To "p"

$pH = -\log [H_3O^+]$
$pOH = -\log [OH^-]$
$pK_a = -\log K_a$
$pK_b = -\log K_b$
$pK_w = -\log K_w$

# pH is pHun and other bad puns

$pH + pOH = 14$

$pK_a + pK_b = 14$

Calculations: weak acids

$K_a = [H_3O^+]^2 / [HA]$

To "un-p"

$[H_3O^+] = 10^{-pH}$
$[OH^-] = 10^{-pOH}$
$K_a = 10^{-pKa}$
$K_b = 10^{-pKb}$
$K_w = 10^{-pKw}$

$[H_3O^+][OH^-] = 1 \times 10^{-14}$

$[H_3O^+][OH^-] = K_w$

$K_a \times K_b = 1 \times 10^{-14}$

$K_a \times K_b = K_w$

Calculations: weak bases

$K_b = [OH^-]^2 / [B]$

Note:
You are not normally given $K_b$;
Instead you will get given $K_a$ or $pK_a$ of the conjugate acid.
Calculate the $K_b$ value from this!!

Kw is the ionic product for water

$2H_2O \rightleftharpoons H_3O^+ + OH^-$

Or more simply…..

$H_2O \rightleftharpoons H^+ + OH^-$

$K_w = [H_3O^+][OH^-] = 1 \times 10^{-14}$

Calculator Warning!!

Enter a number like $1.05 \times 10^{-3}$ as
1 . 0 5 EXP (-) 3

Significant figures!!

It will usually be 3 e.g. 0.0150, $2.04 \times 10^{-8}$, 4.50, 12.8 etc

Calculations:
salt solutions that affect the pH of water

make the water acidic e.g. $NH_4Cl$
$K_a = [H_3O^+]^2 / [salt]$

make the water alkaline e.g. $CH_3COONa$
$K_b = [OH^-]^2 / [salt]$