SHOW ALL WORK IN THE SPACE BELOW. NO CREDIT FOR AN ANSWER WITHOUT WORK OR AN EXPLANATION EVEN IF THE ANSWER IS CORRECT ITSELF.

A circular loop of many turns of wire, of radius 8 cm is placed in a magnetic field of 0.6 T. The field is perpendicular to the loop. While still inside the magnet, the loop is then pulled into a rectangular shape, that is 23 cm long and 2.12 cm wide, still perpendicular to the field. It takes 0.3 sec to distort the circle into the long, thin wire shape.

(A) When is emf generated in the loop? Explain.
(B) If the emf generated is 0.3 volts, how many turns of wire are there in the loop?

(A) EMF is generated when the area is changing.

\[ E = -N \frac{\Delta \Phi}{\Delta t} \]

\[ = -N \frac{\Delta AB}{\Delta t} \]

\[ = -N B \frac{\Delta A}{\Delta t} \]

\[ \Delta A = A_{\text{final}} - A_{\text{initial}} \]

\[ = (23 \text{ cm} \times 2.12 \text{ cm} - \pi \left(8 \text{ cm}\right)^2) \]

\[ = (48.76 \text{ cm}^2 - 200.96 \text{ cm}^2) \]

\[ = -152.2 \text{ cm}^2 \]

\[ = -1.5 \times 10^{-2} \text{ m}^2 \]

\[ \Delta t = 0.3 \text{ s} \]

\[ 0.3 \text{ V} = -N \frac{-1.5 \times 10^{-2} \text{ m}^2}{0.3 \text{ s}} \cdot 0.6 \text{ T} \]

\[ -N \left(-5 \times 10^{-2} \text{ m}^2/\text{s} \cdot 0.6 \text{ T}\right) \]

\[ N = \frac{0.3 \text{ V}}{3 \times 10^{-2} \text{ V}} = 100 \]

C=Q/V  C = A/ε_0d  I = ΔQ/Δt  I = V/R  P = I^2R = IV/1  R = ρL/A  V = U/Q  E = F/Q  E = ΔV/Δz  I e^- = -1.6 \times 10^{-19} C

F = qv x B  F = IΔ x B  B = μ_0/I/2π  ε = -N ΔΦ/Δt  Φ = AB  μ_0 = 4π \times 10^{-7} \text{Tm/a}