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Completing the Square | Past Exam Question | C1 OCR January 2012 Q3

Given that

$$5x^2 + px - 8 = q(x-1)^2 + r$$

for all values of x , find the values of the constants p , q and r .

$$\begin{aligned} 5x^2 + px - 8 &\equiv q(x-1)^2 + r \\ &\equiv q(x-1)(x-1) + r \\ &\equiv q(x^2 - 2x + 1) + r \\ &\equiv qx^2 - 2qx + (q+r) \end{aligned}$$

\therefore Compare coefficients:

$$x^2: \quad q = 5$$

$$x: \quad p = -2q \quad \text{but } q = 5$$

$$\therefore p = -10$$

constants:

$$q+r = -8 \quad \text{but } q = 5$$

$$\therefore 5+r = -8$$

$$\therefore r = -13$$

$$\therefore p = -10, q = 5, r = -13$$

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