

21. If $(x - 2)^2$ is a factor of $x^3 + px + q$, find the value of p and the value of q .

$$(a+b)^2 = a^2 + 2ab + b^2 \Rightarrow (x-2)^2 = x^2 - 4x + 4$$

divide
remainder = 0

$$\begin{array}{r} x^2 - 4x + 4 \overline{) x^3 + 0x^2 + px + q} \\ \underline{+ x^3 - 4x^2 + 4x} \\ 4x^2 + (p-4)x + q \\ \underline{+ 4x^2 - 16x + 16} \\ 0x + 0 \end{array}$$

equating coefficients

$$\begin{aligned} \textcircled{1} \quad (p-4) + 16 &= 0 \\ p + 12 &= 0 \\ p &= -12 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad q - 16 &= 0 \\ q &= 16 \end{aligned}$$