Binomial Theorem Ex 18.2 Q15(vi)

$$\left(3-\frac{x^3}{6}\right)^7$$

Here $n=7$, which is odd

$\therefore$ middle term is $\left(\frac{7+1}{2}\right)$ and $\left(\frac{7+1}{2}+1\right)=4^{th},5^{th}$ terms

$$T_n=T_{r+1}=(-1)^r\,{}^nC_r x^{n-r}y^r$$

$$T_4=T_{3+1}=(-1)^3\,{}^7C_3\,(3)^{7-3}\left(\frac{x^3}{6}\right)^3$$

$$=-\frac{7!}{3!4!}\times 3^4\times\frac{x^9}{6^3}$$

$$=-\frac{7\times 6\times 5}{3\times 2\times 1}\times 81\times\frac{x^9}{216}$$

$$=-\frac{105}{8}x^9$$

And

$$T_n=T_{r+1}=(-1)^r\,{}^nC_r x^{n-r}y^r$$

$$T_5=T_{4+1}=(-1)^4\,{}^7C_4\,(3)^{7-4}\left(\frac{x^3}{6}\right)^4$$

$$=\frac{7!}{4!3!}\times 3^3\times\frac{x^{12}}{6^4}$$

$$=\frac{7\times 6\times 5}{3\times 2\times 1}\times 27\times\frac{x^{12}}{1296}$$

$$=\frac{35}{48}x^{12}$$

Binomial Theorem Ex 18.2 Q15(vii)

$$\left(\frac{x}{3}+9y\right)^{10}$$

Here $n=10$, which is even, therefore it has 11 terms

$\therefore$ middle term is $\left(\frac{n}{2}+1\right)=6^{th}$ term

$$T_n=T_{r+1}=(-1)^r\,{}^nC_r x^{n-r}y^r$$

$$T_6=T_{5+1}=(-1)^5\,{}^{10}C_5\left(\frac{x}{3}\right)^{10-5}(9y)^5$$

$$=-\frac{10!}{5!5!}\times\frac{x^5}{3^5}\times 9^5\times y^5$$

$$=61236x^5y^5$$

Binomial Theorem Ex 18.2 Q15(viii)

For the given binomial expansion $n = 12$.

So middle term is $\left(\frac{12}{2}+1\right) = 7^{th}$ term.

$$T_7 = {}^{12}C_6(2ax)^{12-6}\left(-\frac{b}{x^2}\right)^6$$

$$T_7 = {}^{12}C_6(2ax)^6\left(\frac{b}{x^2}\right)^6$$

$$T_7 = {}^{12}C_6\left(2^6a^6x^6\right)\left(\frac{b^6}{x^{12}}\right)$$

$$T_7 = {}^{12}C_6\left(\frac{2^6a^6b^6}{x^6}\right)$$

Middle term is ${}^{12}C_6\left(\frac{2^6a^6b^6}{x^6}\right)$.

Binomial Theorem Ex 18.2 Q15(ix)

For the given binomial expansion $n = 9$.

So middle terms are $\left(\frac{9+1}{2}\right) = 5^{th}$ term and $\left(\frac{9+3}{2}\right) = 6^{th}$ term.

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

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

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

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

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

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

The middle terms are ${}^9C_4\left(\frac{p}{x}\right)$ and ${}^9C_5\left(\frac{x}{p}\right)$.

Binomial Theorem Ex 18.2 Q15(x)

For the given binomial expansion $n = 10$.

So middle term is $\left(\frac{10}{2}+1\right) = 6^{th}$ term.

$$T_6 = {}^{10}C_5\left(\frac{x}{a}\right)^{10-5}\left(-\frac{a}{x}\right)^5$$

$$T_6 = -\,{}^{10}C_5\left(\frac{x}{a}\right)^5\left(\frac{a}{x}\right)^5$$

$$T_6 = -\,{}^{10}C_5 = -252$$

Middle term is -252.

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