Binomial Theorem Ex 18.2 Q9(vii)

$$(a-2b)^{12} = {}^{12}C_0 a^{12} - {}^{12}C_1 a^{11}(2b)^1 + {}^{12}C_2 a^{10}(2b)^2 - {}^{12}C_3 a^9(2b)^3 + \_ - {}^{12}C_7 a^5(2b)^7 + \_$$

$$= -\frac{12!}{7!5!} \times 128$$

$$= -\frac{12 \times 11 \times 10 \times 9 \times 8}{5 \times 4 \times 3 \times 2} \times 128$$

$$= -101376$$

Binomial Theorem Ex 18.2 Q9(viii)

$$(1-3x+7x^2)(1-x)^{16} = (1-3x+7x^2)\left({}^{16}C_0 - {}^{16}C_1 x + {}^{n}C_2 x^2 + \ldots\ldots + {}^{16}C_{16} x^{16}\right)$$

$\therefore$ Coefficient of x in $(1-3x+7x^2)(1-x)^{16}$

$$= 1 \times \left(-{}^{16}C_1\right) - 3 \times \left(-{}^{16}C_0\right)$$

$$= -16 - 3$$

$$= -19$$

Binomial Theorem Ex 18.2 Q10

$$T_n = T_{r+1} = {}^{n}C_r x^{n-r} y^r$$

$$= {}^{21}C_r \left(\left(\frac{x}{\sqrt{y}}\right)^{\frac{1}{3}}\right)^{21-r} \left(\left(\frac{y}{x^{\frac{1}{3}}}\right)^{\frac{1}{2}}\right)^r$$

$$= {}^{21}C_r \left(\frac{x^{7-\frac{r}{3}}}{y^{\frac{7}{2}-\frac{r}{6}}}\right) \frac{y^{\frac{r}{2}}}{x^{\frac{r}{6}}}$$

$$\frac{x^{7-\frac{r}{3}-\frac{r}{6}}}{y^{\frac{7}{2}-\frac{r}{6}-\frac{r}{2}}}$$

$$\Rightarrow \quad x^{\frac{42-2r-r}{6}} = y^{\frac{21-r-3r}{6}}$$

Since x and y have same power

$$\frac{42-3r}{6} = \frac{-(21-4r)}{6}$$

$$42+21 = 4r+3r$$

$$63 = 7r$$

$$r = 9$$

Term is 10^{th}

$$(t_n = t_{r+1})$$

Binomial Theorem Ex 18.2 Q11

$$(-1)^r \, {}^{20}C_r \left(2x^2\right)^{20-r} \left(\frac{1}{x}\right)^r$$

$$x^{40-2r} x^{-r} = x^9$$

$$40 - 3r = 9$$

$$31 = 3r$$

$$r = \frac{31}{3}$$

r can not be in fraction

$\therefore$ There is no term involving x^9.

Binomial Theorem Ex 18.2 Q12

Any term in the expansion of $\left(x^2 + \frac{1}{x}\right)^{12}$ is

$$T_N = T_{r+1} = {}^nC_r x^{n-r} y^r$$

$$= {}^{12}C_r \left(x^2\right)^{12-r} \left(\frac{1}{x}\right)^{12}$$

$$= {}^{12}C_r x^{24-2r} x^{-12}$$

$$x^{12-2r} = x^{-1}$$

$$12 - 2r = -1$$

$$2r = 13$$

$$r = \frac{13}{2}$$

r can not be a fraction, therefore there is no term in the expansion of $\left(x^2 + \frac{1}{x}\right)^{12}$ having the term x^{-1}.

*********** END **********