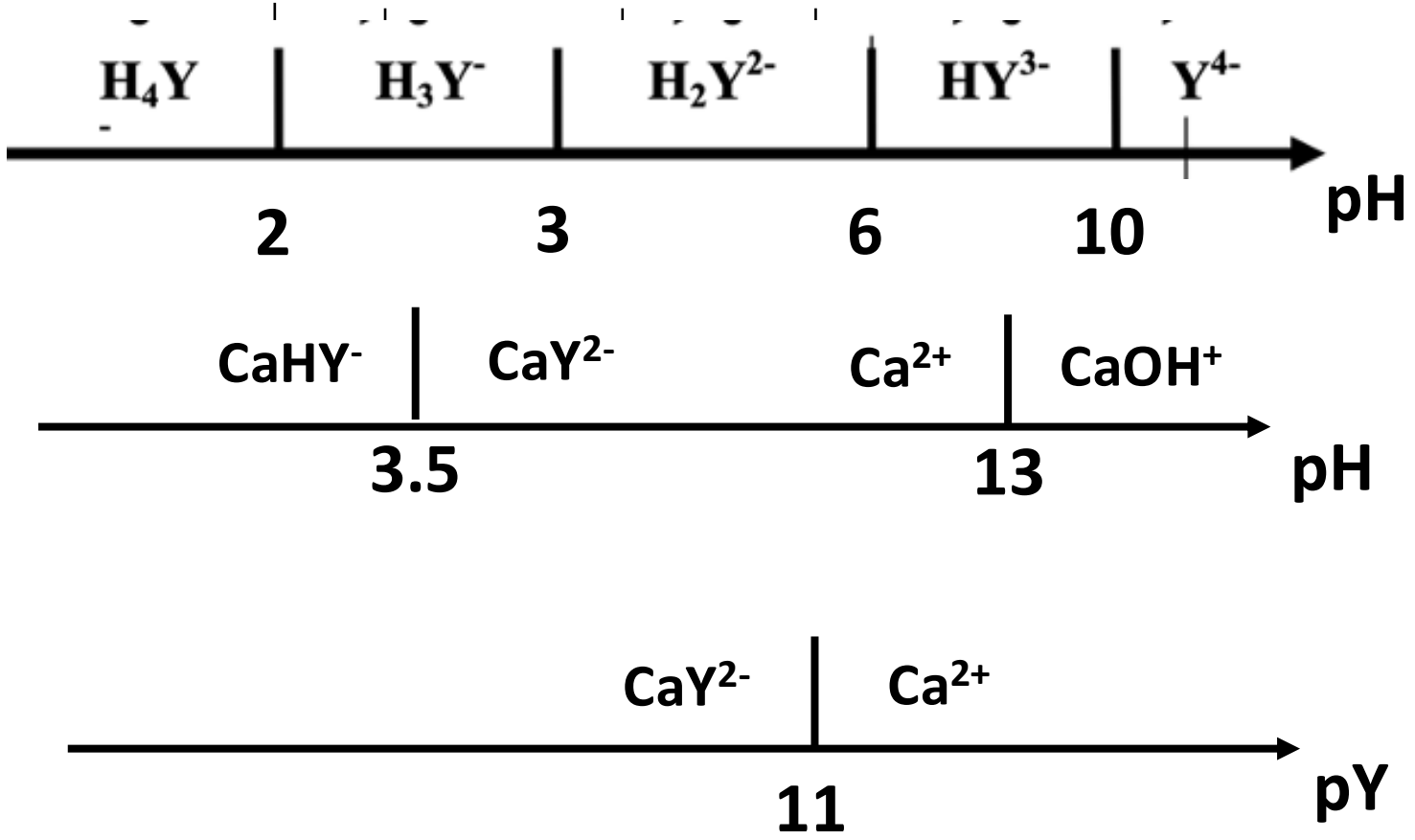
Q.A. III
DBZP
pY´= (pH)
EDTA-Ca
(trazo rápido por ZP)

