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How to find constants in a polynomial given factors

If $f(x)$ is a polynomial and $f(p)=0$ then $x-p$ is a factor of $f(x)$

or

If $f(x)$ is a polynomial and $f(-q)=0$ then $x+q$ is a factor of $f(x)$

If $x^3 + 2x^2 + ax + b$ has factors $x+1$ and $x-2$. Find a and b .

Let $f(x) \equiv x^3 + 2x^2 + ax + b$

Since $x+1$ is factor

$$\therefore f(-1) = 0$$

$$\therefore (-1)^3 + 2(-1)^2 + a(-1) + b = 0$$

$$\therefore 1 - a + b = 0 \quad \textcircled{1}$$

Also since $x-2$ is a factor

$$\therefore f(2) = 0, \Rightarrow 16 + 2a + b = 0 \quad \textcircled{2}$$

$\textcircled{2} - \textcircled{1}$ gives

$$15 + 3a = 0$$

$$\therefore 3a = -15$$

$$\therefore a = -5$$

Sub. $a = -5$ into $\textcircled{1}$

$$1 + 5 + b = 0$$

$$\therefore b = -6$$

$$\therefore a = -5, \quad b = -6$$

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