



Binomial Theorem Ex 18.2 Q9(iii)

$$\begin{aligned}
 & x^{-15} \text{ in } \left( 3x^2 - \frac{a}{3x^3} \right)^{10} \\
 & (-1)^r {}^{10}C_r (3x^2)^{10-r} \left( \frac{a}{3x^3} \right)^r \\
 & (-1)^r {}^{10}C_r \frac{3^{10-r} a^r}{3^r} x^{20-2r-3r} \\
 \Rightarrow & x^{20-5r} = x^{-15} \\
 & 20 - 5r = -15 \\
 & 35 = 5r \\
 & r = 7 \\
 & (-1)^7 {}^{10}C_7 \frac{3^3 a^7}{3^7} \\
 & -\frac{40}{27} a^7
 \end{aligned}$$

Binomial Theorem Ex 18.2 Q9(iv)

$$\begin{aligned}
 & x^9 \text{ in expansion of } \left( x^2 - \frac{1}{3x} \right)^9 \\
 & T_n = T_{r+1} = (-1)^r {}^9C_r x^{9-r} y^r \\
 & = (-1)^r {}^9C_r (x^2)^{9-r} \left( \frac{1}{3x} \right)^r \\
 & = (-1)^r {}^9C_r x \frac{1}{3^r} x^{18-2r-r} \\
 \Rightarrow & x^{18-3r} = x^9 \\
 & 18 - 3r = 9 \\
 & 3r = 9 \\
 & r = 3 \\
 & = (-1)^3 {}^9C_3 \frac{1}{3^3} \\
 & = -\frac{9 \times 8 \times 7}{3 \times 2 \times 9 \times 3} \\
 & = \frac{-28}{9}
 \end{aligned}$$

Binomial Theorem Ex 18.2 Q9(v)

$x^m$  in expansion of  $\left(x + \frac{1}{x}\right)^n$

$$T_r = {}^nC_r x^{n-r} y^r$$

$$= {}^nC_r x^{n-r} \left(\frac{1}{x}\right)^r$$

$$x^{n-2r} = x$$

$$n - 2r = m$$

$$r = \frac{n-m}{2}$$

$${}^nC_{\frac{n-m}{2}} = \frac{n!}{\left(\frac{n-m}{2}\right)! \left(\frac{n+m}{2}\right)!}$$

Binomial Theorem Ex 18.2 Q9(vi)

$$(1-2x^3+3x^4)\left(1+\frac{1}{x}\right)^4 = (1-2x^3+3x^4) \left( {}^4C_0 + {}^4C_1 \frac{1}{x} + {}^4C_2 \left(\frac{1}{x}\right)^2 + {}^4C_3 \left(\frac{1}{x}\right)^3 + {}^4C_4 \left(\frac{1}{x}\right)^4 + \right. \\ \left. {}^4C_2 \left(\frac{1}{x}\right)^2 + {}^4C_3 \left(\frac{1}{x}\right)^3 + {}^4C_4 \left(\frac{1}{x}\right)^4 + {}^4C_3 \left(\frac{1}{x}\right)^3 + {}^4C_2 \left(\frac{1}{x}\right)^2 \right) \\ = -(2x^3) \left( {}^4C_2 \left(\frac{1}{x}\right)^2 \right) + \left( 3x^4 \times {}^4C_4 \left(\frac{1}{x}\right)^4 \right) \\ = -(56) + (210) \\ = -112 + 168 \\ = 154$$

\*\*\*\*\* END \*\*\*\*\*