13. (a) □ - 1 an “X” in **all** boxes

(b) □ - 1 **not graded**

Fig. 1.A

(c) □ - 1 a “•” at the origin, for y-axis

(d) applied field, by wire
- □ - 1 a “•” near center of coil
- □ - 2 a “×” inside dashed box

(e) □ - 1 **not graded**

Fig. 1.C

(f) □ - 1 a “•” for current I_W

(g) axes
- □ - 1 vertical y-axis
- □ - 2 horizontal z-axis
- □ - 3 a “×” at origin, for x-axis

(h) field line
- □ - 1 counterclockwise (or upward) arrow
- □ - 2 closed loop, around I_W

(i) **not graded**

Fig. 1.B

(j) □ - 1 counter clockwise I_C (green arrows) – one arrow is OK

(k) □ - 1 a “•” near center of coil

(l) □ - 1 a “×” near midpoint of outer-left coil edge

Fig. 1.D

(m) coil currents
- □ - 1 left wire: a “•”
- □ - 2 right wire: a “×”

(n) coil field loops
- □ - 1 left: counterclockwise around “•”
- □ - 2 right: clockwise around “×”

Solve

(o) □ - 1 $A = N\ell w$
- □ - 2 $(B_A)_i = \dfrac{\mu_0 (I_W)_i}{2\pi d}$ **note:** $\ell \neq d$, $I_W \neq I_C \neq I$

(p) □ - 1 $\theta_A = 0^\circ$
- □ - 2 $\cos\theta_A = 1$

(q) □ - 1 **not graded**
- □ - 2 **not graded**

(r) □ - 1 Faraday: $\mathcal{E}_C = \left|\dfrac{\Delta\Phi}{\Delta t}\right|$
- □ - 2 Ohm: $I_C = \dfrac{\mathcal{E}_C}{R_C}$ (no subscript “C” is OK)

(s) □ - 1 $(I_W)_f < (I_W)_i$

(t) □ - 1 $I_C = -\dfrac{\mu_0 N\ell w}{2\pi d R_C \Delta t}\left((I_W)_f - (I_W)_i\right)$
- □ - 2 **not graded**

Assess

(u) forces
- □ - 1 left edge: larger force, points left
- □ - 2 right edge: smaller force, points right
- □ - 3 an “X” for “along the negative z-axis

(v) rules of thumb
- □ - 1 $\vec{F}_{WC}$ and $\vec{B}_W$ are perpendicular.
- □ - 2 $\vec{F}_{WC}$ and I_C are perpendicular