Prof. Alejandro BAEZA

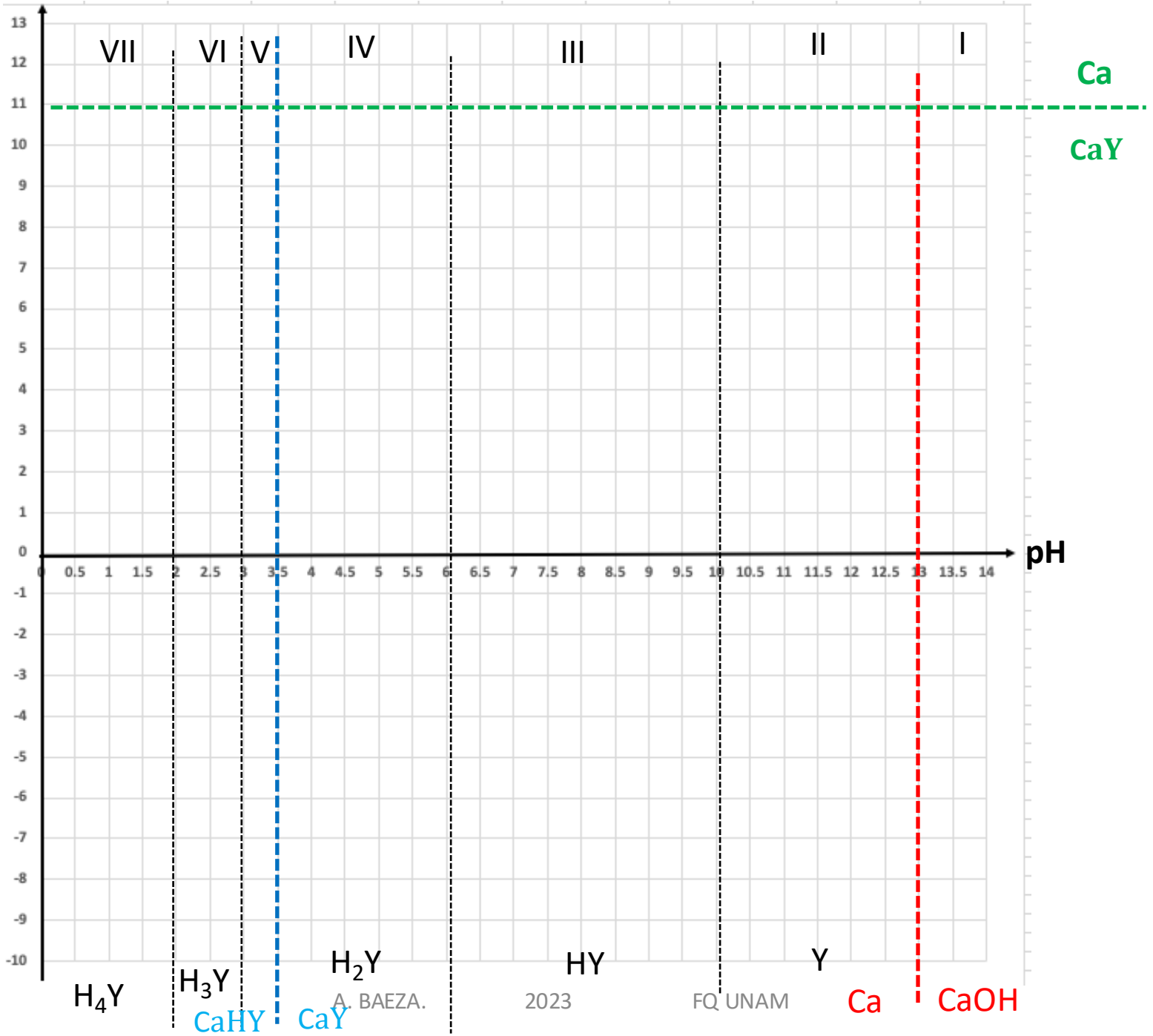
F.Q. UNAM - 2025-I

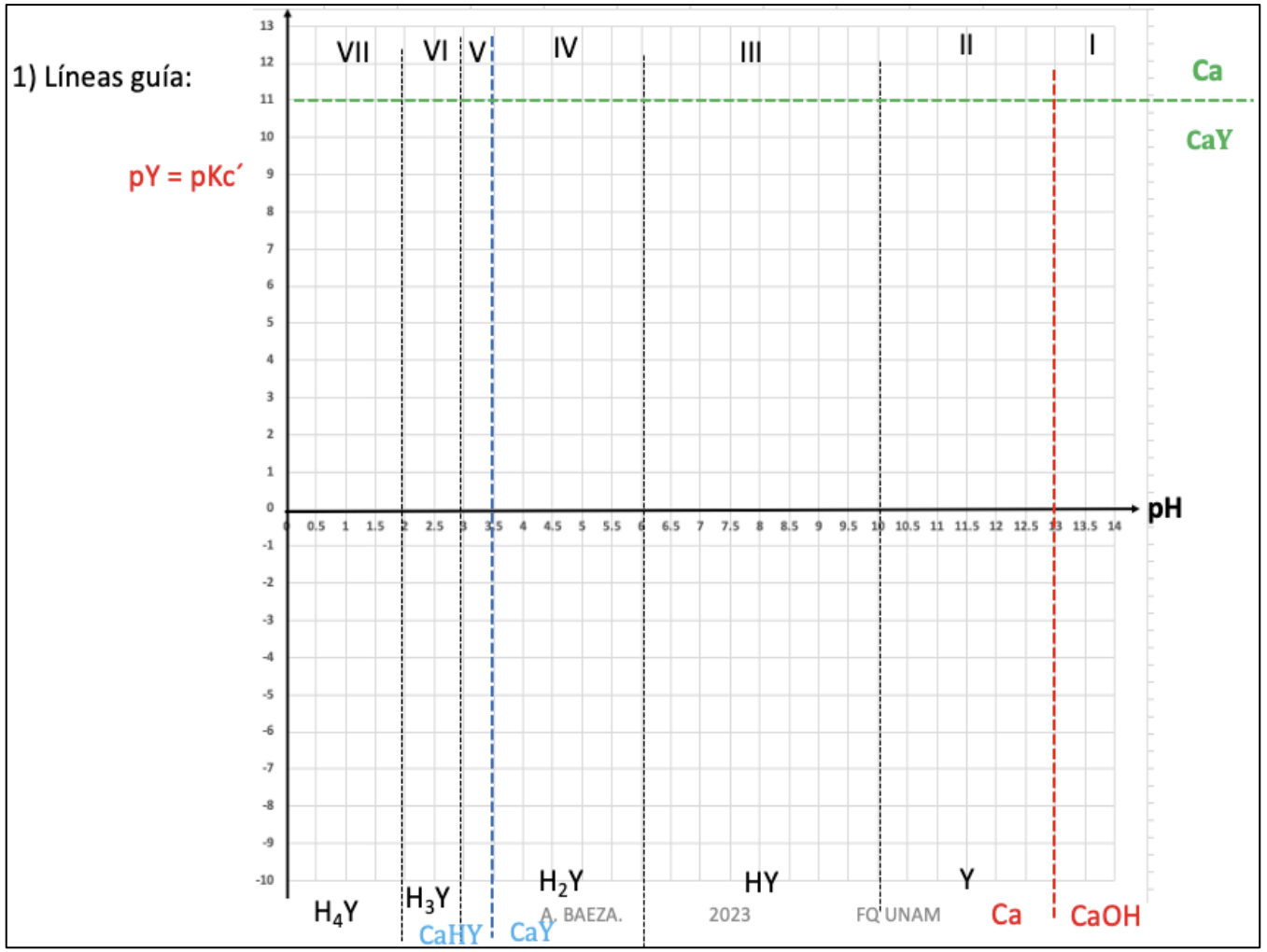
Preludio: DUZP



1) Líneas guía:

