**S4 Chemistry Quiz**

1. 0.3M $H_2SO_4$
   pH = ?

2. pH of an alkali = 10.5;
   Given: $[H^+][OH^-] = 1 \times 10^{-14}$ $mol^2$ $dm^{-6}$
   $[OH^-(aq)]$ = ?

3. pH of an acid, pH = 1.5
   Given: $[H^+][OH^-] = 0.90 \times 10^{-14}$ $mol^2$ $dm^{-6}$
   $[OH^-(aq)]$ = ?

4. At T °C, $[H^+][OH^-] = 1.5 \times 10^{-14}$ $mol^2$ $dm^{-6}$
   What is the neutral pH?

**Suggested Answer**

1. $[H^+] = 2 \times 0.3 = 0.6$ M
   pH = 0.22

2. $10.5 = -\log [H^+]$
   $[H^+] = 3.16 \times 10^{-11}$
   $(3.16 \times 10^{-11})\ [OH^-] = 1 \times 10^{-14}$
   $\Rightarrow \quad [OH^-] = 3.16 \times 10^{-4}$ mol dm$^{-3}$ OR $3.16 \times 10^{-4}$ M

OR pH + pOH = 14
   $\Rightarrow$ 10.5 + pOH = 14
   $\Rightarrow$ pOH = 3.5
   $3.5 = -\log [OH^-]$
   $[OH^-] = 3.16 \times 10^{-4}$ mol dm$^{-3}$ OR $3.16 \times 10^{-4}$ M

3. $1.5 = -\log [H^+]$
   $\Rightarrow \quad [H^+] = 0.0316$
   $[H^+]\ [OH^-] = 0.90 \times 10^{-14}$
   $[OH^-] = 2.85 \times 10^{-13}$ mol dm$^{-3}$ OR $2.85 \times 10^{-13}$ M

OR $[H^+][OH^-] = 0.90 \times 10^{-14}$ mol$^2$ dm$^{-6}$
   $-\log [H^+] - \log [OH^-] = -\log (0.90 \times 10^{-14})$
   pH + pOH = 14.05
   1.5 + pOH = 14.05
   pOH = 14.05 – 1.5 = 12.55
   $[OH^-] = 2.85 \times 10^{-13}$ mol dm$^{-3}$ OR $2.85 \times 10^{-13}$ M

4. $[H^+][OH^-] = 1.5 \times 10^{-14}$ mol$^2$ dm$^{-6}$
   Neutral: $[H^+] = [OH^-]$
   $[H^+]^2 = 1.5 \times 10^{-14}$
   $-2 \log [H^+] = -\log (1.5 \times 10^{-14})$
   pH = 6.91

OR Neutral: pH = pOH
   2 pH = 13.82
   pH = 6.91