Example 9 Find the middle term (terms) in the expansion of $\left(\dfrac{p}{x} + \dfrac{x}{p}\right)^9$.

Solution Since the power of binomial is odd. Therefore, we have two middle terms which are 5th and 6th terms. These are given by

$$T_5 = {}^9C_4\left(\frac{p}{x}\right)^5\left(\frac{x}{p}\right)^4 = {}^9C_4\frac{p}{x} = \frac{126p}{x}$$

and

$$T_6 = {}^9C_5\left(\frac{p}{x}\right)^4\left(\frac{x}{p}\right)^5 = {}^9C_5\frac{x}{p} = \frac{126x}{p}$$