pY = pKc´





Zona I

$$CaOH^+ + Y^{4-} + H^+ \rightleftharpoons CaY^{2-} + H_2O$$

$$K = [Y^{4-}][H^+]$$

$$[Y^{4-}] = \frac{K}{[H^+]}$$

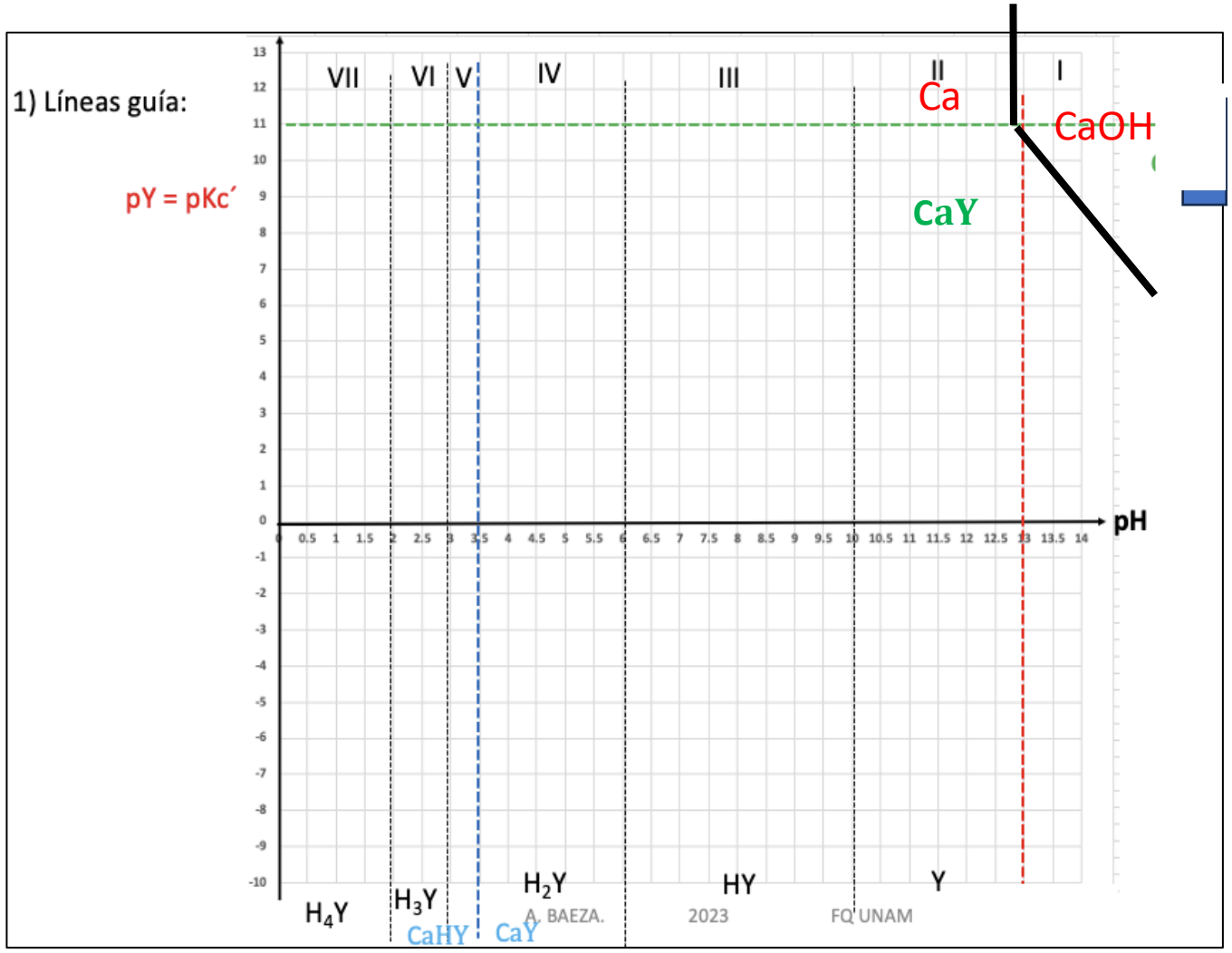
$$log\,[Y^{4-}] = \log K - \log[H^+]$$

$$-log\,[Y^{4-}] = -\log K + \log[H^+]$$

$$pY = pK + pH$$

Y : X Y : H Y=1 : H= 1 m= +1

