = 4t\ell^3 \ .$$

At $t = 2.5$ s, we find the magnitude of the induced emf is 8.0×10^{-5} V. Its "direction" (or "sense") is clockwise, by Lenz's law.