1 Ans PI1

The voltage pulse appears as an induced emf $\mathcal{E}$. This quantity is proportional to the change in magnetic flux: $\mathcal{E} = -N\frac{d\Phi_B}{dt} = \frac{d}{dt}\left(\mathbf{B}\cdot\mathbf{A}\right) = -\frac{\Delta(BA)}{\Delta t}$. In other words a large change (pulse) in the B field generates a large emf $\mathcal{E}$.

2 Ans PI2

The oscilloscope registers a nonzero voltage for the large coil, even though there is no electrical connection because of **mutual inductance**.
In particular, if two coils of wire are brought in close proximity, then a changing magnetic flux will induce a voltage $\mathcal{E}_{\text{coil B}}$.
We note that $\exists\,\mathcal{E}_{\text{coil B}} \neq 0$ only when the magnetic flux $\Phi_{\text{B, coil A}}$ is changing, ie $\frac{d\Phi_{\text{coil A}}}{dt} \neq 0$ (see answer PI1).
Since there is an induced emf in coil B, the power in coil B $P = \mathcal{E}_{\text{coil B}} \cdot R \neq 0$ is non-zero, i.e. there is **energy transfer** from coil A to another over time.

3 Ans PI3