$$CaOH^+ + Y^{4-} + H^+ \rightleftharpoons CaY^{2-} + H_2O$$



Zona I

$$CaOH^+ + Y^{4-} + H^+ \rightleftharpoons CaY^{2-} + H_2O$$

$$K = \frac{1}{[Y^{4-}][H^+]}$$

$$[Y^{4-}] = \frac{1}{K[H^+]}$$

$$log\,[Y^{4-}] = -\log K - \log[H^+]$$

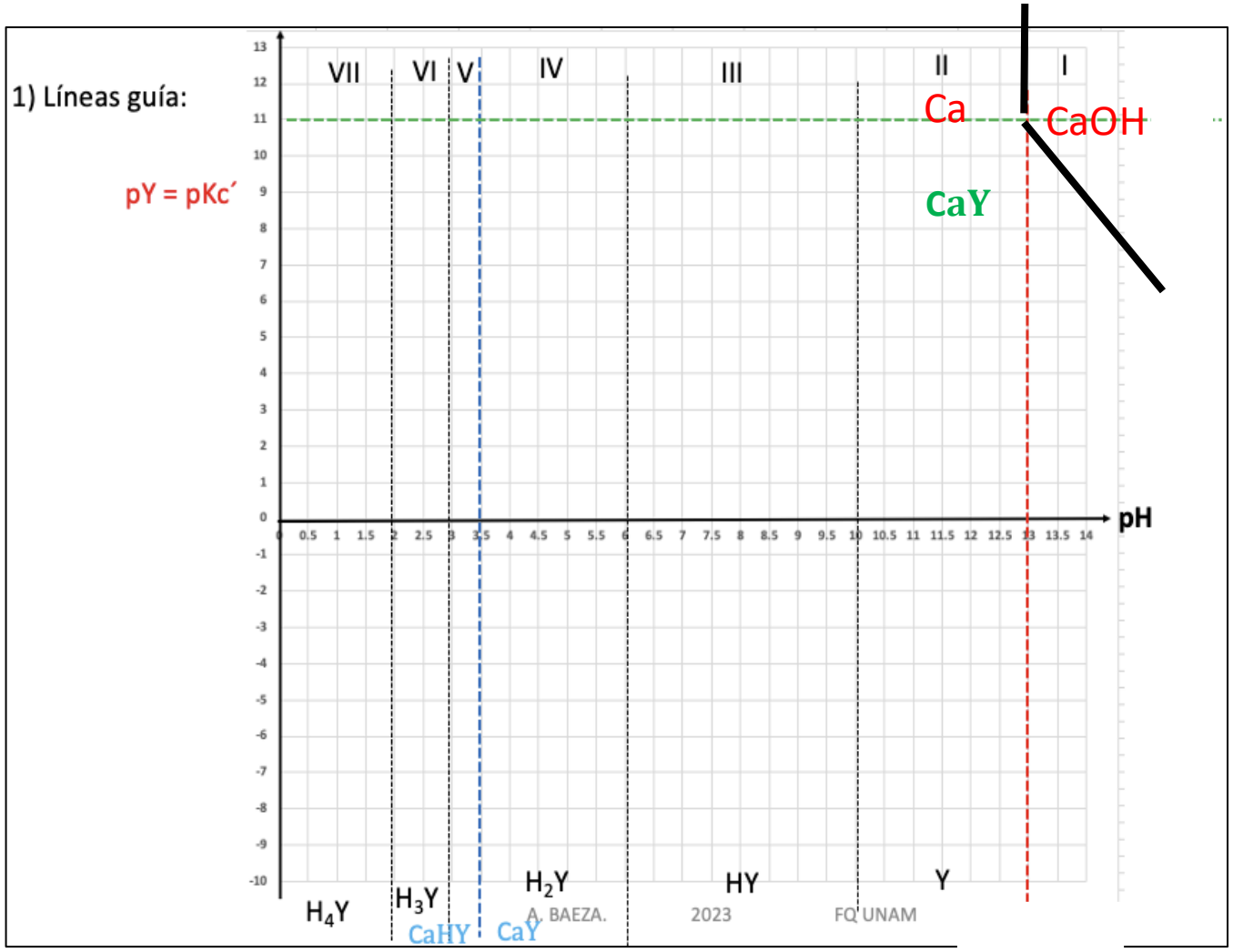
$$-log\,[Y^{4-}] = +\log K + \log[H^+]$$

