2008 Q8

8. Write down and simplify the general term in the expansion of \( \left(x^2 + \frac{1}{x}\right)^{10} \). Hence, or otherwise, obtain the term in \( x^{14} \).

Answer

\[
\binom{10}{r}(x^2)^{10-r}\left(\frac{1}{x}\right)^r
\]

\[
= \binom{10}{r}x^{20-3r}
\]

\[20 - 3r = 14 \implies r = 2\]

The term is \( 45x^{14} \).