$$pY = pK - pH$$

Y : X Y : H Y=1 : H= 1

m= -1

$$CaOH^+ + Y^{4-} + H^+ \rightleftharpoons CaY^{2-} + H_2O$$



Zona II

$$Ca^{2+} + Y^{4-} \rightleftharpoons CaY^{2-}$$

$$K = [Y^{4-}]$$

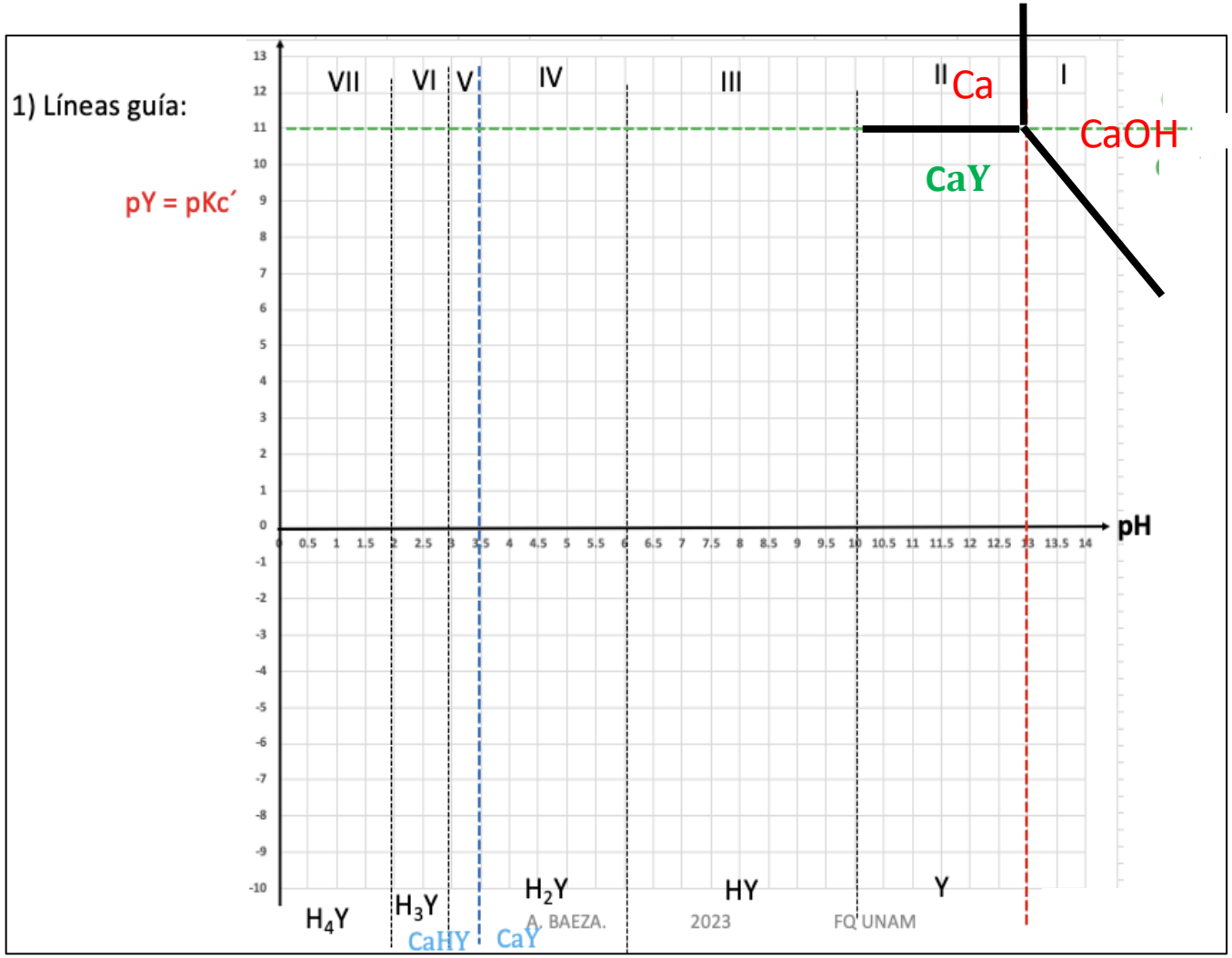
$$[Y^{4-}] = K$$

$$log\,[Y^{4-}] = \log K$$

$$-log\,[Y^{4-}] = -\log K +$$

$$pY = pK$$

Y : X Y : H Y=1 : H = 0 m= 0



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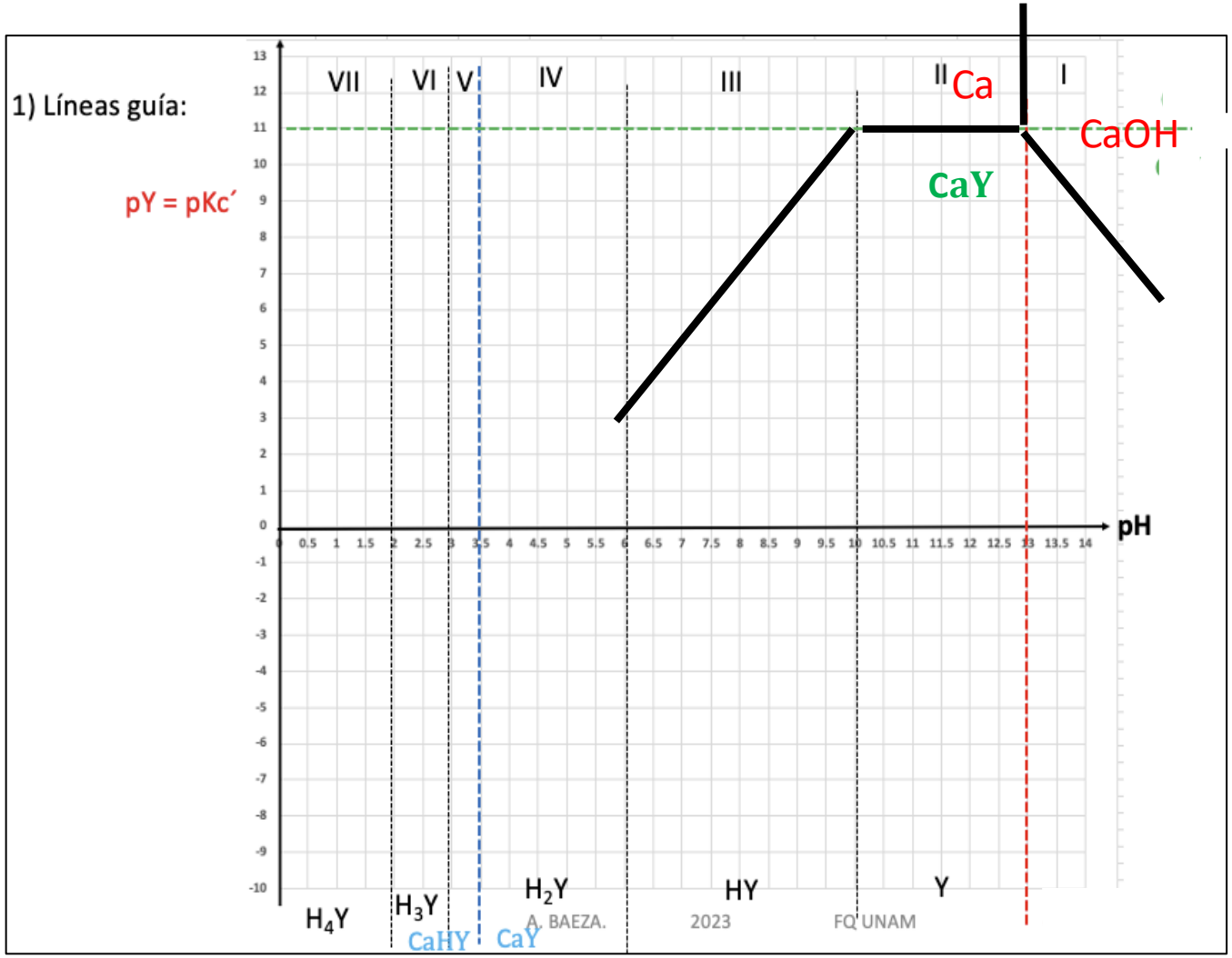
Y : X Y : H Y=1 : H = 0 m= 0



Zona III

$$Ca^{2+} + HY^{3-} \rightleftharpoons CaY^{2-} + H^+$$

$$K' = \frac{[H^+]}{[Y^{4-}]'}$$

$$[Y^{4-}]' = \frac{[H^+]}{K'}$$

$$log\,[Y^{4-}] = -\log K + log[H^+]$$

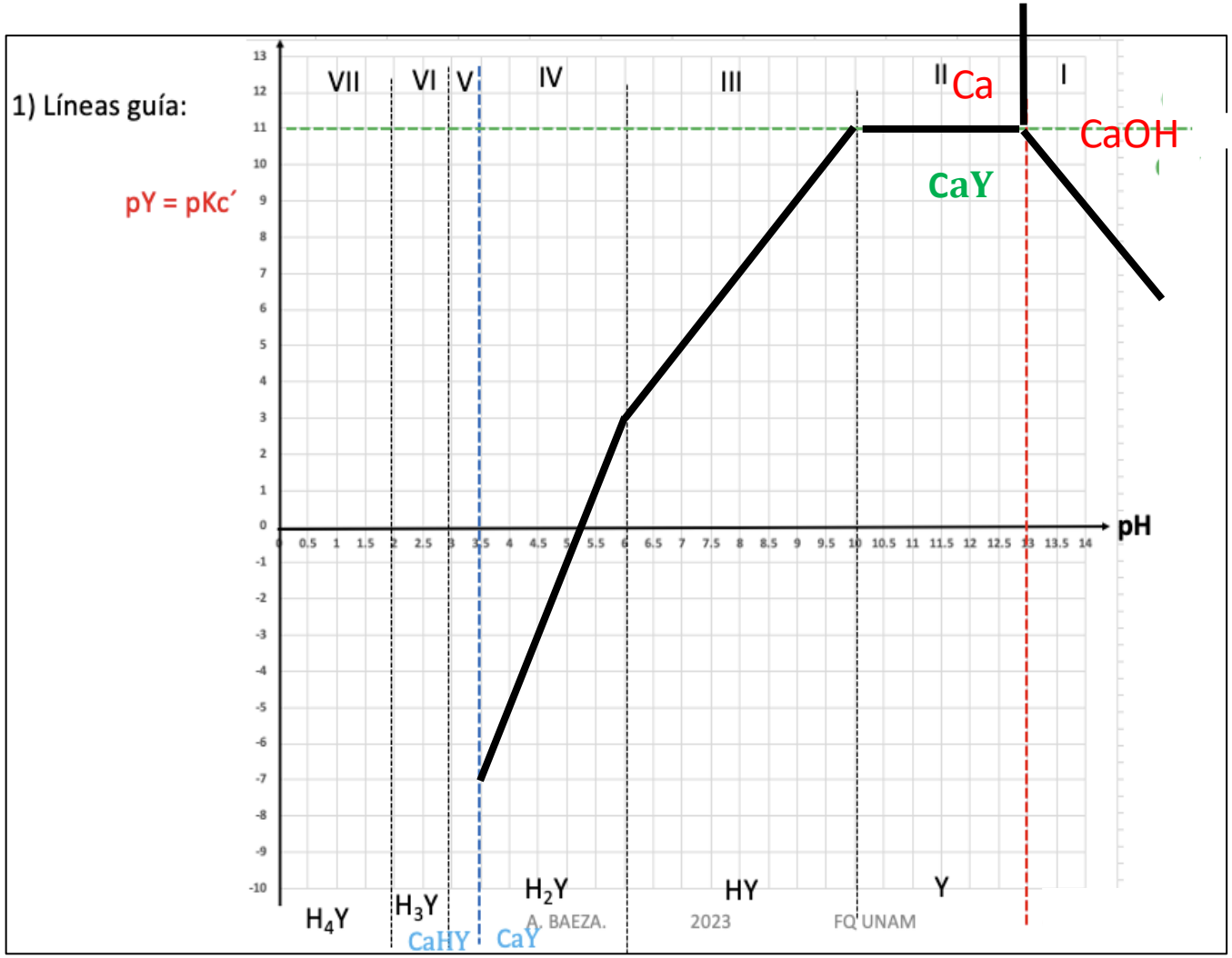
$$-log\,[Y^{4-}] = \log K - log[H^+]$$

$$pY = -pK + pH$$

Y : X Y : H Y=1 : H = 1

m= +1

$$Ca^{2+} + HY^{3-} \rightleftharpoons CaY^{2-} + H^+$$



Zona IV

$$Ca^{2+} + H_2Y^{2-} \rightleftharpoons CaY^{2-} + 2H^+$$

$$K' = \frac{[H^+]^2}{[Y^{4-}]'}$$

$$[Y^{4-}]' = \frac{[H^+]^2}{K'}$$

$$log\,[Y^{4-}] = -\log K + 2log[H^+]$$

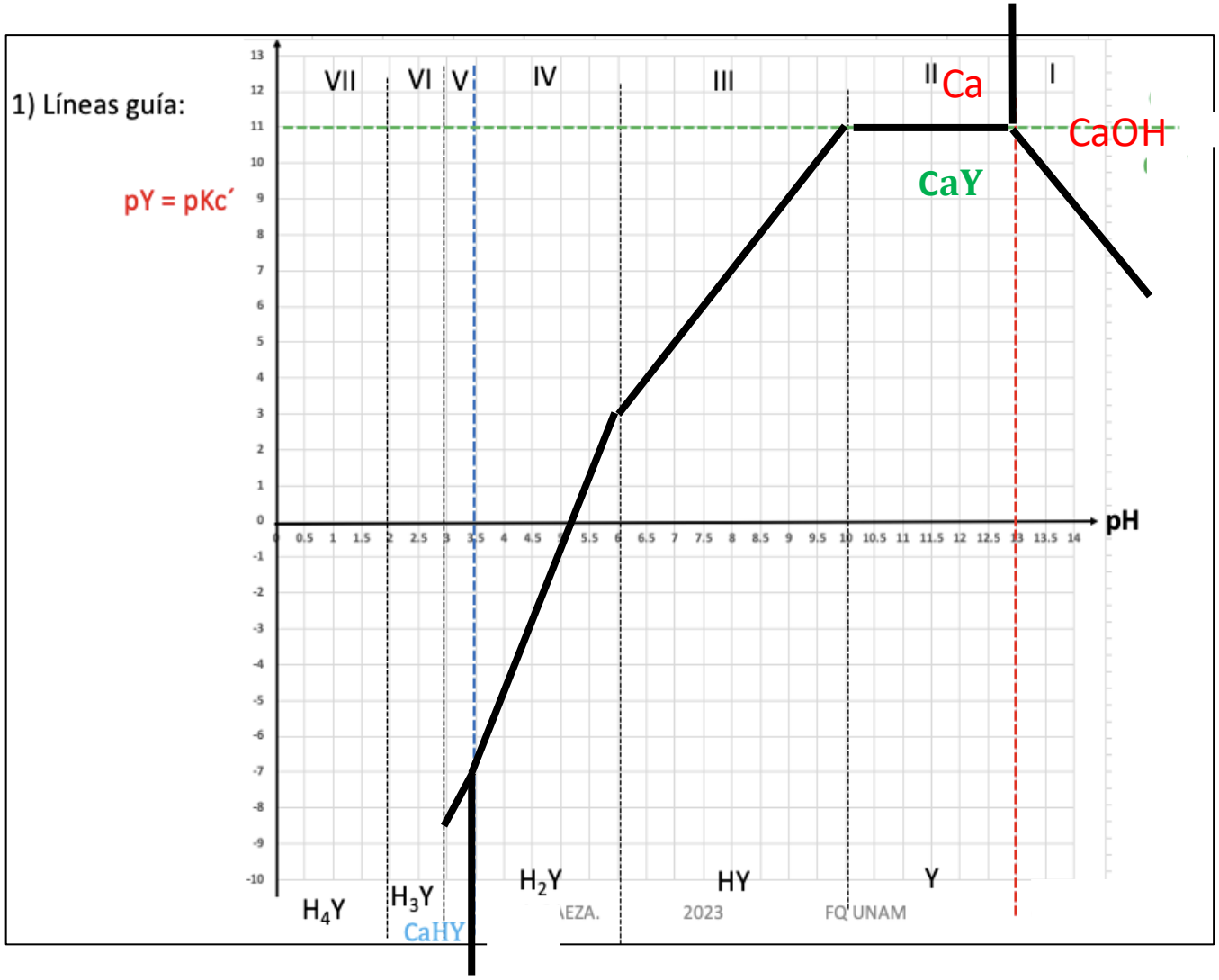
$$-log\,[Y^{4-}] = \log K - 2log[H^+]$$

$$pY = -pK + 2pH$$

Y : X Y : H Y=1 : H = 2

m= +2

$$Ca^{2+} + H_2Y^{2-} \rightleftharpoons CaY^{2-} + 2H^+$$



Zona V

$$Ca^{2+} + H_3Y^- \rightleftharpoons CaHY^- + H^+$$

$$K' = \frac{[H^+]}{[Y^{4-}]'}$$

$$[Y^{4-}]' = \frac{[H^+]}{K'}$$

$$log\,[Y^{4-}] = -\log K + log[H^+]$$

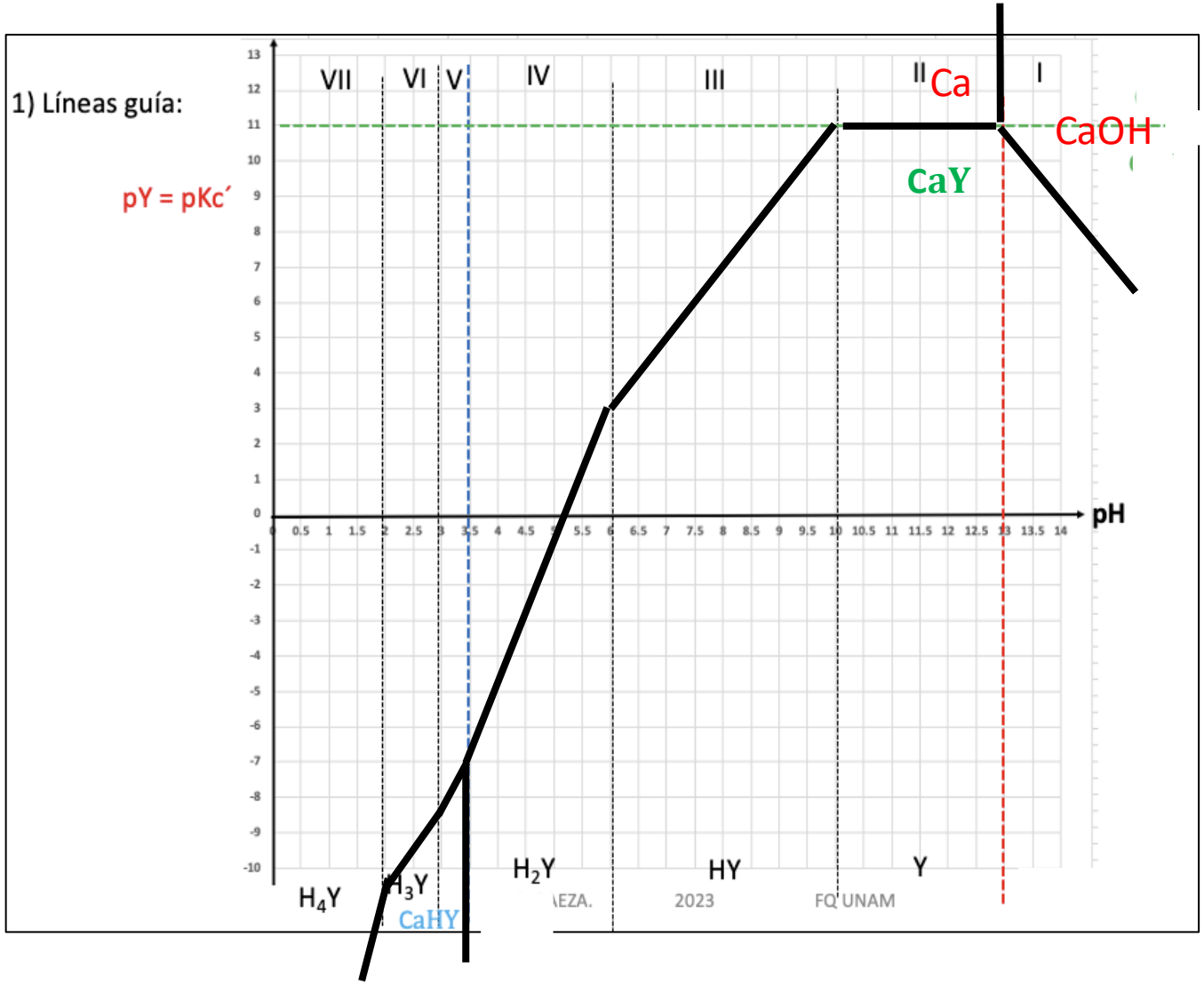
$$-log\,[Y^{4-}] = \log K - log[H^+]$$

$$pY = -pK + pH$$

Y : X Y : H Y=1 : H = 1

m= +1

$$Ca^{2+} + H_3Y^- \rightleftharpoons CaHY^- + H^+$$



Zona VII

$$Ca^{2+} + H_4Y \rightleftharpoons CaHY^{-} + 3H^{+}$$

$$K' = \frac{[H^+]^3}{[Y^{4-}]'}$$

$$[Y^{4-}]' = \frac{[H^+]^3}{K'}$$

$$log\,[Y^{4-}] = -\log K + 3log[H^+]$$

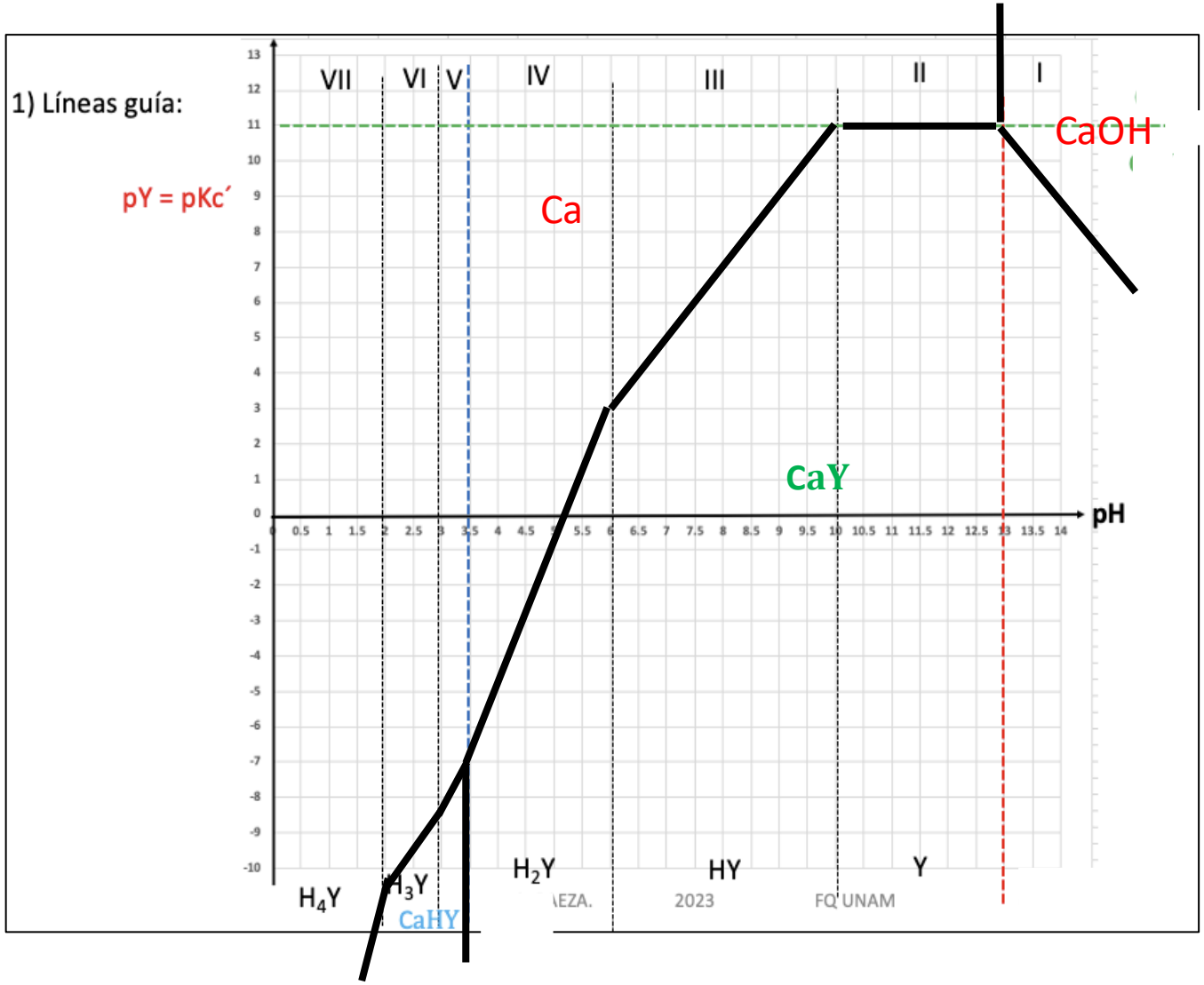
$$-log\,[Y^{4-}] = \log K - 3log[H^+]$$

$$pY = -pK + 3pH$$

Y : X Y : H Y=1 : H = 3

m= +3

$$Ca^{2+} + H_4Y \rightleftharpoons CaHY^{-} + 3H^{+}$$



Zona VII

$$Ca^{2+} + H_4Y \rightleftharpoons CaHY^{-} + 3H^{+}$$

$$K' = \frac{[H^+]^3}{[Y^{4-}]'}$$

$$[Y^{4-}]' = \frac{[H^+]^3}{K'}$$

$$log\,[Y^{4-}] = -\log K + 3log[H^+]$$

$$-log\,[Y^{4-}] = \log K - 3log[H^+]$$

$$pY = -pK + 3pH$$

Y : X Y : H Y=1 : H = 3

m= +3

$$Ca^{2+} + H_4Y \rightleftharpoons CaHY^{-} + 3H^{+}$$